Hydrogen in Wales: A pathway and next steps for developing the hydrogen energy sector in Wales

Questions

Strategic Vision

1 Public and private sector representatives are developing a hydrogen pathway for Wales based on evidence that hydrogen will be required to play a part in the future energy mix if we are to meet our climate change aspirations.

Do you agree this activity is needed to ensure Wales is well positioned to take advantage of potential opportunities arising from use of hydrogen? If not, why? Do you have any evidence to support these views?

We do. It is clear that for particular regions and sectors use of hydrogen may help to achieve full decarbonisation in the medium to long-term. In our view, wherever possible processes should be electrified using electricity generated by renewable means with hydrogen being employed in those cases where this is not possible. There are two reasons for this – firstly to decarbonise as swiftly as possible, and secondly because alternative low carbon fuel sources from renewable sources, such as green hydrogen, are likely to be scarce until closer to 2050. In terms of the sectors which look likely to benefit most from hydrogen deployment this will primarily include heavy transportation and hard-to-decarbonise industrial processes. Both of these broad areas will present difficulties and heavy industry will be a particular challenge for Wales given our higher share of industrial emissions compared to the UK average. Many of these emissions come from a handful of high-emitting industrial clusters such as Port Talbot steelworks and hydrocarbon refining sites on the Milford Haven waterway. Decarbonising these sites with the help of green hydrogen should be an ambition of the Welsh Government's approach to a hydrogen economy. The specific regions which will be most likely to see hydrogen used more widely are those situated proximate to hydrogen production

facilities and with relatively small populations where residential heating could be provided by hydrogen if electrification is difficult. It is important to note that this will be a marginal use of hydrogen under virtually all realistic decarbonisation scenarios[1] provided by the Climate Change Committee[2], Energy Systems Catapult[3], National Grid ESO[4], and others. This initial pathway sees only a minimal role for hydrogen in heating.

To position Wales to seize the specific opportunities hydrogen production and usage will present action should be taken now to ensure the skills and expertise are in place for this to happen. We welcome the focus in objective 8 around supporting industrial decarbonisation in Wales through developing the required skills and training and facilitating research and development for hydrogen fuel switching of industrial appliances and particularly support the creation of a dedicated centre of excellence.

2 Why are you supportive/not supportive of Wales pursuing hydrogen opportunities?

If supportive, what actions can you / your organization, take to contribute towards the development of the hydrogen sector in Wales (and under what conditions)?

We are supportive of Wales pursuing specific hydrogen opportunities as part of a broader decarbonisation strategy because we recognise the necessity of using hydrogen in particular circumstances and can see that Wales is well-placed to become an early mover in hydrogen generated using the abundant renewable resource that we have in Wales, helping to avoid energy imports. Hydrogen generated using fossil fuels should be avoided, even if this is intended to be coupled with carbon capture use and storage technologies as these technologies remain at an early stage of development and are unlikely to ever be

[1] www.carbonbrief.org/in-depth-qa-does-the-world-need-hydrogen-to-solve-climate-change

[2] Climate Change Committee in their most recent advice to both the UK and Welsh Governments.

[3] es.catapult.org.uk/reports/innovating-to-net-zero/

[4] National Grid ESOs 2020 Future Energy Scenarios.

able to remove all emissions[5] and store them safely. To help make a success of our move towards net zero we need to be avoiding the combustion of fossil fuels wherever possible.

Energy Saving Trust is an independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy to address the climate emergency. Our work focuses on reaching net zero targets by encouraging and taking action to reduce energy consumption, installing new infrastructure and accelerating a move to sustainable, low carbon lifestyles. A trusted, independent voice, we have over 25 years' sectoral experience. We provide leadership and expertise to deliver the benefits of achieving carbon reduction targets. We empower householders to make better choices, deliver transformative programmes for governments, including the Welsh Government through the delivery of the Nest programme as part of the wider Warm Homes Programme and by leading a consortium, along with the Carbon Trust, which delivers the Welsh Government Energy Service, and support businesses and community groups with strategy, research and assurance –enabling everyone to play their part in building a sustainable future. We are actively engaged in Wales' transition to net zero and take a keen interest in policy discussions geared towards this end.

3 Do you have any evidence on the best sources of energy for low carbon / renewable hydrogen production? Should Wales seek to generate hydrogen within the country or seek import opportunities, or pursue both options?

It is our firmly held view that as we position Wales to play a role in a decarbonised future that includes a role for hydrogen in specific circumstances there is little value in investing in modes of production that will increase carbon emissions and will rapidly become redundant

[5] The Energy Systems Catapult net-zero report states that while "speculative innovation measures" that result in carbon capture of up to 99% would make blue hydrogen "highly appealing", anything less effective should not be considered: "Without speculative innovation measures, methane reforming at a 95% capture rate is too high carbon to meet net-zero.". Even at 100% CCUS effectiveness emissions from blue hydrogen would still occur through upstream leakage as illustrated in a report which accounts for these leakages, by the Pembina Institute thinktank.

once renewable methods of generating hydrogen are commonplace[6]. For this reason, we believe that Wales should seek to position itself as a producer of green hydrogen produced from renewable-powered electrolysis and avoid costly and high-emitting imports of hydrogen. Avoiding unnecessary imports will mean being selective about which uses for hydrogen are developed and supported. Electrification should be the priority with any gaps left as a result of economic or technical infeasibility being filled by hydrogen.

In terms of the ideal renewable sources of electricity, offshore and onshore wind and marine renewables appear to be the most promising in the Welsh context with there being scope to use hydrogen electrolysis as a form of storage onshore with this green hydrogen then deployed across Wales and exported elsewhere.

4 In your view, does the proposed hydrogen pathway complement on-going and planned hydrogen initiatives across the UK? What other actions should be considered in the hydrogen pathway that would further distinguish Wales, or support other UK activities? Do you have any evidence to support these views which you can share?

We think that a missed opportunity within the hydrogen pathway is the lack of a strong commitment to work with existing industries to explore the potential for hydrogen decarbonisation to help create a viable market for domestically-produced hydrogen. We recognise that this is identified as a medium-term objective but a number of industrial sectors are already taking an interest in the potential for hydrogen to help them decarbonise operations and it would be best to work collaboratively with industry on a joint scoping and R&D exercise at the earliest stage possible. An obvious example is Port Talbot steel works. The production of steel presents particular challenges when it comes to cutting emissions but despite this four of the five largest steel producers in the world have announced 2050 carbon neutrality targets. All five of these producers are working on hydrogen steelmaking techniques. The

[6] Wood Mackenzie recently published analysis on the future for green hydrogen predicting that it would be cost-competitive by 2030 in certain markets with a strong pipeline of projects and significant global interest.

first hydrogen pilot plants are already running and large demonstration plants are planned for the near future in Europe and China.

Hydrogen Pathway Scope

5 Are there other areas where you believe hydrogen and fuel cell technologies have a role to play in Wales in the short term (period to 2025)?

It is our view that the future role for hydrogen in personal vehicle transport and smaller commercial transport will be minimal with the vast majority of these vehicles being replaced by electrified vehicles or public transport. For this reason we think that the pathway laid out in this consultation could be rebalanced to focus more on heavier commercial vehicles, such as large freight lorries, and positioning Wales to use green hydrogen to decarbonise industrial processes. It is our view that vehicles should only be powered by hydrogen when necessary. Large vans used by tradespeople do not need to be powered by hydrogen – electrification will work perfectly well for these vehicles. For this reason we question the arguments made around objective 2 regarding the creation of an early market for fuel cell vehicles and in particular the following section: "the rollout of a fleet of vehicles in the order of 300 fuel cell vans or 150 fuel cell trucks in Wales will be possible". We would welcome clarity on how a 'van' is defined as we see little value in creating a fleet of smaller vans better suited to electrification when there are other vehicle types and sectors which could also create demand for hydrogen. Likewise, the future role of hydrogen produced through grey or blue processes should be minimal if we are to successfully meet our net zero commitment[7]. For this reason it is our view that the pathway should seek to position Wales to capitalise on the opportunities offered by green hydrogen production and use.

[7] In their analysis of the 2018 Clean Planet for All proposals the European Commission stated: "In the decarbonised future, hydrogen obtained from electrolysis using decarbonised electricity is the preferable option, including 'green' hydrogen obtained from renewables.".

6 Do you believe the pathway strikes the right balance between being ambitious yet proposing actions which can be delivered?

Yes, it is welcome to see the Welsh Government thinking positively about the opportunities new green technologies offer and seeking to position Wales to capitalise on these.

As we have made clear elsewhere in our response it is our view that the priority must be supplying and using green hydrogen produced using renewable-powered electrolysis. For this reason we believe that the commitment to "establish at least one renewable hydrogen production site 10+ MW by 2023/24" could be made more ambitious, especially given that the 200 hydrogen buses planned in the pathway alone will likely require more than the c.4,000 kg H2/day produced by a 10 MW renewable electrolyser. It appears to be the case that 10 MW of renewable generation will not be adequate to meet the demand created by the other priorities in this pathway. As far as possible we think that locally supplied green hydrogen capacity should increase in lockstep with new demand.

We welcome the Welsh Government's commitment to finding place-based solutions as we recognise that there will be regions in Wales which are better suited to utilising hydrogen than others (eg they are sparsely populated but have significant renewable generation potential). Being aware of these possibilities and supporting the development of local approaches is a sensible and proactive means of allowing an efficient transition to net zero. In general, wider outreach to the general public should be encouraged. Transitioning to net zero will be disruptive and will only be possible with the 'buy-in' of the public, they should feel engaged in the process in their local area. This commitment to proactive engagement could be strengthened in the pathway given its importance.

Hydrogen Pathway Delivery

7 In addition to the points set out in the objectives, are there any other "no regrets" actions that you believe Welsh Government / industry should take

in the short term to develop the hydrogen sector in Wales? Do you have evidence you can share in support of that view?

As discussed in our response to question 4 we believe that a more explicit commitment to working collaboratively with large industrial sites and firms in Wales on pilot projects would be a no regrets action and would signal to the hydrogen production projects currently at development stage that there is a viable market to access once they are able to produce hydrogen.

8 What are the key barriers, risks and challenges to realise the opportunities described? In your view, what measures would help to overcome these and what are the key enabling factors?

We think that a key risk in the adoption of hydrogen is infrastructural lock-in where we invest heavily in technologies that rapidly become obsolete and create stranded assets or throw up barriers to full decarbonisation. For this reason it is our view that the Welsh Government should be cautious in pursuing or supporting hydrogen production that uses fossil fuels as either the feedstock or energy source. Imports of hydrogen produced through these processes should also be viewed with caution. It is our view that there is little reason that Wales' future hydrogen needs couldn't be met through green hydrogen produced in Wales or the UK. Achieving this will likely require UK and Welsh Government, and industry, commitment and investment but the fact this Hydrogen in Wales pathway is considering these issues and we are expecting a UK hydrogen strategy imminently shows that there is an appetite in Cardiff and Westminster to work towards making the most of the opportunity green hydrogen presents.

Welsh Language Considerations

9 We would like to know your views on the effects that 'Hydrogen in Wales' and the next steps for developing the hydrogen energy sector in Wales would have on the Welsh language, specifically on opportunities for

people to use Welsh and on treating the Welsh language no less favourably than English. What effects do you think there would be? How could positive effects be increased, or negative effects be mitigated?

10 Please also explain how you believe the proposed opportunities could be formulated or changed so as to have positive effects or increased positive effects on opportunities for people to use the Welsh language and on treating the Welsh language no less favourably than the English language, and no adverse effects on opportunities for people to use the Welsh language.

Summary

11 If you have any related comments which we have not specifically addressed in this consultation, please respond under question 11, supported by any relevant evidence.

We would welcome greater clarity on the proposed role of integrators and vehicle retrofit as it is not clear whether retrofitted vehicles would still be able to operate using their original diesel and petrol engines as

well as hydrogen. We do not support the conversion and modification of existing vehicle powertrains to hydrogen dual-fuel (where hydrogen is combusted in a diesel engine) if this allows diesel to continue to be burnt in smaller vehicles that could just as easily be electrified (or be powered entirely by hydrogen). We want to halt as rapidly as possible the combustion of fossil fuels to allow us to reach our climate targets. However, conversions to increase the range of battery electric vehicles may be worthwhile in certain circumstances.

We support an assessment being undertaken of which public sector vehicles a retrofit approach may be suitable for but this should be undertaken with stringent criteria set with the true cost of a hydrogen conversion (in terms of realistic carbon emissions) considered as part of the assessment.