Ceres Power – Supplementary written evidence (BAT0048)

Letter from Dr Mark Selby FREng, Chief Technology Officer at Ceres Power following an evidence session on Tuesday 27 April.

Further to my appearance in front of your Committee on 27 April 2021, as part of the *Role of batteries and fuel cells in achieving Net Zero* inquiry, I am writing with further thoughts for your Committee's consideration as part of its inquiry.

During the inquiry many witnesses have focused on applications of fuel cells and batteries in transport. Whilst the issues and opportunities in this segment are familiar given its long history, the emergent view of Hydrogen is one where its role in transport is relatively marginal (or least limited to heavy transport) but its role as a wider decarbonisation technology is central to the decarbonising the so-called hard to abate sectors. This is vital for understanding the role of fuel cells in the UK, both as a producer of Hydrogen through electrolysis, and as a user of Hydrogen to produce power.

Hydrogen is a System Technology and needs clear policy in all areas. The associated technologies related to production, storage, logistics and consumption together represent a broad technical solution to the hardest to decarbonise sectors and therefore a rich commercial opportunity for the UK as no one country has dominance. To fully exploit both the practical solutions offered in the UK energy system and attract foreign investment to the UK solving global problems requires a comprehensive approach in Technology Development and Deployment.

The application of hydrogen to climate change and net zero is most predictable and represents the largest impact and opportunity in the following areas:

- Decarbonisation of steel production – hydrogen as a chemical alternative to "coking coal" represents around 50% of the final energy demand of the sector and is already at parity with other decarbonisation technologies in this sector.
- Methanol and other High Value Chemicals - used as intermediates to produce plastics.
- Ammonia – currently, ammonia is used almost exclusively to produce fertilisers but is likely to be a key technology to decarbonise heavy shipping.
- Hydrogen for production of other synthetic fuels(eg e-Kerosene) – represents both a bridging technology to avoid stranding existing aviation assets and potentially a long term solution to decarbonising aviation.

Together, these four sectors represent gigatons of global carbon dioxide emissions and represent well over 400 million tonnes of hydrogen production in

a 2050 context; almost 10 times the size of the market for hydrogen for light duty vehicles[1]. Together, these markets represent somewhere between 40 to 50% of the global hydrogen economy in 2050. This alone generates a hydrogen economy of sufficient scale that costs come down, technology is commoditised, and hydrogen becomes attractive other value chains as a result.

Despite the evidence submitted to the committee that UK does not have a particular leadership position in the relatively small automotive Fuel Cell sector, Ceres would argue that the UK has a current globally recognised pedigree and the opportunity to excel in three broad areas of the Hydrogen Technology ecosystem – core hydrogen technologies, hydrogen production products (eg electrolyser systems), and green hydrogen as a commodity.

The UK's innovation infrastructure including academics, universities, start-ups, scale-ups and SMEs, including licensing businesses like Ceres, are widely recognised globally as leading actors in the effort to mitigate climate change and this can be seen in the resultant inward investment. Examples of policy support that would allow the UK to further deepen this competence and bridge the gap from academia to industry include the establishment of an equivalent to the Faraday Institution for fuel cell and hydrogen technology to support research; and an equivalent to the Advanced Propulsion Centre to support development, deployment and commercialisation of fuel cell and hydrogen technologies focused on non-transport applications. More generally, these initiatives would position the UK as a leading country in the global skills agenda for electrochemical technologies furthering the prospects for growth and inward investment.

The UK has a small number of companies that are globally recognised for their hydrogen production technologies. Policy could further securing their progress by supporting investment in the UK both in the manufacturing and other supply chain aspects and creating demand through government procurement such as for refuelling equipment for government vehicle fleets.

The UK also has a very competitive renewables position with regard to offshore wind, making it logical that we should also produce 'green' hydrogen locally, decarbonising UK industry in plastics, agrochemicals and steel. Furthermore, the production of hydrogen for export also represent a significant opportunity. Finally, the UK has a historic pedigree in nuclear technology that can be linked to high temperature electrolysis where the UK does have a globally leading technology company in Ceres.

Whilst the UK government has created a number of helpful and necessary initiatives to deploy existing technologies at scale and pace over the next

[1] Making the Hydrogen Economy Possible: Accelerating Clean Hydrogen in an Electrified Economy, April 2021

decade, the major acceleration of deployment of hydrogen will occur globally in the period 2030-2040 in most projections. Today's programmes will need to be substantially built on if we are to ensure that hydrogen, fuel cell, and other technologies which can decarbonise hard to abate industrial sectors are commercially ready by the 2030s – and represent a substantive commercial opportunity in a global market. Without expanded support for this innovation and the associated scale up, we risk the realisation in 2030 that the technologies needed to achieve deep industrial decarbonisation are not ready for deployment.

It is likely that the hard to decarbonise sectors such as steel, chemicals and heavy transport will represent the largest commercial opportunity, and Government should consider support for start-ups and scale-ups, through a mixture of mandates, carbon taxes, tax credits, and other funding support to accelerate deployment of decarbonisation technology across the respective value chains.

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