Connah's Quay Low Carbon Power

Preliminary Environmental Information Report
Volume II, Chapter 6: Project Alternatives

Uniper

The Planning Act 2008
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
PINS Reference: EN010166
September 2024

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Prepared for:
Uniper UK Limited

Prepared by:
AECOM Limited

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6. Project Alternatives

6.1 Overview

6.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) sets out the alternatives that have been considered during the evolution of the Proposed Development design as presented in **Chapter 4: The Proposed Development** and **Chapter 5: Construction Management and Programme** (**PEIR Volume II**), up to this latest round (Stage 2) of statutory consultation.

6.1.2 No figures or appendices support this chapter.

6.2 Legislative and Policy Considerations

6.2.1 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the 'EIA Regulations') (Ref 6-1) specifies that an Environmental Statement (ES) should contain '*A description of the reasonable alternatives studied by the applicant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment'* (Regulation 14(2)(d)). This PEIR presents the results of preliminary environmental assessments and alternatives considered, prior to publication of the final ES.

6.2.2 National Policy Statement (NPS) EN-1 (Ref 6-2) paragraphs 4.3.9 and 4.3.15 to 4.3.17 states that '4.3.9...*This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective'. '4.3.15 Applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility. 4.3.16 In some circumstances, the NPSs may impose a policy requirement to consider alternatives. 4.3.17 Where there is a policy or legal requirement to consider alternatives, the applicant should describe the alternatives considered in compliance with these requirements.'*

6.2.3 Taken together with EN-1, the NPS for Natural Gas Electricity Generating Infrastructure (EN-2) (Ref 6-3) provides the primary basis for decisions on applications for electricity generating stations, including natural gas electricity generating infrastructure (such as the Proposed Development). Section 2.2 of EN-2 outlines the factors influencing site selection for natural gas electricity generating infrastructure. These include: climate change adaptation and resilience (given the typical coastal and estuarine locations for sites, often with increased flood risk), land use and size of site; transport infrastructure for the delivery and removal of construction materials, fuel, waste and equipment; water resources, for example, some generating stations have very high water demands for cooling; electrical grid connection, and; impacts to the environment, people, and other receptors. However, in outlining such factors, paragraph 2.2.6 states that *'it is for applicants to decide what applications to bring forward and the government does not seek to direct applicants to particular sites for natural gas electricity generating stations'*.

6.3 Consideration of Alternatives

Do-Nothing

6.3.1 The *'Do Nothing'* scenario would entail the Proposed Development not being undertaken and the continued operation of the existing Connah's Quay Power Station until the end of its operational lifespan. This would entail a loss of overall generating capacity after the closure of the existing Connah's Quay Power Station.

6.3.2 It is considered that a '*Do Nothing*' scenario is not appropriate given the established national need for new low carbon energy generation to meet the UK's net zero targets and critical national priority (CNP) status for new carbon capture and storage (CCS) infrastructure (refer to **Chapter 7: Planning Policy and Need**). Another key disadvantage of a '*Do Nothing*' scenario would be the lack of additional investment in the local and regional economy since the Proposed Development would not be developed, in addition to the potential reduced availability of electricity and security of supply for the local, regional, and national economy. The *'Do Nothing'* scenario may also entail a reduction in employment in the vicinity of the Site.

Alternative Sites

6.3.3 The Applicant's consideration of locations for low carbon projects has been set within the prevailing and rapidly changing policy context. At the time of site selection, the relative maturity of each Carbon Capture, Usage & Storage (CCUS) Cluster[1] was a key factor in decision making. Track 1 Cluster status had been given by the UK Government to the HyNet CCUS Cluster in north-west England in October 2021 (to be taken forward into Track 1 negotiations), and subsequently, in September 2023, the proposed plans for Track 1 Expansion for the HyNet CCUS Cluster were announced, which the Applicant is now taking part in the application process for.

6.3.4 Proximity to the HyNet CCUS Cluster and the timing of announcement of the Track-1 Expansion process are, therefore, key reasons why the existing Connah's Quay Power Station site was selected.

6.3.5 The existing Connah's Quay Power Station site has also been selected by the Applicant for the development of a low carbon generating station (the Proposed Development), as opposed to other potentially available sites, for the following reasons:

- the existing Connah's Quay Power Station site has a long history (over 70 years) of power generation, which has demonstrated the capacity to respond to technological evolution since the coal-fired station in the 1950s, through to the development of a natural gas-fired combined cycle gas turbine (CCGT) generating station in the 1990s;
- the desire by the Applicant to secure a future for the existing Connah's Quay Power Station site and workforce beyond the lifetime of existing

[1] 'Clusters' refer to geographic concentrations of related industries or developments of large-scale related industries on adjacent sites. 'CCUS Clusters' refer to clusters of industries which either facilitate or are enabled to use decarbonisation, carbon capture, usage, and storage, or other processes to reduce carbon emissions.

assets, making use of emerging clean low carbon technologies to respond to the challenges of climate change;

- the existing Connah's Quay Power Station employs an established highly skilled workforce and is a major employer that supports a variety of local industries and supply chains, both of which bring significant income to the local economy and may be retained by the Proposed Development;
- the existing Connah's Quay Power Station site has excellent existing electrical grid, gas, cooling water and transport links, specifically the National Gas Transmission (NGT) gas and National Grid Electricity Transmission plc (NGET) networks. There is potential that these may be (wholly or partially) reused or repurposed for the Proposed Development, thereby potentially reducing development costs and the volume of materials required;
- the existing Connah's Quay Power Station site is in close proximity to the proposed HyNet Carbon Dioxide (CO_2) Pipeline Project and discussions with Liverpool Bay CCS Ltd have determined that the Proposed CO_2 Connection can directly connect into the Site to enable the onward transport of captured CO_2 from the Proposed Development to be stored in depleted oil and gas fields in Liverpool Bay;
- the Main Site is partially an operational site (brownfield) which is more appropriate to redevelop in policy terms for large scale power generation than a wholly greenfield location;
- there is sufficient space within the Main Site to construct a CCGT with integrated CCP generating station to maximise the generating capacity (and import and export limits) of the Site without encroaching on known OHL exclusion zones within the Main Site;
- the Main Site (and other areas of the Indicative Site Boundary) are wholly in the ownership of the Applicant; and
- the Main Site is located in close proximity to the existing Connah's Quay Power Station, providing opportunities for synergies, efficiencies and thus economic and environmental benefits for the Proposed Development.

Alternative Designs

6.3.6 The consideration of alternatives and design evolution has been undertaken with the aim of preventing or reducing adverse environmental effects (following the mitigation hierarchy of avoid, reduce, mitigate, and, if no previous option is possible, compensate) while maintaining operational efficiency and cost-effectiveness. The design, including options for cooling water supply and the location of construction laydown considering proximity of sensitive ecological receptors, has evolved in response to Stage 1 non-statutory consultation feedback and the findings of ongoing surveys and technical studies as detailed in this chapter. Preliminary mitigation measures that have been included within the design of the Proposed Development are referenced in each topic specific chapter and will be confirmed in the ES.

6.3.7 The design of the Proposed Development is at a preliminary stage and will continue to evolve up to the point of the Development Consent Order (DCO) Application submission, in response to technical engagement and Stage 2 statutory consultation feedback and with reference to ongoing surveys and

technical studies. Detailed design work will proceed once the Project moves into the Front End Engineering Design (FEED) stage, which is due to commence later in 2024, although any changes that result from the FEED work will remain within the design parameters set by the DCO.

Design Options

6.3.8 As part of the ongoing design process, consideration has been given to a range of design options. Decisions taken regarding the concept design of the Proposed Development have, where relevant and as far as reasonably practicable, been informed by environmental appraisal and assessment work and following Stage 1 non-statutory consultation feedback and additional technical engagement with stakeholders.

6.3.9 The Rochdale Envelope (Ref 6-5) approach, as described in **Chapter 2: Assessment Methodology and Consultation**, has been applied to address these options and the approach taken has been described within each topic specific chapter (**Chapters 8- 23**).

6.3.10 Aspects of design that have been determined to date include:

- the Applicant would not build the CCGT without the CCP as the Applicant is fully committed to building a low carbon generating station;
- the preferred low carbon technology is natural gas-fired CCGT with CCP;
- the design for the CCGT with CCP within the Main Site consists of up to two 'Trains', each comprising an independent CCGT with CCP unit and associated supporting infrastructure. Some supporting elements such as administrative buildings, workshops, and the CO_2 export routes may be shared between the two Trains;
- the layout of the Proposed Development which follows a broadly linear configuration with the massing of the main built elements 'centralised' and sited in proximity to the existing Connah's Quay Power Station (refer to **Plate 4-5** in **Chapter 4: The Proposed Development**);
- the primary cooling method, for reasons of operational functionality and performance, will be recirculating hybrid (water/ steam condensing) cooling of both the CCGT and CCP;
- the Proposed Development will continue to abstract from and discharge to the River Dee for cooling water, in line with the current process for the existing Connah's Quay Power Station;
- the Applicant has confirmed that the existing gas treatment plant (GTP) above ground installation (AGI) is not suitable for repurposing for CO_2 export, and therefore the Proposed Development will require construction of a new AGI for CO_2 export (the 'Proposed CO_2 AGI');
- the Applicant will work collaboratively with its partners, Liverpool Bay CCS Ltd, to agree the location, design and operational parameters for the Proposed CO_2 AGI to connect to the Proposed Development's CO_2 compression equipment for onward transfer into the Repurposed CO_2 Connection pipeline and Proposed CO_2 Connection pipeline;
- there will be no bulk CO_2 storage within the Site;

- once operational, in certain temporary scenarios described in **Chapter 4: the Proposed Development**, it may be necessary to run the CCGT without the CCP. The CCGT configuration will therefore allow the CCGT to run independently of the CCP with emissions exiting via the heat recovery steam generator (HRSG) stack at up to 85 m above-ground level (AGL) rather than via the CCP absorber stack;
- the use of construction laydown area layouts that include minimum ecological safeguard zones in order to avoid and reduce impacts on sensitive habitats as described in **Chapter 5: Construction Programme and Management**; and
- the main construction and operational access to the Site will be from Kelsterton Road, via the A548.

6.3.11 By contrast, the following aspects have not yet been determined, so options have been included and assessed within this PEIR:

- the absorber towers could comprise either a single tower or up to two towers, which could vary in shape for each Train;
- final stack heights and locations may change but would remain within the parameters of the Rochdale Envelope assessed and described in **Chapter 4: The Proposed Development**;
- the manufacturer of the CCGT units and the CCP technology licensor, and therefore the final dimensions of the proposed structures and any buildings, are not yet known. Although dimensions may change, these would remain within the parameters of the Rochdale Envelope assessed;
- the need (or otherwise) for certain buildings and/ or enclosures remains uncertain at this stage prior to FEED, but these are within the parameters of the Rochdale Envelope assessed;
- the Proposed Development may utilise the existing Connah's Quay Power Station cooling water abstraction and discharge infrastructure located within the River Dee. Alternatively, new abstraction and discharge infrastructure may be required and therefore both options have been considered in this PEIR;
- as described in **Chapter 5: Construction Programme and Management**, the existing surface water outfall may require maintenance / minor upgrade works, including clearing debris / repair so that it is suitable for use of the Proposed Development. Alternatively, construction of a new permanent outfall structure for surface water drainage discharge may be required in the immediate vicinity of the existing outfall structure. The outline surface water drainage strategy that will accompany the Application will therefore consider both options;
- As described in **Chapter 2: Assessment Methodology and Consultation**, there is potential that two of the four units of the existing Connah's Quay Power Station may remain operational alongside Train 1 only (and that construction of Train 2 may not proceed). This operational arrangement would remain within the natural gas import, cooling water abstraction/ discharge, and electrical export limits of the Site and has been assessed, as relevant);

- the potential need for works to the Repurposed CO_2 Connection within the Repurposed CO_2 Connection Corridor, is subject to an ongoing safety case review; therefore, worst-case assumptions on the need for work have been assessed in this PEIR, where relevant;
- it is anticipated that the largest Abnormal Indivisible Load (AIL) will be received at one or more local ports in North Wales or north-west England. Each port and access from each to the Main Site for AILs has been included and assessed in this PEIR; and
- the design will continue to evolve and be refined through a continuous process of environmental assessment, and as a result of feedback from the Stage 2 statutory consultation stage and ongoing technical engagement up to the point of submission of the Application.

Alternative Technologies

6.3.12 The UK Government is currently developing its policy and investment framework to support low carbon technologies. Therefore, as confirmed in the EIA Scoping Report (**Appendix 1-A, PEIR Volume IV**), a screening review was carried out of all possible technologies which could provide low carbon dispatchable power within the timeframe under consideration.

6.3.13 These were shortlisted and evaluated based upon a techno-economic assessment including consideration of:

- infrastructure availability at the existing Connah's Quay Power Station site;
- technical and commercial maturity of technology options;
- sequencing with the HyNet CCUS Cluster;
- emerging business models, such as the Dispatchable Power Agreement (DPA); and
- potential for the Proposed Development to be operational by 2030.

6.3.14 A CCGT generating station, suitable for generating dispatchable low carbon electricity enabled with a post-combustion Carbon Capture Plant (CCP) was selected as the preferred basis of design by the Applicant for Pre-FEED following completion of the techno-economic assessment. The Applicant is progressing with this single low carbon technology option which allows for connection into the proposed HyNet CO_2 Pipeline Project.

Alternative Layouts

6.3.15 Within the EIA Scoping Report (**Appendix 1-A PEIR Volume IV**), an area was included in the Indicative Site Boundary to the east of the Main Site that was proposed as an 'Indicative Enhancement Area' (referred to in this PEIR as the 'Construction and Indicative Enhancement Area' or 'C&IEA'). This area is currently unused and partially vegetated, with areas of relic hardstanding material and overhead electrical lines (OHL). It has been confirmed that this C&IEA would be unsuitable for the development of permanent assets as part of the Proposed Development due to its location, size, infrastructure access, and exclusion zones around existing OHL. However, the C&IEA may be used for temporary laydown and construction compounds during construction,

subject to height restrictions for the OHL exclusion zones and proposed ecological safeguard zones to protect sensitive habitats and species within the Dee Estuary. Following construction, some or all of the C&IEA may be used for the purposes of ecological mitigation and/ or biodiversity enhancement measures.

6.3.16 A number of different locations within the wider existing Connah's Quay Power Station site were considered for the Proposed Development but have been discounted for various environmental and technical reasons, including the need for and availability of contiguous space and the presence of existing infrastructure that would be intended for continued operation (in whole or in part) during construction.

6.3.17 Therefore, any further consideration of layout was limited to options within the Main Site as outlined. The constraints of the shape and extent of the Main Site, the layout of existing OHL routes and exclusion zones within the Main Site, and the presence of existing infrastructure required for continued operation of the existing Connah's Quay Power Station site, necessitated an overall linear layout for the Proposed Development. The locations of the Dee Estuary designations and surrounding habitats further limited the potential to move the footprint of the Proposed Development within the Main Site further north-west, in order to minimise potential impacts to the ecological receptors.

6.3.18 The Applicant has committed to a two Train design, each equivalent with some shared facilities. There was consideration of a more-compact arrangement for each Train (e.g. one north-west Train and one south-east Train) within the Main Site, in contrast to the two linear Trains as outlined in **Chapter 4: The Proposed Development**. However, this would lead to two distinct massings of the tallest structures of each Train, separate from each other, whereas the two linear Trains approach would place these tallest structures side-by-side, which reduces the overall massing of the Proposed Development. Therefore, the two linear Trains were selected for the Proposed Development.

6.4 Conclusions and Next Steps

6.4.1 The *'Do Nothing'* approach of not replacing the existing Connah's Quay Power Station before or at the end of its operational lifespan has been discounted due to the effects this would have at the local, regional, and national scale in terms of energy security and capacity, economic activity and supply chains, and employment, which are considered to be unacceptable.

6.4.2 The existing Connah's Quay Power Station site was identified as being the most suitable site for the Proposed Development given its proximity to the HyNet CCUS Cluster and infrastructure that is in development via the HyNet CO_2 Pipeline Project.

6.4.3 Within the Applicant's landholding at the existing Connah's Quay Power Station site, the Main Site was identified as being the most suitable for the following key reasons:

- absence of major structures requiring demolition, treatment and removal on the Main Site footprint, allowing for continuation of electricity generation during construction (if either construction approach described in **Chapter 2: Assessment Methodology and Consultation** is adopted);

- sufficient space is available within the Main Site plot to accommodate the power generation and carbon capture equipment without encroaching on OHL exclusion zones;
- the Main Site enables connections to be developed to existing electrical, gas and, in the future, CO_2 pipeline infrastructure; and
- adequate supplies of cooling water are available from the adjacent Dee Estuary, utilising existing and / or new abstraction and discharge infrastructure. .

6.4.4 The EIA Regulations require that an ES should include an outline of the main alternatives that have been studied by the Applicant and an indication of the main reasons for its choices, taking into account the likely significant environmental effects of each alternative. Under the EIA Regulations there is no requirement to assess alternatives, only a requirement to provide a review of those alternatives that have been considered.

6.4.5 Where alternatives are examined and assessed during the application process, information on the potential options and reasons for selection (or otherwise) will be included within the ES. Where, at the time of submission of the Application for development consent, alternatives are still necessary for any particular element of the Proposed Development, the EIA will consider and assess the 'worst-case' impacts of the alternative options, in accordance with the Rochdale Envelope approach that is often applied in planning applications and is outlined in the Planning Inspectorate (PINS) Advice Note 9.

References

Ref 6-1 HM Government (2017) Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. Available online at: https://www.legislation.gov.uk/uksi/2017/572/contents/made (Accessed 27/06/24).

Ref 6-2 DESNZ, 2023; *Overarching National Policy Statement for Energy (EN-1)* [online]. Available at: https://assets.publishing.service.gov.uk/media/65bbfbdc709fe1000f637052/overarching-nps-for-energy-en1.pdf (Accessed 26/06/2024).

Ref 6-3 DESNZ, 2023; *National Policy Statement for Natural Gas Electricity Generating Infrastructure (EN-2)* [online]. Available at: Available at: https://assets.publishing.service.gov.uk/media/65a787fc640602000d3cb7c0/nps-natural-gas-electricity-generating-infrastructure-en2.pdf (Accessed 26/06/2024).

Ref 6-4 DESNZ, 2024; *CCUS Track-1 Expansion. HyNet Application Guidance* [online]. Available at: https://assets.publishing.service.gov.uk/media/659e8ba6e96df5000df843e0/ccus-track-1-expansion-hynet-application-guidance.pdf (Accessed 26/06/2024).

Ref 6-5 PINS (2018). Advice Note 9: *Rochdale Envelope* [online]. Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-nine-rochdale-envelope/ (Accessed 26/06/2024).