Keadby Next Generation – Written Representation - Deadline 1

by James Hewitt

Summary

This submission comprises six sections, namely:

- Procurement of fuel to be burned by the proposed project – price versus availability
- Availability of surplus blue hydrogen
- The alternative of retrofitting Keadby 2
- Dispatchability
- Compliance with the low-carbon standard
- 20-year Global Warming Potential
- Biodiversity Net Gain

The text considers fundamental matters which may make the Applicant's proposal difficult to justify.

Procurement of fuel to be burned by the proposed project – price versus availability

The Applicant highlights that the proposed project seeks to help "enable" a market for hydrogen to become established (presumably in the Humber region). The project offers to do so burning any combination of blue hydrogen and methane as fuel.

As was clearly confirmed by the Applicant during ISH1, the amount of green hydrogen likely to be burned by the project can reasonably be assumed to be zero.

Crucially, the Applicant provides no assurance that the project would burn as much of any surplus blue hydrogen as is available at any given time – up to 100% of its capacity. Instead, the proposal would enable the Applicant to burn as little as it likes, without penalty

The mix of fuel burned would presumably be influenced by the price of blue hydrogen (especially relative to that of readily available methane).[1] The Applicant does not indicate whether availability of surplus blue hydrogen would over-ride price when choosing the mix of fuel. The price differential between the two fuels is likely to make use of blue hydrogen prohibitive. Government is unlikely to sufficiently subsidise blue hydrogen long enough (if at all) to enable it to compete with methane. This is fundamental. Price, not the sufficiency of off-takers, may determine the evolution of a market for blue hydrogen across that region.[2]

Another fundamental factor seems to have been excluded from the Applicant's DCO submission – the worldwide absence of power stations which can burn 100% hydrogen. Between 5% and 30% is the greatest proportion for projects which are currently operating or under construction. None are expected to be operational at 100% hydrogen for two or so decades. Consequently, it is likely that no generating units of the size proposed will be available for the Applicant to procure until well into the 2040s.[3] One might reasonably conclude that this Application is a decade or more in advance of its ostensible purpose.

The impact of unabated greenhouse gas emissions will rise steeply over time as the global carbon budget for the UNFCCC target of "well below 2°C" approaches exhaustion.[4] Such urgency further militates against proceeding with this proposal – and warrants an IEMA / ISEP rating of Major Adverse.

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[1] Hydrogen is forecast to be between two and ten time greater than methane by the end of this decade (– and therefore likely to be prohibitively costly until well beyond when unabated methane-fired baseload power is prohibited in the UK). GE Vernova "Hydrogen overview" (12 2024) [redacted]

[2] "Policy support" for industries which are not commensurate with the climate, biodiversity, and plastic / waste emergencies might not be warranted if government resources and social licence are lacking.

[3] Mitsubishi Power – for example "Turbines driven purely by hydrogen in the pipeline" [redacted]

[4] The "1.5°C" target is all but lost. If fairly shared to reflect the UK's wealth and legacy of combustion and promoting it abroad, the UK's share of the budget for "well below 2° C" will probably exhausted within seven years at the current rate of UK emissions. From minute six, Kevin Anderson "National Emergency Briefing" 27 November 2025 [redacted]

Availability of surplus blue hydrogen

Hydrogen has value in many uses. It is well established that one of the lowest value uses is as a fuel for power stations.[5]

Its availability is questioned – including in the DCO application for a new power station at Connah's Quay states[6] "*given the uncertainties about whether the volumes of hydrogen needed would be commercially available at the unknown point when it might be required.*"

The Applicant does not discuss the quantity of surplus blue hydrogen that can foreseeably be assumed. That amount will depend on the combined production capacity of blue hydrogen projects in the region at any given time, and on the extent to which production achieves full capacity. Achieving full capacity will depend on the rate at which CO_2 is captured. The lack of examples of blue carbon production world-wide indicates that the quantities produced may be less than promoted for planning and publicity reasons.

Planning approval for at least one project (H2H Saltend) to produce hydrogen - and capture CO_2 deriving from its production was granted early in 2024. The performance of the CO_2's downstream transportation and the permanence of its subsequent disposal would be crucial. H2H Saltend will presumably have been designed to supply specific prospective users. If there were not enough such users at the time of the planning application, then it would seem reasonable to conclude that there is insufficient demand in Humberside – the UK's most energy intensive industrial region and perhaps the UK's leading user of grey hydrogen[7].

Equinor indicates[8] that its blue hydrogen would displace 30% of the methane burned by a power station[9] having greater capacity (1200MW) than that proposed by the Applicant (900MW). Displacing 100% instead of 30% of the methane would help enable the development of a hydrogen market to almost the same extent as the Applicant's proposal. This tends to confirm that the primary purpose of the Applicant's proposal is weak.

The Applicant does not set out the amount of blue hydrogen which would be burned when the fuel mix is 100% hydrogen. If this is trivial relative to the quantity of blue hydrogen which would be produced by H2H Saltend[10] then the ability of the Applicant's project to enable a hydrogen market in the Humberside region correspondingly trivial – defeating its purpose. Conversely, if the amount is large, then this would indicate that (i) current initiatives to greatly reduce the burning of methane by industries in the Humberside region (the UK's leading emitter of CO_2[11]) are ineffective and (ii) the Applicant's proposal would tend to delay remedy.

"H2H Saltend Third Consultation Materials 2023" states[12] that Equinor plans to establish at least 1.8GW of (implicitly blue) hydrogen production capacity in the Humber region by 2030.

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[5] For example, in Michael Liebreich's Hydrogen Ladder [redacted]

[6] Clause 1.4.10 of Uniper's "Connah's Quay Low Carbon Power Carbon Capture Readiness Report" (08 2025)

[7] Most of this will have been produced, as a byproduct, by the industries which then use it. That grey hydrogen would need to be replaced by blue hydrogen if the processes which currently utilise that grey hydrogen are to continue. One proposal is [redacted] supplying Phillips 66.

[8] Page 10 of "H2H Saltend The first step to a Zero Carbon Cluster" [redacted]

[10] Or, if larger, the total capacity of blue hydrogen production facilities which currently have planning approval in the Humber region.

[11] Humber Industrial Cluster Plan [redacted] (or [redacted]

Unless gross hyperbole, that statement suggests that there will be no shortage of demand for blue hydrogen from enterprises which already exist.

As such there is no need to create additional demand from new ventures such that which the Applicant proposes at Keadby.

Seeking the option of whether to proceed within seven instead of five years - despite the urgency indicated by government policy and the Climate Change Act 2008 (2050 Target Amendment) Order 2019[13] - could imply that enabling a market for hydrogen is a confection.

The alternative of retrofitting Keadby 2

The potential to supply blue hydrogen to two methane-fired power stations (West Burton and Mercia Power Response) once they have retrofitted is recognised by East Coast Hydrogen.[14, 15]

The Applicant does not consider the feasibility of retrofitting Keadby 2 so that it can generate power using a mix of hydrogen and methane up to 100% of either – thereby serving the same purpose as the proposed Keadby Next Generation project, of helping to establish a market for blue hydrogen in the Humber region.[16]

Dispatchability

The Applicant's proposal indicates that its purpose is to supply baseload power. This is contrary to government policy of decarbonising electricity supply (currently by 2030). Footnote 24 of DENZ policy paper "*Clean Power 2030 Action Plan: A new era of clean electricity – main report*" (04 2025) states "*While delivering its Clean Power ambition for 2030, the government's aim is to ensure there will be sufficient flexible capacity on the system to meet security of supply. This includes retaining existing unabated gas capacity.*"

By 2030, that unabated capacity is not to exceed 5% of total supply.[17] Hydrogen (and methane with carbon capture and storage) is to be used dispatchably. If, as planned, the percentage of wind and solar power generation accessing the national grid increases, then the amount of that dispatchable power will decrease. The Applicant's proposal does not reflect this. In contrast, SSE Thermal (as the Applicant) promotes the flexible (/dispatchable) character of generation at Keadby 2.[18]

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[13] - and, of course, the evidence and science. In addition, because greenhouse gas emissions in the UK are of global relevance, a globally accepted system of monitoring reporting and verification of the permanent disposal of CO_2 is crucial. Social licence – not least for blue hydrogen – is lacking.

[14] East Coast Hydrogen Deliver Plan (11 2023) [redacted]

[15] East Coast Hydrogen, which may operate as the region's only supplier of blue hydrogen, suggests that it may do so using repurposed pipelines which used to transport methane. This might not be feasible given differences in the chemical and physical properties of those two fuels.

[16] SSE Thermal states that Keadby 2 entered commercial operation during 2023 – at a time when SSE already had plans for the "next generation" of low-carbon power stations at Keadby. [redacted]

[17] DESNZ "*Clean Power 2030 metrics: methodology*" (09 2025) https://assets.publishing.service.gov.uk/media/68da6c95dadf7616351e4b76/Clean_Power_2030_Metrics_methodology.pdf

[1][redacted]

Compliance with the low-carbon standard

The Applicant does not provide estimates for the greenhouse gas emissions associated with each component of the supply chain for either the hydrogen or methane it proposes to burn.

This inhibits assessment of the robustness of the estimates which the Applicant does present. Such estimates might be subject to significant doubt given the lack of comparable examples of blue hydrogen production operating worldwide.[19]

It also hinders the drawing of conclusions from the overall analysis.

It would be helpful if the Applicant also presents estimates for the volumes of methane associated with burning 100% methane or 100% blue hydrogen at the proposed project.[20] Doing so would help provide a simple estimate of the extent to which burning blue hydrogen at the proposed project has fewer supply chain emissions than burning methane there.

The supply of methane produced in the UK is likely to decline during the lifetime of the proposed project.[21] Correspondingly (and in response to pressure from USA), imports of LNG are likely to increase. Roughly 70% of this is imported from USA, almost 95% of whose exports of LNG to the UK are supplied from Texas and Louisiana. This is likely to have been produced by fracking – with large fugitive emissions. As such, the GHG emissions intensity of blue hydrogen supplied to the proposed project is likely to rise.

20-year Global Warming Potential

In Chapter 18, from clauses 18.3.48 and 18.3.49, the Applicant draws attention to the large differences between the Global Warming Potentials of both methane and hydrogen 100 years and 20 years after the gases enter the atmosphere. In clause 18.3.51, the Applicant then chooses to adopt the GWP which is most favourable for the analysis. The effect of this (intentional or otherwise) is potentially to mislead the Secretary of State.

That choice neglects that the year by which the UK is legally bound to achieve Net Zero is 2050 – less than 25 years from now and as the Climate Change Committee repeatedly highlights, UK progress towards that date is lagging. It also neglects that the UK's share of the global carbon budget for the UNFCCC target of "1.5°C" will be exhausted long before 2050.[22]

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[19] Although their CO_2 capture processes differ, the substantial underperformance of post-combustion CO_2 capture facilities deployed worldwide at power stations of comparable scale gives cause for concern about the robustness of capture rates for blue hydrogen. There are only two such power stations – Petra Nova and Boundary Dam. Both supply the captured CO_2 to help extract more fossil fuel rather than solely for permanent disposal.

[20] That amount should include an explicit estimate for the quantity of methane required to carry out the processes of CO_2 capture and the downstream disposal of that CO_2 – "the energy penalty" or "parasitic load".

[21] The North Sea Transition Authority forecasts an decrease of almost 50% between 2025 and 2030 and by [redacted]x

The UK government projects a similarly rapid decline - https://www.gov.uk/government/consultations/building-the-north-seas-energy-future/building-the-north-seas-energy-future-consultation-document-accessible-webpage

[22] The UNFCCC target of "well below 2°C" will probably be exhausted by 2050, especially if allocated to reflect the UK's wealth and the legacy of emitting in the UK and facilitating emissions elsewhere.

For purposes of comparison and good practice, it would presumably be best if the Applicant were to present the analysis based on both the 25- and 100-year GWP – doing so for each component of the supply chain, rather than as in Chapter 18 and, in particular Table 18.10.

Table 18-10 gives estimates for the Scope 3 GHG emissions intensity associated with operational fuel supply. For Scenario A (100% hydrogen), this is 119 tCO_2e/GWh (33 gCO_2e/MJ - assuming 3.6 million MJ are equivalent to 1GWh). This is 50% greater than the maximum for compliance with the Low Carbon Hydrogen Standard.

Biodiversity Net Gain

The Applicant washes its hands of Biodiversity Net Gain ("BNG") beyond the term of the project it proposes. This is inconsistent with BNG – which requires foreseeable permanence. A failure by the Applicant to contractually transfer the BNG obligation to its successors would seem essential.

The Applicant's proposals for BNG should reflect foreseeable impacts of climate change – which, ironically, is being caused by greenhouse gas emissions such as those at Keadby and the industries of the Humber region.

For such proposals to have credibility, the Applicant ought presumably to submit not only examples of where comparable attempts at BNG have been a success, but also an indication of the extent to which their success represents the norm.