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Via email: decarbonisationmailbox@gov.wales

For the Attention of Smart Living
Climate Change Division
Welsh Government
Cathays Park
Cardiff
CF10 3NQ

Consultation Ref: WG41823

Response to Welsh Government Consultation – Hydrogen in Wales

Dear Sirs,

UKPIA represents the eight main oil refining and marketing companies operating in the UK. The UKPIA member companies – bp, Essar, Esso Petroleum, Petrolneos, Phillips 66, Prax Refining, Shell and Valero – are together responsible for the sourcing and supply of product meeting over 85% of UK inland demand, accounting for a third of total primary UK energy¹.

The refining and downstream oil sector currently lies at the centre of the Welsh and broader UK economy. It provides a secure supply of affordable energy for road and rail transport, aviation and marine applications, as well as for commercial and domestic heating. It also supplies feedstocks for the petrochemicals sector, along with specialised non-energy products such as lubricants, bitumen for use in road surfacing, and graphite for use in electric vehicle batteries and as electrodes in steel and aluminium manufacture.

The sector, therefore, has an opportunity to be at the heart of an orderly and just transition to a Net-Zero economy. By reinventing itself, using its extensive resources to decarbonise its activities and products, the sector has an important role also in future supply of new energy carriers and technologies such as hydrogen, energy storage and carbon capture, utilisation and storage.

¹ [BEIS Digest of UK Energy Statistics \(DUKES\) 2019 Tables 3.2-3.4.](#)

UKPIA welcomes the opportunity to respond to the consultation on the hydrogen pathway and next steps for developing the hydrogen energy sector in Wales. Our responses to the questions posed in the consultation document are given in Attachment 1.

Yours faithfully,

A handwritten signature in black ink that reads "Andrew Roberts". The signature is written in a cursive, slightly slanted style.

Dr Andrew Roberts
Director – Downstream Policy

cc: Michael Duggan BEIS
Simon Stoddart BEIS
Mike Mackay BEIS

Attachment 1

UKPIA Response to Welsh Government Consultation – Hydrogen in Wales

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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?

UKPIA agree that hydrogen will play an important role in the future energy mix for Wales and the wider UK to meet our Net-Zero climate change aspirations. This has been recognised in the Committee on Climate Change (CCC) Sixth Carbon Budget report², which identifies an opportunity for scale up of low-carbon hydrogen production to 90 TWh by 2035 under their “Balanced Pathway” scenario. The hydrogen produced could be used in applications that are more difficult to decarbonise and less suited to electrification, particularly shipping and industrial heat and to provide flexibility to deal with intermittency in the power system. The CCC also states that hydrogen may have a material longer-term role in space heating for buildings transport, such as heavy goods vehicles (HGVs).

Other well-regarded Net-Zero scenarios, such as the Energy Systems Catapult “Clockwork” and “Patchwork” scenarios³ present an alternative perspective with greater potential for hydrogen, with up to 250 TWh required by 2050 to meet demand from industry, space heating, flexible power generation, HGVs and shipping. These differences in the anticipated role of hydrogen in the energy mix highlight the importance of a systems approach in pathway development and the need for a number of different scenarios and pathways, such that the role of different energy vectors and their interdependence can be better understood.

It is important that the Welsh Government assess the future role for hydrogen in the energy mix and support and enable early project development to realise the decarbonisation potential available early in the transition to Net-Zero. Wales is well-positioned to take advantage of offshore wind and other renewable electricity generation in green hydrogen production, in particular, to decarbonise public transport

² Committee on Climate Change, [The Sixth Carbon Budget: The UK's path to Net Zero](#), December 2020.

³ Energy Systems Catapult, [Innovating to Net Zero: UK Net Zero Report](#), March 2020.

in rural areas as an alternative to battery-powered buses and trains on non-electrified routes or to produce low carbon liquid fuels (LCLFs) for use in the current vehicle fleet.

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)?

UKPIA fully supports the interests of the Welsh Government in pursuing opportunities for hydrogen production and use where this complements or enables implementation of projects under broader UK Government policy initiatives (see also response to Question 4).

Over recent months, UKPIA has engaged with the Hydrogen Advisory Council and its sub-groups, seeking to highlight the UK refining and downstream oil industry as a significant actor in the UK's hydrogen economy. We have also published two recent reports reviewing the future role of the sector: "[Transition, Transformation, and Innovation: Our role in the Net-Zero Challenge](#)" (the TTI Report), published in October 2020; and more recently, the role of hydrogen as a transport energy vector has been assessed in the report "[The Future of Mobility in the UK](#)" published in March 2021.

As identified in the TTI Report, the refining and downstream sector is already a major hydrogen producer, producing around 800 tons/day (44 MMcfd) for own use, with plans to increase this via low carbon projects such as HyNet in the North West and Gigastack in the Humber region.

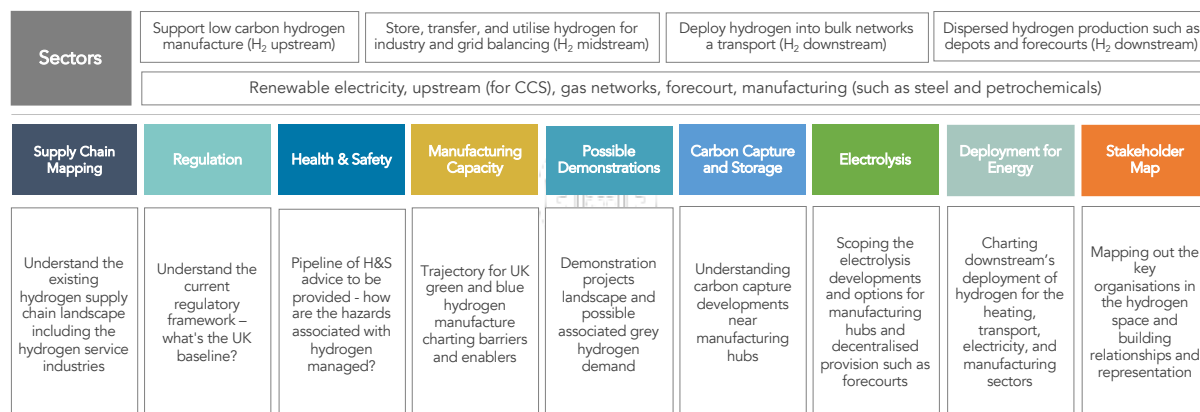
The main points regarding refinery hydrogen production and use are as follows:

- Around 47% of the hydrogen produced is obtained as a by-product from catalytic reforming processes and is produced with negligible associated CO₂ emissions.
- Around 31% is produced using steam or autothermal reforming, leading to CO₂ emissions of around 900 ktpa, although here there is potential for use of carbon capture to abate these emissions, as will be demonstrated by the HyNet project.
- Refinery hydrogen demand is increasing as biomass and waste-derived materials are used to reduce the carbon footprint of fuels such as petrol and diesel; this leads to opportunities for decarbonising refinery hydrogen production using additional low carbon production such as that planned under the HyNet and Gigastack projects.
- The main use of hydrogen - nearly 75% - is for hydrotreatment of various streams to improve product quality and performance, but the balance is used as a component of refinery fuel gas used to fire furnaces and boilers providing heat for refinery processes. The HyNet project aims to use refinery fuel gas as the hydrogen source, with the hydrogen produced used to decarbonize firing of combustion units at the Essar Stanlow refinery.
- The sector is also involved in the development of hydrogen filling stations for road transport, using on-site hydrogen production using electrolysis.

Refineries such as the Valero Pembroke refinery are therefore in a position to act as an anchor for hydrogen projects and to form a hub for cluster-based projects. They also have many years' experience in managing large scale engineering and construction projects and health and safety aspects of hydrogen production. To build on this experience and to develop input for hydrogen policy development, UKPIA has

formed an industry-led Hydrogen Committee focussed on a broad range of topics (Diagram 1).

Diagram 1. Scope of UKPIA Hydrogen Committee activities



As regards the development of the hydrogen sector, in the absence of a sustainable and supportive business environment with a clear demand profile, it will be difficult to realise the potential for hydrogen in the energy transition. The same is also true to support transformation of the refining and downstream oil sector to protect both current levels of employment and investment and the additional investment required to achieve this transformation, in particular as the sector seeks to recover from impacts caused by the COVID-19 pandemic and reduced levels of demand, continued low margins and increasing costs (for example, ETS and electricity).

Many of the policies shaping the business environment are the responsibility of the UK Government (for example, taxation, carbon pricing and support for major infrastructure projects), but there remains an important role for the Welsh Government and its agencies to play in facilitating rapid development of the hydrogen sector, for example, in planning policy and regulation, environmental permitting and in providing support for local initiatives, many of which have been highlighted in the consultation document under the recommended actions and objectives.

Government support in development of large-scale hydrogen production (using steam reforming and CCS or electrolysis using renewable electricity) and use (such as hydrogen injected into gas networks and industrial use) will be essential. Support provided to date via the BEIS Energy Innovation Programme has proved successful in bringing forward the HyNet and Gigastack projects⁴. Further support provided under the £20m Industrial Fuel Switching competition initiated in November 2018 has provided funding to stimulate early investment in fuel switching processes and technologies, including a hydrogen-fired refinery CHP⁵.

Further support will be required for implementation of these and similar large-scale projects, including the 10 MW hydrogen production facility proposed by the Welsh

⁴ Under the Clean Growth Strategy, the Government established the BEIS Energy innovation Programme, with a budget of £505 million from 2015-2021, with a further commitment made in the March 2020 Budget to at least double the size to £1 billion. Two funding competitions have been held under this Programme for hydrogen supply and use projects; Phase 1 funded 13 [feasibility studies](#), including the Gigastack (£500k) and HyNet (£498k) projects. Phase 2 provided funding for 5 [demonstration projects](#), again including the Gigastack (£7.5m) and HyNet (£7.48m) projects.

⁵ The £20m Industrial Fuel Switching competition was initiated in November 2018 and allocated funding to stimulate early investment in fuel switching processes and technologies. In Phase 2, 7 [feasibility studies](#) were funded looking into developing technologies at TRL 4 to 7 to enable the use of a low carbon fuel for a particular industrial process or across an entire site. A FEED study for a hydrogen-fired refinery CHP was included under the [HyNet Industrial Fuel Switching project](#) (£299k). Phase 3 is funding 4 demonstration projects, including project design for a hydrogen-fired refinery CHP at Essar Stanlow under the HyNet North West project (£5.24m).

Government. UKPIA and its member companies are currently engaged with BEIS on the development of business models to support CCUS and hydrogen products via the BEIS Industrial CCUS Expert Group and the BEIS Hydrogen Advisory Council Working Group on business models, where it is understood that new policies for support of CCUS and hydrogen production from the £240m Net-Zero Hydrogen Fund, announced in the UK Government's Ten Point Plan for a Green Industrial Revolution, will be subject to consultation later this year.

Through our engagement with BEIS, UKPIA has raised concerns about the interaction between the proposed CCUS business model and the UK ETS, where for installations receiving a free allowance allocation, the current approach proposes forfeit allocated free allowances in proportion to the tonnage of CO₂ captured. UKPIA have agreed to work with BEIS on development of refinery examples to show possible impacts undermining carbon leakage protection provided by the allocation of free allowances. This provides an example of potential contributions from UKPIA in engagement with the Welsh Government on development of the hydrogen sector and policy measures to support investment.

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?

UKPIA believe that scale up of low carbon/renewable hydrogen production will initially be achieved through a combination of hub or cluster-based large-scale production (such as that envisaged under the HyNet and Gigastack projects), with smaller dispersed local hydrogen production using on-site electrolysis. For large-scale projects producing hydrogen for industrial use or injection into the gas networks, the best options appear to be direct connection to renewable energy sources such as offshore wind, although a back-up electricity supply would be required due to the intermittency associated with some forms of renewable electricity. Here again, it will be important to consider the interaction between different policy areas and regulatory regimes, in particular, any changes proposed under the Ofgem [Reform of network access and forward-looking charges](#) and [Targeted Charging Review: Significant Code Review](#).

For smaller scale dispersed hydrogen production, grid-sourced electricity is likely to be a more resilient supply, although steps will be required to ensure the additional electricity required is matched by increased renewable electricity generation elsewhere if the hydrogen produced is to be regarded as low carbon. UKPIA note this topic is currently under consultation as part of the Department for Transport consultation "[Targeting net zero – Next Steps for the Renewable Transport Fuels Obligation](#)".

UKPIA believe that local hydrogen production for local use will be required in Wales in the early stages in development of the hydrogen market, simply because we understand that import and export is currently unproven at any significant scale. However, should the latter options become available (in particular bearing in mind the hazards associated with hydrogen transport and handling), Wales and Welsh industry should be ready to take advantage of these opportunities to improve flexibility and resilience.

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?

As set out in the response to Questions 2 and 3, the proposed hydrogen pathway and any local policy development undertaken by the Welsh Government must be complementary to ongoing and planned initiatives across the UK. The Welsh Government and its agencies have the potential to act as enablers and facilitators in the implementation of many of the objectives identified, even where funding may be allocated from wider UK Government funds. There is an opportunity here to distinguish Wales from other UK regions in provided greater agility in decisions that are the responsibility of the Welsh Government, local authorities and the Welsh regulators and to foster a proactive, positive approach across a wide range of stakeholders in achieving the objectives identified.

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)?

The short-term role of hydrogen and fuel cell technologies in transport applications has been covered adequately in the proposed hydrogen pathway. However, the role of hydrogen in decarbonisation of industrial heat and in decarbonisation of gas networks supplying gas for domestic, commercial and industrial heating should also be recognised, although these potential uses may be dependent on broader UK Government policy measures and regulatory regimes.

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

UKPIA believe the proposed pathway provides an appropriate level of ambition, whilst proposing actions which can be delivered. Implementation of some of the larger projects identified will clearly be dependent on broader UK Government funding initiatives. However, the Welsh Government should also ensure that such broader UK policy initiatives take into account any special considerations associated with project implemented in Wales and use its influence to ensure that interaction between different policy areas and regulatory regimes are properly considered to avoid unintended consequences, as identified in the response to Question 3.

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?

See response to Question 5.

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?

As identified in the response to Question 2, there are a number of key challenges, barriers and risks associated with delivery of the objectives identified under the hydrogen pathway. Foremost is the need to ensure an enduring and supportive business environment, to encourage investment, in particular as many sectors seek to

recover from impacts caused by the COVID-19 pandemic. Other factors include the following:

- The risk of policy uncertainty – this is mitigated by the strong cross-party commitment to Net-Zero.
- The dependence on central government funding and competition from projects in other regions outside Wales. This could be mitigated against by ring fencing a portion of the funds for Wales, as has been achieved by the Scottish Government under the Industrial Energy Transformation Fund (IETF).
- Risks associated with changes in Ofgem regulation of electricity transmission and distribution and regulation gas networks.
- Limited supply of renewable electricity and access to CO₂ storage to facilitate production of low carbon hydrogen.

As also noted in the response to Question 2, many of the policies shaping the business environment are the responsibility of the UK Government (for example, taxation, carbon pricing and support for major infrastructure projects), but there remains an important role for the Welsh Government and its agencies to play in facilitating rapid development of the hydrogen sector in bringing greater agility in decisions that are the responsibility of the Welsh Government, local authorities and the Welsh regulators for example, in planning policy and regulation and environmental permitting.

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?**

UKPIA has no response to this Question.

- 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.**

UKPIA has no response to this question.

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.**

UKPIA has no further comments or evidence at this stage.

Responses to consultations are likely to be made public, on the internet or in a report. If you would prefer your response to remain anonymous, please put a cross here:

UKPIA is happy for these responses to be made public.