



## Oil & Gas Authority

### **Bacton Energy Hub study**

**Q: Will the full Bacton Energy Hub study be published?**

A: The conclusions have been presented in the published short version of the report and in the recent presentation. The full report contains commercially sensitive information and will not be shared more widely.

**Q: Will the economic assumptions used to underpin the statements made in the report on the economic viability of the projects be published?**

A: The OGA has no plans to publish the economic assumptions.

### **Special Interest Groups (SIGs)**

**Q: How can we register our interest and support?**

A: The OGA will be issuing a questionnaire to all parties who registered to attend the presentation on 16 June 2021. Interested parties can then express their interest in being involved in the next phases and to articulate their skills and what they feel they can contribute.

**Q: What date will you issue the TORs for the SIGs?**

A: The SIG TORs will be issued in July.

**Q: How will the participants for the SIGs be selected and what is the timeline for announcing the SIG members?**

A: The key requirement for participation in the SIG's is a willingness of the participants to contribute their knowledge and skills in an open and collaborative manner with the other members of the SIG. Following completion of the questionnaire, OGA will engage with respondents to discuss this commitment. OGA does not have any other selection criteria; the only other relevant consideration will be having manageable numbers participating in each SIG. It is hoped to have the SIGs up and running by the Autumn.

**Q: Will this project be carried out by OGA alone?**

A: No; the role of the OGA is to promote and catalyse collaboration but the intention is a working consortium will be established and led by industry.

**Q: Will the LEP or EEEGR be used to support the SIG's?**

A: The intention is to have EEEGR playing a key role in supporting the Bacton Energy Hub SIGs.

### **Hydrogen**

**Q: What are the risks associated with hydrogen gas compared to traditional North Sea gas?**

A: Work, primarily led by the HSE as the relevant regulator, is underway on multiple fronts to look closely at the challenge and gather evidence. Ongoing projects already consider hydrogen blending and will inform the Bacton Energy Hub project and the future design assumptions for the Hub.

### **Blue hydrogen**

**Q: What is the process for reformation of methane into CO<sub>2</sub> and hydrogen; is it catalytic or electrochemical?**

A: Blue hydrogen is produced from the chemical conversion of methane to hydrogen, with the resultant CO<sub>2</sub> being captured and permanently stored. Two principal conversion technologies are generally available: steam methane reforming and auto thermal reforming; both processes use a catalyst. However, there are other emerging technologies.

**Q: Why do we have to wait to 2030 for blue hydrogen?**

A: The OGA considers 2030 an indicative date for matured hydrogen production and distribution at Bacton. Timelines will be further defined by industry during the next phases of work.

**Green hydrogen**

**Q: Is discounting green hydrogen production until 2040s/50s a pessimistic view, and is this based on production onshore (using electricity from offshore or onshore) or direct production offshore (using existing gas pipelines as a blend back to Bacton)?**

A: The OGA considers that Bacton will transition in stages, from hydrocarbon, to hydrocarbon plus blue hydrogen, blue and green hydrogen, aiming for 100% green hydrogen. The indicative timeline to get to 100% green hydrogen deployment at a large commercial scale based on currently available technology is credible, though there may be potential to accelerate this. The timelines are indicative and will be further refined by industry as more technical studies are undertaken.

**Q: For green hydrogen are you proposing that the conversion of seawater to hydrogen from excess wind power is done offshore or onshore? What is the plan for salt disposal from green hydrogen production from sea water?**

A: The Energy Hub concept has not been defined at this stage so no detailed concepts have been proposed for either offshore or onshore green hydrogen production; both will be given consideration by industry, and salt disposal will form part of the detail design stages as concepts are matured.

**Q: What discussions has the OGA had with the Offshore Wind Developers or engaged with the Offshore Transmission Network Review around the potential of direct wire into the Bacton Energy Hub? All current green hydrogen projects draw energy from existing onshore substations. How can we coordinate the engagement and activity now to ensure the Bacton Energy Hub is factored into future offshore wind infrastructure developments?**

A: The OGA is in discussions with offshore wind operators and BEIS about the work relating to the Bacton Energy Hub; both are aware of the potential that such a scheme could deliver. It will be for industry to define how the Hub can be factored into future offshore wind infrastructure developments.

**Q: Have you considered engaging with the Dolphyn Project who are looking for a location to test their first offshore installation and associated hydrogen generation technology?**

A: The OGA would expect that industry, through the relevant SIG, will engage all projects that have green hydrogen experience in the development of the Bacton Energy Hub.

**Hydrogen blending**

**Q: There has been speculation that the National Grid will be able to accept up to 20% hydrogen. Is this correct; and if so, how will this work in practice if there are several points around the country where hydrogen will be injected into the system? For example, if there is an onshore site generating green hydrogen with an associated storage unit that has the capacity to vary the rate that hydrogen is added to the National Grid who would control the volumes that could be sold into the Grid and blended with natural gas and how would this be done?**

A: The technical potential for this conversion is currently the subject of studies sponsored by the relevant infrastructure owners and it is not for us to pre-empt the outcome of these studies.

**Q: What proportion of blended hydrogen in the NTS requires consumers to adapt their domestic or commercial boilers?**

A: This is the subject of ongoing studies and not within the OGA remit.

**Q: High concentrations of hydrogen even when blended with hydrocarbon gas will cause hydrogen embrittlement of pipework as the UK's existing infrastructure, both in NTS and**

**in the onshore and offshore production and processing systems, is not designed to carry hydrogen; is this foreseen as a significant difficulty, and will we have to factor in a reduced operating pressure or reduced life span for the pipework to account for his effect?**

A: There are a number of ongoing projects seeking to demonstrate the use of hydrogen in existing infrastructure such as Hydeploy, H21, HYNTS all of which will be a good foundation of learning for the Bacton Energy Hub when industry is developing their thinking in this regard.

**Q: CO2 acidification, when wet CO2 forms carbonic acid, will have an impact on existing infrastructure; has the reduced lifespan and increased corrosion loss on pipework used for offshore carbon storage been factored into the plan?**

A: Infrastructure re-use and re-deployment will be one area of the forward project studies undertaken by industry, of which material compatibility will be one of the considerations.

**Q: Is pipework containing hydrogen more porous compared to methane; what are the losses thought to be in both the NTS and onshore/offshore production systems; and has the risk of any losses been considered?**

A: All of the safety implications for the displacement of hydrocarbons to hydrogen are critical considerations and will form part of the future phases as industry matures the project concept and detailed design.

### **Infrastructure**

**Q: Is it necessary for the Government to take ownership of crucial parts of privately owned infrastructure to make the Bacton Energy Hub viable?**

A: The OGA expects industry will take the lead to develop the Bacton Energy Hub concepts further

**Q: A key regulatory challenge is to provide access or transfer infrastructure assets to new owners or users motivated to use them; what is your thinking of the OGA role in this?**

A: As part of the OGA's stewardship process, the OGA engages with current incumbents on a range of matters, including plans for any assets. Under the OGA's Net Zero Stewardship Expectation (SE11), the OGA considers re-use and repurposing of infrastructure to support and progress energy integration developments including CCS and hydrogen. We believe right assets right hands will play a key role in developing this opportunity.

**Q: Will existing offshore infrastructure (platforms, pipelines) be re-used?**

A: Infrastructure re-use will be an area of consideration for industry in the development of the Bacton Energy Hub concept.

**Q: Have you identified any critical infrastructure currently used for hydrocarbon production that will remain economic for a number of years, that you would want to repurpose in the short term for the Bacton Energy Hub? Would the OGA compromise individual field MER for the accelerated development of the Bacton Energy Hub?**

A: The OGA strategy requires industry to operate in a way consistent with net zero ambitions, lowering production emissions and making serious progress on the solutions that can contribute to the UK achieving net zero. As industry develops the Bacton Energy Hub concept, both the MER and net zero impacts will need to be considered.

**Q: What is your view on European plans for a natural gas / hydrogen blend transmission system?**

A: The OGA expects industry to explore the potential synergies for Bacton, including opportunities for the import or export of hydrogen to Europe.

**Q: Do you plan to exploit the BBL connection with Den Helder to take advantage of the wider European hydrogen potential?**

A: The Energy Hub has not yet been defined; the OGA expects industry, in the next phase of the project, as the concepts are defined further to consider the roles the interconnectors could play as they are recognised as a potential value adding opportunity.

**Q: Have you had any discussions with National Grid with regards to the Future Operating Strategy (FOS) for the Bacton gas terminal?**

A: Yes; the OGA is actively engaged with National Grid on this work and would expect this to continue as industry takes this work forward.

**Q: Will Cadent gas be involved?**

A: If Cadent wish to be involved in the next phase of work on the Bacton Energy Hub they are very welcome.

### **Hydrogen and CO2 storage**

**Q: How will the underground storage of hydrogen be regulated, and will there be any restrictions to storing hydrogen onshore in depleted gas fields?**

A: These things will be considered as Government is developing the policy framework for hydrogen.

**Q: All discussions on blue hydrogen refer to offshore storage of CO2, is the use of onshore depleted gas fields an option?**

A: Hydrogen policy development is a matter for BEIS.

**Q: At what pressure do you propose to compress and store the CO2 offshore, what are the characteristics of a CO2 capture well?**

A: The pressure of the CO2 will depend on the choice of storage, if a depleted reservoir is chosen it is most likely the CO2 will be stored in the gas phase at lower pressures, as the reservoir pressures increase so will the required CO2 pressure. However, for storage sites where CO2 is to be stored as dense phase at typical reservoir temperatures (circa 80bar) further detailed analysis is required by industry; this was beyond the scope of the scoping study.

**Q: Has there been any analysis looking at how much hydrogen storage is required for the Hub and what form this may take? Can this be onshore depleted gas fields?**

A: This will be considered as the SIGs develop their terms of reference and define their scopes of work; OGA would expect industry to investigate both onshore and offshore options.

**Q: Is there a report which gives further insights on the storage potential for depleted gas reservoir in the area?**

A: At this stage, the OGA evaluation is being used to help inform the OGA's licensing approach to carbon storage. There are no reports yet.

### **Hydrogen and CO2 business models**

**Q: How do we generate a price for hydrogen and storing CO2 that is sufficiently robust to support project finance investment from the private sector?**

A: Hydrogen policy is a matter for BEIS.

### **CO2 abatement**

**Q: How do you see the cost per tonne of CO2 reduction for Bacton compared to other Energy Hubs or other abatement activities?**

A: This level of analysis is yet to be undertaken.

### **Other Energy Hubs**

**Q: Are the OGA supporting other energy hubs throughout the UK to a similar level, allowing all hubs to progress equally to meet the CCC aims for CCS and hydrogen?**

A: Yes. Through the OGA stewardship of carbon storage licences we are providing support for other projects in the UK that have a carbon storage licence.

**Q: Has the NW of England also been considered for an Energy Hub, and if it has, has the offshore gas production been checked for life span?**

A: To date the main focus has been the decarbonisation of industrial clusters; however, we are aware of industry led projects in the NW, e.g. Hynet, that are exploring hydrogen and CCS. The OGA might evaluate the potential of other areas in due course.

### **Service sector opportunities**

**Q: Is the OGA associated with FPAL or similar?**

A: The OGA is not directly associated with FPAL or anything similar. We are aware that Achilles (FPAL), which has recently been rebranded to Achilles Europe, are just about to launch a “green energy” section which will help identify supply companies with capability in energy transition projects.

### **Useful links**

- **HSE: ‘Safe Net Zero 2021 – Hydrogen’** <https://safenetzero.evessiocloud.com/live/en/page/home>
- **National Grid Hydrogen Roadmap to 2050** <https://www.nationalgrid.com/uk/gas-transmission/document/135511/download>
- **National Grid FutureGrid** <https://www.nationalgrid.com/uk/gas-transmission/insight-and-innovation/transmission-innovation/futuregrid>
- **HyNTS: Hydrogen in the NTS** <https://www.nationalgrid.com/uk/gas-transmission/document/133841/download>
- **HyDeploy at Keele** <https://hydeploy.co.uk/hydrogen/>
- **HyDeploy North East** <https://hydeploy.co.uk/winlaton/>
- **HyNet North West** <https://hynet.co.uk/>
- **LTS Futures** <https://www.sgn.co.uk/about-us/future-of-gas/hydrogen/lts-futures>
- **H100 Fife** <https://www.sgn.co.uk/H100Fife>
- **H21** <https://h21.green/>