



All Party Parliamentary Group on Hydrogen, Non-Verbatim Minutes – the role of hydrogen in powering industry

DATE: Tuesday 23 March 2021

TIME: 11:15-12:00

METHOD: Zoom Meeting

CHAIR: Jacob Young MP for Redcar and Chair of the APPG on Hydrogen

SPEAKERS: Dan Arnold, Head of Hydrogen for Industry, Department for Business, Energy and Industrial Strategy
Rebecca Rosling, Head of Smart Customers, Research and Development at EDF
Andrew Marsh, Corporate Affairs Business Partner for Gas Transmission at National Grid
Chris Gent, Policy Manager at Carbon Capture and Storage Association

MINUTES

Jacob Young, MP for Redcar and Chair of the APPG on Hydrogen

Jacob Young welcomed parliamentarians and wider stakeholders to the meeting. He informed those attending the meeting that the Group had just held its AGM and noted that the Hydrogen APPG is one of the most popular APPG's and that the Group is privileged to have a fantastic set of Officers supporting hydrogen in Parliament. He added the Group is also privileged to have great sponsors and highlighted them in alphabetical order: Baxi, Bosch, Cadent, EDF, Equinor, Energy and Utilities Alliance, Johnson Matthey, National Grid, Northern Gas Networks, SGN, and Shell.

Jacob outlined that this meeting would consider the role and potential of hydrogen in powering industry and examine how the Government can work with industry to progress the role of hydrogen in powering industry. He noted the importance of this meeting's theme as industry is the second most polluting sector in the UK after transport, accounting for 21% of the UK's total carbon emissions. He added that the session was a precursor to the Group's inquiry on the role of hydrogen in powering industry.

He then introduced the first speaker, Dan Arnold, Head of Hydrogen for Industry, Department for Business, Energy and Industrial Strategy

Dan Arnold, Head of Hydrogen for Industry, Department for Business, Energy and Industrial Strategy

Dan said that it was a pleasure to update everyone attending the meeting on the work that the Government is doing on hydrogen, and he welcomed the launch of the APPG on Hydrogen's inquiry into the role of hydrogen in powering industry. He said his team's work is about unlocking the potential for low carbon hydrogen to help decarbonise industry by enabling its uptake, either as a fuel or a feedstock source. He noted the Prime Minister's Ten Point Plan and the Energy White Paper, which confirmed that for the UK to reach net zero emissions by 2050, hydrogen will play an important role in decarbonising hard to abate sectors, such as industry. Underpinning this he said is the development of the UK's first Hydrogen Strategy, which he noted is well underway and will be published in the second quarter of this year.



He stated that the Hydrogen Strategy will detail the key steps needed in the 2020s to deliver the UK's ambition for five gigawatts of low carbon hydrogen capacity by 2030 and will set the context for further scale up on the way to net zero. He said that this will provide a clear long-term signal to investors that the Government is committed to building the UK's hydrogen economy and set out in detail on how the Government will work with industry to achieve this.

Dan noted that the Hydrogen Strategy will follow on from the Industrial Decarbonisation Strategy, which he said is the first strategy published by a major economy which sets out how industry can decarbonise in line with net zero, while remaining competitive, and without pushing emissions abroad. He stated that as the Government set out in the strategy, the expectation is that emissions will need to reduce by at least two-thirds by 2035 and by at least 90% by 2050. To help achieve this, switching from fossil fuel use in industry to low carbon fuels will be essential, so by 2030, the Government expect that 20-terawatt hours per year of fossil fuel use will be replaced with low carbon alternatives, which includes hydrogen, electrification and bio energy. He said that this is the equivalent of about one and a half million households switching their gas use to clean fuels.

He said his team see the short-term, low regret opportunities for hydrogen conversion including steam boilers and combined heat and power processes in sectors such as chemicals refineries. He added that hydrogen is also the most promising option for decarbonising high temperature direct firing processes and is supporting innovation and testing to bring high temperature hydrogen technologies to maturity and commercial readiness. As well as establishing a fuel switching policy framework to unlock investment in the technologies that need to decarbonise, he said the Government is committed to using carbon pricing as a tool to send a clear market signal. He noted that this will provide certainty on net zero ambition for industrial sectors.

Dan added that the Government are also putting in place funding mechanisms to support CCUS and low carbon, hydrogen infrastructure, noting that £170 million was awarded recently to nine projects within five industrial cluster regions, as part of the second phase of the industrial decarbonisation challenge, which will support the deployment of CCS and hydrogen projects that can help decarbonise industrial clusters.

He stated that there will be much further support to kickstart the hydrogen economy, mentioning that the Ten Point Plan confirmed that a £240 million net zero hydrogen fund will provide capital co-investment for early hydrogen production projects, with more details on this to be published later this year. He said that his team are developing business models for the revenue support side, that will aim to overcome the cost gap between low carbon hydrogen, and higher carbon fuels such as natural gas. He stated that the Government is committed to a consultation on the preferred low carbon hydrogen model in the second quarter, with a final model to be agreed in 2022. Alongside this, they are considering the role that fuel standards can play in helping industry invest in low carbon alternatives. He said that the Government is gathering evidence on the emissions associated with different hydrogen production technologies and will work with industry to develop a UK standard that defines low carbon hydrogen, and that there will be a lot more on this issue in the Hydrogen Strategy.

Dan concluded by saying that 2021 promises to be a very exciting year for hydrogen in the UK, including its role in powering industry, and looks forward to engaging with the APPG on Hydrogen's inquiry and reading its findings in the final report.

Jacob Young thanked Dan for his presentation and stated from his perspective and the APPG on Hydrogen's that they appreciate the Department for Business, Energy and Industrial Strategy's (BEIS) approach so far in not backing a winner in terms of blue or green hydrogen, and that they have adopted a dual approach, which he said the Group thinks is the right approach.



Dan Arnold replied and said that BEIS are firmly committed to the twin track approach of deploying both blue and green hydrogen.

Andrew Marsh, Corporate Affairs Business Partner for Gas Transmission at National Grid

Andrew stated that he would provide a summary of how the National Grid can work towards the transition of industry away from carbon intensity and support industries to unlock the potential of a hydrogen economy. He said that around 22% of the UK's gas demand goes into industry, and that there are no viable alternatives at present for creating the fuel required for certain industrial processes in industries such as the chemicals industry, glass, and ceramics. He stated on the National Transmission System (NTS) there is a diverse range of industrial connections, some of which are totally reliant on gas. He noted that the approximate locations for industrial connections are spread across the NTS but are very compatible with the main industrial clusters, and that all UK gas networks are collaborating in this endeavour.

He noted that gas networks are an asset which the consumer has already invested in, with an asset value of around £30 billion, but more importantly they deliver three times the energy delivered by the electricity networks and provide storage and flexibility that is largely unavailable if there was a pure electrification route to decarbonisation. He stated that there are a range of options about how the UK can meet its net zero emissions objective. In terms of how this practically works, Andrew said that some carbon dioxide emissions are unavoidable, particularly with blue hydrogen which will require carbon capture and storage. He said that industry will do its part by improving processes and equipment and reducing carbon but that the UK will need blue hydrogen from methane as well as green hydrogen via electrolysis from surplus renewable energy. He stated that this applies both in terms of production and the broader supply chain.

Andrew welcomed and recognised the Government's commitment to both blue and green hydrogen and noted that this position is supported by the Climate Change Committee. He said that the National Grid also acknowledge that blue hydrogen may be the bridge to green hydrogen in the long-term and become a transitional technology in around 40-50 years' time. He said that with the publication of the Industrial Decarbonisation Strategy and the forthcoming Hydrogen Strategy, the National Grid will be able to focus on commercialisation and trials at scale, to inform policy decisions of the future, which will enable the industry and the supply chain to scale up.

He stated that the National Grid also need to see support for innovation, applied to the wider supply chain through incremental actions, both at the production end but also the consumer end, such as support for hydrogen ready boilers, which sends a message both to consumers and the supply chain of the growing hydrogen economy. He said that whichever decarbonisation route the Government chooses, the UK will be dealing with long asset life cycles, and some highly integrated processes. He recognised that this could be costly which is why there is a need for certainty to attract the necessary financing.

Andrew noted that a frequent question the National Grid receive is how decarbonising industries will work for those industries which cannot move away from methane quickly. He said that the National Grid is using some Ofgem Network Innovation Allowance funding to look at something called deep blending to solve this issue. He explained that deep blending would enable areas to increase their concentration of hydrogen incrementally. This would mean that the network could provide around 20% hydrogen to those areas that can only take a light blend. He noted that Cadent are already running small live local networks on 20% Hydrogen using existing networks. He said that when you get higher concentrations of hydrogen, this is when more work needs to be done on the transmission and distribution assets, but reiterated that these are networks that the British consumer has already invested in.



He mentioned that the National Grid announced the UK hydrogen 'backbone' project recently which explores how they could unlock a 2,000-kilometre hydrogen network using existing assets where possible, and also some new ones. This will join up the most carbon intense industrial clusters around the country, including Teesside, Humber, Grangemouth, the North West, Southampton and South Wales.

Andrew concluded by saying that the National Grid are brilliantly placed to deliver on efforts to decarbonise industry through hydrogen technology but stated that what they need now is clarity and collaboration to ensure they have got the right capability and the right programme to deliver net zero emissions in the future. He said there needs to be support and incentives for a range of industrial customers and power generators to switch fuels, and that the Government must send the right signals to all stakeholders, investors, consumers, and the supply chain.

Rebecca Rosling, Head of Smart Customers, Research and Development at EDF

Rebecca stated that as an electricity company EDF are focused on green hydrogen and outlined that there are a number of different parts of the business that are looking at green hydrogen. One such project is the Sizewell C project which she explained is EDF's new nuclear project which would supply around 7% of current UK electricity demand. She said that this relates to hydrogen because EDF noted that the project could support the growth of green hydrogen projects that run to use existing electricity generation to decarbonise the construction project there. She added that once it is built, EDF see a really strong potential to showcase hydrogen produced by nuclear energy. She said the reason for this is as well as producing electricity nuclear energy also produces heat, which EDF believes will in time significantly reduce the cost of the electrolysis process.

She stated that EDF are also involved in other different green hydrogen projects, looking at the Teesside Hydrogen Transport hub, and in Scotland, in Stornoway in Orkney, where EDF have a very large offshore wind farm under construction. She said that EDF can see that hydrogen will become a route to market for a lot of its onshore and offshore wind farms. She noted that all the projects EDF are looking at are at earlier stages than the ones at Sizewell C, which she said comes back to the business model question that has been discussed in the session. In the absence of any kind of support, she said that EDF cannot make the commercial commitment to hydrogen but are pushing ahead as much as they can now.

Rebecca noted another important part of EDF's hydrogen projects, such as Hynamics which is a dedicated subsidiary set up recently and primarily in France to provide low carbon hydrogen solutions, such as end to end electrolyser design and operation. She said the business model for the project is geared towards creating a local ecosystem where you have got the electricity generation, the hydrogen production and the hydrogen demand all in one place.

She added that on the supply side of the business, EDF are being approached every day by different customers to talk about what they should be doing about hydrogen and said that her team is trying to support those discussions. She mentioned this as evidence that the demand is there for hydrogen.

Rebecca then went on to state that the Sizewell C team were part of the Freeport East hydrogen hub to develop a local hydrogen hub so in that area there is offshore wind and the existing Sizewell B nuclear power station. The idea, she noted, is to create a Suffolk hydrogen hub. She explained that the main point of the project is to demonstrate that electrolytic hydrogen can be produced at large scale. She stated that EDF does not believe that blue hydrogen does not have a role in the development of the hydrogen economy and agrees with the consensus that both blue and green will be needed in the short term. However, she said that the really important point about green hydrogen is that it can be scaled up and you can start with something small, stimulate the market



and develop more and more hydrogen. She mentioned this to deter from the narrative that electrolytic hydrogen is for small scale projects and blue hydrogen is for big scale projects.

Jacob Young asked Rebecca if she could elaborate on the use of hydrogen in the construction of Sizewell C.

Rebecca Rosling explained that Sizewell C is next to an operating nuclear station, Sizewell B and that EDF can put an electrolyser very close to the operational station to produce hydrogen on site. She added that the hundreds and possibly thousands of HGVs and buses that are on the sites that are potentially not suitable for electrification would then be sought to be powered as much as possible through hydrogen.

Chris Gent, Policy Manager at Carbon Capture and Storage Association

Chris introduced his role and explained that the CCSA is the trade association for companies interested in the commercial scale and deployment of carbon capture and storage in the UK and that they are also active in Europe, representing over 50 companies across the value chain of carbon capture and storage (CCS). Chris explained that carbon capture and storage is the technology which decarbonises current hydrogen production using reformation of natural gas or carbon containing feedstocks, and then capturing the CO₂ and then leaving the hydrogen stream afterwards.

He said that hydrogen production alongside carbon capture and storage is done today at industrial scale and noted the various examples of this in industrial clusters mentioned by the previous speakers. He said the really important point about CCS is that it is key to enabling early volumes of hydrogen, particularly around the industrial clusters, and providing reliable volumes of hydrogen, which industry will need to have certainty on in order to decarbonise and make investment decisions.

Chris stated that the CCSA were very happy to see the Industrial Decarbonisation Strategy published and noted positively in particular how CCS and hydrogen are progressed side by side and, highlighting the Government's twin track approach in those technologies. He said the CCSA see both hydrogen and CCS working together over time and that both blue and green hydrogen must be produced. He argued that it was not about deciding between blue or green hydrogen and that if people look at the challenges ahead for the UK to get to net zero, there needs to be a recognition of a range of solutions.

He added that the CCSA welcomed the industrial decarbonisation challenge announcement of funding and were pleased to see that all of the CCS clusters around the UK were awarded funding as part of that announcement. He said importantly that the clusters around the UK which received funding all have an element of hydrogen production with CCS. He stated that these clusters also have a positive focus on local economies and supply chains that provide jobs for local people and provide a pathway for some industries into a low carbon future.

Chris then went on to list three key asks for the Government on carbon capture and storage. Firstly, to ensure that the business models are accelerated and developed in earnest. Secondly, to confirm that older clusters can progress at their natural pace, noting that the Government released a cluster sequencing consultation which tried to introduce a framework by which the Government's CCS ambition for two clusters by the mid 2020s and two more by 2030 are to be met. He said that there was a lot of detail on the mid 2020s clusters but not so much detail on the remaining clusters. Thirdly, there needs to be a clear funding envelope for hydrogen and CCS, noting that one of the key successes of offshore wind is that it had a defined funding envelope over a long period of time which supported the business model.

Question and Answer Session

Lord Tebbit (Conservative) asked what the timetable is for the introduction of hydrogen for transport, such as coastal shipping, construction sites and heavy road vehicles?

Rebecca Rosling noted Lord Tebbit's question and said this comes back to what has been a common theme in this session on the business model of hydrogen. She explained that the timetable for something on a small scale could be released within a year but for the more serious projects it depends on how quickly the business models are clear and how quickly people can get going.

Jacob Young stated that there is work on going on in terms of timetables for hydrogen targets and that these also need to be set out in the forthcoming Hydrogen Strategy.

Tom Brewer, Global Environmental Sustainability Leader at Anheuser-Busch InBev said that Budweiser are a potential consumer of hydrogen and are happy to invest in this if there is the support to make this happen. He noted that hydrogen blending links the electricity grid and the gas grid potentially, and asked Andrew if there is potential to look at whether there are grid constraints, where the wires are not big enough to handle moving energy around, and that Budweiser want to be able to strategically sign grid based electrolysis units in order to expand the grid in areas where it is not big enough.

Andrew Marsh said that hydrogen blending does link both the electricity and the gas grid and stated the biggest contribution hydrogen can make is in terms of providing storage and flexibility that the electricity network needs. He said he was pleased to hear what Tom has said in that no company would make the investment in hydrogen unless it had some certainty and prospects of growth.

Harry Hoster, Professor & Director of Energy Lancaster asked Rebecca if EDF have any concrete electrolyser installations in the pipeline.

Rebecca Rosling said the most concrete installation is the Sizewell B demonstrator that she discussed earlier and reiterated that for further projects go ahead there needs to be further signals from the Government to make them work commercially.

Enrique Troncoso, Consultant at Systeng Consulting said it was important to recognise that for both blue and green hydrogen, many projects are not at the commercial stage yet, and that the industry needs to gather the evidence to understand what the pitfalls are and what the safety restrictions are. He said in terms of time scales, the industry is probably going to see a lot of activity ramping up over the next five to ten years.

Jacob Young noted from the chat function that there were a few comments around ammonia for transport and wondered if any of the panellists could comment on ammonia as a fuel.

Chris Gent said that if you were to look at the hydrogen and CCS linked projects around the UK there are companies looking at ammonia, particularly in the shipping and heavy marine sector. He said there was a bit of work that needs to be done and that there needs to be more commitment on the deployment of hydrogen before we can get too far down in terms of its use for shipping.

Jacob Young then asked the panellists for their closing remarks and comments.

Andrew Marsh thanked everyone for attending and stated that the encouraging number of participants shows how much will and collaborative vigour there is in the hydrogen sector and that



that is what is needed to make the sector grow at the speed that is necessary. He reiterated that the sector needs clarity from the Hydrogen Strategy later this year, and a need for industrial and political stakeholders to get on board.

Chris Gent added that the number of participants was fantastic to see, and that the hydrogen sector is growing very quickly as an area. He said from the point of view of the CCSA that it is mainly about making sure projects can go ahead, and that there can be certainty and clarity for the sector, backed up with a funding revenue stream over a period of time which can encourage investors to get involved.

Rebecca Rosling said the size of the challenge is enormous, and the amount of hydrogen the sector needs to produce is massive. She said the industry is ready to start producing hydrogen at scale and that all they need is the help to do that. She reiterated that the sector should not get distracted on what is the best technology, and whether there should be a focus on green or blue hydrogen, and that the sectors should find a way to stimulate demand to set the UK on a hydrogen path.

The Chair, Jacob Young then closed the session and noted that the questions and ongoing discussion in the chat function will be widely shared as more questions could not be answered due to the time restraints of the meeting. He encouraged attendees to submit a response to the APPG on Hydrogen's inquiry on the role of hydrogen in powering industry. He concluded by thanking the speakers and attendees and looked forward to hosting the next session of the Group.