

ENVIRONMENT & ECONOMY OVERVIEW & SCRUTINY COMMITTEE

Date of Meeting	Tuesday, 6 th July 2021
Report Subject	Update on Deeside Hydrogen Hub Project
Cabinet Member	Cabinet Member for Streetscene & Transportation Cabinet Member for Streetscene
Report Author	Chief Officer (Streetscene & Transportation)
Type of Report	Operational

EXECUTIVE SUMMARY

In 2019, the North Wales Economic Ambition Board (NWEAB) commissioned consultants to consider options for the decarbonisation of passenger transport networks in North Wales, and one of the areas under consideration was Deeside Industrial Park (DIP).

Separately and, as part of the development work for the North Wales Growth Deal, Advisian / Jacobs were commissioned to consider opportunities for the development of the hydrogen economy in the region as part of the Growth Deal Smart Energy Programme. This study provided a high level review of the hydrogen energy market, developed a long list of options for hydrogen generation and use in North Wales, and led to a series of high-level concepts for hydrogen energy projects in North Wales.

One of the project concepts was a hydrogen hub in Deeside (also referred to as a hydrogen bunkering facility), which was conceived as part of the North Wales Growth Deal (signed in December 2020), as part of the region's commitment to decarbonising transport and delivering low emission transport solutions. The project is based on local generation, storage, and use of "green" hydrogen (i.e. hydrogen generated from renewable electricity via water electrolysis). The Growth Deal is for the whole North Wales region and has allocated £11.4 million to the Deeside Hydrogen Hub project and this project falls under the Smart Access to Energy programme.

Following a request by the Committee in February 2021, this report provides an update on the work carried out to date by Jacobs to develop a Strategic Business Case (SBC) for a new hydrogen hub at Deeside and seeks comments from Members.

RECOMMENDATIONS

1	That the Committee welcomes the report and supports the work carried out to date in partnership with the NWEAB to consider the options for a hydrogen energy hub in Deeside
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REPORT DETAILS

1.00	BACKGROUND
1.01	<p>In 2019, the North Wales Economic Ambition Board (NWEAB) commissioned consultants to consider options for the decarbonisation of passenger transport networks in North Wales, and one of the areas under consideration was Deeside Industrial Park (DIP).</p> <p>That initial proposal envisaged the potential use of electric or hydrogen electric buses on the Deeside shuttle service. The report concluded that the area would be suitable for a pilot project, as long as the appropriate vehicles were available.</p> <p>Separately and, as part of the development work for the North Wales Growth Deal, Advisian / Jacobs were commissioned to consider opportunities for the development of the hydrogen economy in the region as part of the Growth Deal Smart Energy Programme.</p> <p>This study provided a high level review of the hydrogen energy market, developed a long list of options for hydrogen generation and use in North Wales, and led to a series of high-level concepts for hydrogen energy projects in North Wales.</p> <p>One of the project concepts from this piece of work was a hydrogen hub in Deeside (also referred to as a hydrogen bunkering facility), which was conceived as part of the North Wales Growth Deal (signed in December 2020), as part of the region's commitment to decarbonising transport and delivering low emission transport solutions. The project is based on local generation, storage, and use of green hydrogen (i.e. hydrogen generated from renewable electricity via water electrolysis). The Growth Deal is for the whole North Wales region and has allocated £11.4 million to the Deeside Hydrogen Hub project.</p>
1.02	<p>In 2020, Jacobs completed a Strategic Assessment for Hydrogen on behalf of the NWEAB and Welsh Government's Smart Living Programme.</p> <p>The assessment created a series of high level mini business cases to further an understanding of the opportunities, and potential challenges, to developing hydrogen projects in North Wales. The opportunities identified were aligned with the North Wales social and economic context and the North Wales growth deal vision.</p> <p>The Strategic Assessment identified a significant opportunity to develop a key site for a hydrogen generation and storage facility in Flintshire, specifically at DIP.</p> <p>The Assessment determined that there is the potential to develop a demonstrator project in Deeside that links various opportunities together as a pilot project to support the use of hydrogen in the decarbonisation of transport networks. A potential early enabling opportunity for current occupiers at Deeside Industrial Park to be early adopters of a range of hydrogen fuelled vehicles was also identified.</p>

1.03	<p>The Deeside project proposes to develop a “hydrogen hub” at Deeside Industrial Park, which would utilise renewable energy to develop green hydrogen to support transport decarbonisation.</p> <p>Hydrogen Fuel Cell vehicles require a high quality of hydrogen to avoid contamination of the fuel cell and green hydrogen is ideal for this purpose. The outline of the project is that the hub would contain hydrogen generation facilities along with storage and fuelling equipment.</p> <p>A critical component of the project is to assess the potential future demand for the fuel and in particular to assess the potential market for hydrogen for fuel cell vehicles. A detailed analysis of the potential future demand has been carried out with potential users, along with discussions with vehicle manufacturers and fleet users to assess possible take up.</p>
1.04	<p>The public sector in Wales has a key role to play in showing leadership in decarbonisation efforts, for example by transitioning public sector fleets from petrol / diesel fuel to low / zero carbon and zero tailpipe emission solutions.</p> <p>There has been a strong focus on battery electric vehicles in recent years and this technology offers an excellent solution for many vehicle types and duty cycles. However, based on currently available technology pure battery electric solutions are unlikely to be able to meet the needs of all vehicles.</p> <p>Hydrogen fuel cell technology offers a promising solution for heavier vehicles and those with challenging duty cycles (e.g. high daily mileage / high daily energy demands), such as refuse collection vehicles. The availability of suitable solutions in this space is currently limited and joint procurement across multiple public bodies offers the potential to pool demands, attract vehicle suppliers, and potentially improve the commercial case for the hydrogen refuelling infrastructure required.</p>
1.05	<p>At the end of the 2021-2021 financial year, funding was made available by Welsh Government to develop a Strategic Outline Case (SOC) for developing hydrogen in the North Wales region with a focus on Flintshire for early enabling work and to further develop the SOC into an Outline Business Case (OBC). The work has progressed well, with Jacobs being appointed by Flintshire to undertake both commissions. A draft SOC has been received, and the OBC is now progressing well.</p> <p>The SOC sets out the policies and drivers for hydrogen at a UK, Welsh and local level. The local level looks at both the Flintshire County Council and North Wales Economic Ambition Board drivers. The proposals within the SOC are being developed through engagement with Flintshire County Council, the NWEAB and Welsh Government representatives.</p> <p>Within the SOC, the role for hydrogen in reducing carbon emissions is discussed in terms of heating, industry and power generation and transport, concluding that there are many opportunities to use hydrogen through fuel switching in all of these markets.</p> <p>Additionally, the current understanding about the market for hydrogen is summarised and specific supply and demand side opportunities in the North Wales and Flintshire region are addressed in the SOC.</p>

1.06	<p>Growing the demand for the hydrogen generated will be essential as part of a new ecosystem for hydrogen across the region and the economic case for using hydrogen in energy applications tends to improve with scale. A certain level of “anchor” demand for hydrogen in (high value) applications such as transport will be required for the project to proceed.</p> <p>Further generation opportunities, storage, distribution and fuelling infrastructure will be required. It will be necessary to grow demand for the fuel, especially if one of the main uses will be to support transport decarbonisation. Deeside is well placed to provide fuel to parts of the strategic transport network and to provide low carbon fuel to other commercial and business users. However, the current geographic scope of the project is limited (i.e. Flintshire) and will require a more regional approach to scale up the project and identify wider demand.</p>
1.07	<p>The emerging proposals are still at an early stage, however, with funding available through the Growth Deal it is hoped that the project can be developed through to a full business case and development funding.</p> <p>Once completed, the OBC will be the subject of a Gateway review, prior to progressing towards the development of a Full Business Case.</p> <p>Initial discussions with the Welsh Government and the UK Government have been positive to date. Further work is underway to assess whether there is support from businesses in the area to be part of the project.</p>
1.08	<p>The various potential elements of the project are set out below.</p> <p>a) Development of a Green Hydrogen Bunkering Facility - This proposal is that this would, initially, be an industrial facility located in Deeside for the production and storage of green hydrogen, from where it can be transported directly to end users. The hydrogen depot facility would be designed to be have above ground industrial scale tankage, and gantries for the discharge of products into road tankers or other vehicles (including shipping) or pipelines, alongside electrolyzers to produce hydrogen on a flexible production schedule. The site would use renewable energy where available to ensure the hydrogen produced is “green.”</p> <p>b) Passenger Transport Services – An opportunity exists to procure a number of midi-bus vehicles that would be suitable for the Deeside shuttle and other passenger transport services in north Wales. There are options to jointly procure with other areas. A further opportunity would be to assess interest from commercial bus operators serving the Deeside area and along the estuary to also convert to zero-carbon hydrogen vehicles.</p> <p>c) Public Sector Fleet – Some Local Authorities have expressed some interest in the use of hydrogen fuelled vehicles to reduce carbon emissions across their fleet. It is likely that zero-carbon vans, light and some heavy goods vehicles will be available on the market. Once again, pooled procurement is likely to be needed to ensure that order size is sufficient to generate interest from manufacturers.</p> <p>d) Heavy Goods Vehicles – The use of hydrogen in fuelling heavy goods vehicles is limited in the UK at the moment and there are few products on the marketplace. In other countries, faster progress is being made. The draft report indicates there could be an opportunity to develop a project in</p>

	<p>partnership with a manufacturer for a specific vehicle type. 18 tonne trucks are suggested. Ideally, these would best be suited to vehicle movements that are on an out and back basis, due to the need for refuelling.</p>
<p>1.09</p>	<p>Currently, there are several other hydrogen energy projects under development across the region, one of which is the HyNet North West project. The HyNet project is predicated on the production of hydrogen from natural gas integrated with carbon capture and storage infrastructure. A key proposal of the project is the creation of a new network of pipelines and infrastructure to capture, store and transport CO₂ emissions from industry and create blue hydrogen from a production plant at Stanlow in Cheshire.</p> <p>Also in development is the Holyhead Hydrogen Hub, which is being led by Menter Môn. The project, now at the technical design stage, would complement the Deeside project by helping to build a more robust and resilient hydrogen network. The project is part of the Anglesey' Energy Island programme and received a specific mention in the Budget on 3rd March 2021. £4.8m has been allocated to support the project, subject to a sufficiently robust business case being prepared. Similarly to the Deeside Hydrogen Hub project, the Holyhead project focuses on "green" hydrogen and the fact both the Holyhead and Deeside hubs would be located at the west and east extremities of the A55 means that there are opportunities for bringing the two projects together, which could present broader geographical and more inclusive outcomes for the whole region.</p> <p>Currently, the two projects in Holyhead and Deeside are running independently of each other, which risks duplication of effort, repeating mistakes, geographical pockets of development, disjointed thinking and a lack of presence on the political landscape.</p>
<p>1.10</p>	<p>Next Steps</p> <p>The draft SOC report from the consultancy work has now been received for the Deeside Hydrogen Hub and is being used to help develop an OBC for the project within the North Wales Growth Deal.</p> <p>Further discussions are also being held with Welsh Government, the Department for Business, Energy & Industrial Strategy (BEIS) and Innovate UK to gauge the level of support for an ambitious pilot project of this type. Outcomes from these discussions will be fed into the OBC.</p> <p>The rationale for developing hydrogen in Flintshire is underpinned by a number of key national, regional and local government strategic policies and drivers, in terms of economic growth, low carbon energy and transport innovation.</p> <p>However, currently, there is no joint project vision for transport hydrogen across North Wales and there is a gap in the evidence regarding what could be jointly achieved across the region; consequently, the contribution towards net zero is not known at this stage.</p> <p>It is therefore recognised that there would be some benefit in a more regional approach and further work is now required to bring the Holyhead and Deeside projects together and set out the rationale for a regional strategy on hydrogen development in North Wales, which feeds into the relevant government strategies that are being developed.</p>

	If sufficient interest existed in the area for a pooled approach to such a proposal, it is intended that we would seek to work with Welsh Government and UK Government to develop a funding proposal for such a project. This would target Innovate UK Funding and could be matched with Growth Deal and other funding.
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2.00	RESOURCE IMPLICATIONS
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2.01	<p>Revenue: there are no implications for the approved revenue budget for this service for the current financial year. However, should the projects proceed, there would be cost implications, however these will be assessed as part of the development of business cases prior to the delivery of the projects.</p> <p>Capital: there are no implications for the approved capital programme for the current financial year. This report provides an update on work that is currently underway and which is funded from existing approved budgets. Again, should the projects proceed, there would be cost implications, however these will be assessed as part of the development of business cases prior to the delivery of the projects.</p> <p>Human Resources: there are no implications for additional capacity or for any change to current workforce structures or roles. Project and programme management is being carried out within existing resources at NWEAB and the Chief Officer (Streetscene & Transportation) is acting as Senior Responsible Officer (SRO) for the Deeside Hydrogen Hub project for Flintshire.</p>
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3.00	IMPACT ASSESSMENT AND RISK MANAGEMENT
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3.01	<p>As this report provides an operational progress review, an IIA has not been produced. However, should the projects proceed, an IIA will be prepared and included with future reports.</p> <p>An assessment of risks will be undertaken as part of the development of the OBC and FBC and a risk and mitigation plan will be produced should the projects go ahead.</p>
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4.00	CONSULTATIONS REQUIRED/CARRIED OUT
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4.01	Cabinet Member (Streetscene & Transportation)
4.03	Further project consultation will be undertaken where appropriate at the relevant project development stage.

5.00	APPENDICES
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5.01	None
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6.00	LIST OF ACCESSIBLE BACKGROUND DOCUMENTS
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6.01	None

7.00	CONTACT OFFICER DETAILS
7.01	<p>Contact Officer: Katie Wilby, Chief Officer (Streetscene & Transportation) Telephone: 01352 704530 E-mail: katie.wilby@flintshire.gov.uk</p>

8.00	GLOSSARY OF TERMS These are provided corporately on the Infonet (link) and maintained by the Executive Office
8.01	<p>North Wales Economic Ambition Board (NWEAB) = The NWEAB is a partnership comprised of the 6 local authorities in the North of Wales: Flintshire, Isle of Anglesey, Conwy, Denbighshire, Gwynedd, and Wrexham. Alongside the local authorities, the NWEAB has partnered with the region’s Higher and Further educational institutes. Currently, the NWEAB is the governance body for the North Wales Growth Deal (NWGD). The growth deal will play a key role in delivering the economic vision adopted by the Board in the “<i>A Growth Vision for the Economy of North Wales</i>” strategy document.</p> <p>SOC = Strategic Outline Case (SOC) = The SOC comprises the strategic, economic, financial, commercial and management cases and forms Stage One of the WeITAG Stages</p> <p>Outline Business Case (OBC) = The OBC examines in greater detail the short list of options for tackling the problem under consideration and forms Stage Two of the WeITAG.</p> <p>Final Business Case (FBC) = The FBC forms Stage Three of the WeITAG appraisal process and its purpose is to make a full and detailed assessment of the preferred option to inform a decision as to whether or not to proceed to implementation.</p> <p>WeITAG is the Welsh Transport Appraisal Guidance, which is a framework for thinking about proposed changes to the transport system. It contains best practice for the development, appraisal and evaluation of proposed transport interventions in Wales. It has been developed by the Welsh Government to ensure that public funds are invested in a way that ensures they maximise contribution to the well-being of Wales, as set out in the Well-being of Future Generations (Wales) Act 2015 and to deliver the Act’s vision of the Wales we want: a more prosperous Wales, a resilient Wales, which supports healthy, functioning ecosystems and recognises the limits of the global environment, a healthier Wales, a more equal Wales, a Wales of more cohesive communities, a Wales of vibrant culture and a globally responsible Wales.</p> <p>Types of Hydrogen: Hydrogen can be produced through a range of processes that can be categorised according to the energy source and hence the scale of CO₂ emissions they generate.</p>

Below are the types of hydrogen that can be produced: -

- **Green:** Produced using renewable electricity (e.g., solar, wind, with very low or no CO₂ emissions), from water by electrolysis.
- **Blue:** Produced in combination with carbon capture, utilization and storage (CCUS), typically using natural gas or biomass (thus with very low or no CO₂ emissions). Grey or Brown hydrogen listed below becomes Blue when linked with CCUS.
- **Grey:** Produced by steam methane reforming without CCUS, using natural gas Grey hydrogen produces a more CO₂ than burning methane due to efficiency losses, and
- Hydrogen produced as a by-product of manufacturing processes may also be referred to as grey hydrogen because of the source of energy used to produce it.
- **Pink:** Generated through high temperature electrolysis by nuclear energy.
- **Brown:** Produced through the gasification of coal and not a process used in the UK and with the most environmental impact.