Wrexham Power Limited ◆ Proposed Wrexham Energy Centre

Overview of strategic development options

1. INTRODUCTION

1.1. Wrexham Power Limited (WPL) is promoting the development of a new combined-cycle gas turbine (CCGT) power station in North Wales. The proposed power station will have an electrical generation capacity of approximately 1,000 MW (megawatts). It will require a connection from the national gas transmission network and a connection to the electricity grid. The proposal constitutes a Nationally Significant Infrastructure Project (NSIP) under the terms of the Planning Act 2008 and therefore the application for development consent is to be made to the Planning Inspectorate.

1.2. This technical note is to support preliminary consultation on the power station proposals. It provides an overview of the strategic options that have been considered in the development of the proposals for CCGT generation at Wrexham, including an outline of the process undertaken to develop the current options for the configuration of the power station, the site location and layout, and the route corridors for the gas and electricity connections.

2. APPROACH

2.1. A review of development options is of value in several respects. It assists a developer to identify appropriate technical options and to select a site or sites appropriate for its needs. From an environmental impact assessment perspective, consideration of alternatives helps the decision-maker to determine whether a proposed site is acceptable, or whether less harmful alternatives are available. In planning terms there can be specific requirements to consider the availability of alternatives where, for example, protected landscapes are affected by a development proposal.

2.2. In the current context the project promoter is considering a number of criteria and options, and this technical note presents these as follows:

- Part 3 - the role of gas as part of the national electricity generation mix, the technology options for gas fired power stations and the selection of CCGT as the preferred technology.

- Part 4 - the basic elements of a CCGT power station, the gas and electricity grid connection requirements and the extent of land needed for the development.

- Part 5 - the national and local search for sites, the consideration of sites in the Wrexham locality and the selection of the site off Bryn Lane at the Wrexham Industrial Estate.

- Part 6 - the location of the power station within the land available at the site off Bryn Lane, the planning and environmental considerations and the options for the technical and spatial configuration of the CCGT.

- Part 7 - the route corridor options for the gas connection.

- Part 8 - the route corridor options for the electricity grid connection.

- Part 9 – consideration of the carbon capture and storage requirements.

- Part 10 – a summary of the consideration of the strategic options for the CCGT development proposals and the next steps.

3. ELECTRICITY GENERATION OPTIONS

3.1. Electricity can be generated from a range of sources – gas, coal, oil, nuclear and various renewable energy sources including wind, solar and hydro power. The future role of gas-fired power stations in the UK is summarised in a separate technical note on the need case for the current project. The general position is explained in paras. 3.6.1 to 3.6.2 of the government's Overarching National Policy Statement on Energy (EN-1), as follows.

> *3.6.1 Fossil fuel power stations play a vital role in providing reliable electricity supplies: they can be operated flexibly in response to changes in supply and demand, and provide diversity in our energy mix. They will continue to play an important role in our energy mix as the UK makes the transition to a low carbon economy, and Government policy is that they must be constructed, and operate, in line with increasingly demanding climate change goals.*
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> *3.6.2 Fossil fuel generating stations contribute to security of energy supply by using fuel from a variety of suppliers and operating flexibly. Gas will continue to play an important role in the electricity sector – providing vital flexibility to support an increasing amount of low-carbon generation and to maintain security of supply.*

3.2. WPL's owners, a joint venture partnership between St Modwen and Glenfinnan Properties, is seeking to develop several CCGT projects, consistent with the national energy strategy.

4. THE SELECTION OF CCGT POWER STATION TECHNOLOGY

4.1. Modern gas-fired power stations can be based on a number of gas turbine technologies. Technology selection takes account of a range of factors:

- Technical/engineering issues

- Materials in and out
- Environmental impact
- Best Available Technology (BAT) for emissions clean-up
- Overall performance characteristics
- Planning issues
- Layout area
- Build programme
- Economics

4.2. Open cycle gas turbine (OCGT) technology has a single gas turbine and offers moderate electrical efficiency. Combined cycle gas turbine (CCGT) technology has both a gas and steam turbine creating additional electrical power and with advances in CCGT technology in recent years, their electrical efficiency is increased.

4.3. A CCGT power station utilises an efficient combination of gas and steam turbines to generate electricity and heat.

4.4. In the gas turbine, air is compressed and passed into a combustion chamber where it is used to burn the natural gas fuel. Hot combustion gases are produced at high pressure and this thermal and pressure energy is converted to mechanical energy through the gas turbine. The gas turbine spins a generator that produces electrical power.

4.5. The excess heat from the gas turbine passes to a heat recovery steam generator (HRSG) where it heats water to produce steam. This steam is then fed under pressure into a second turbine (the steam turbine) that is also linked to a generator in order to produce additional electrical power.

4.6. A typical CCGT of nominally 1,000MW could have two separate turbine houses each containing a gas and steam turbine driving a common generator. Exhaust gases would be discharged to the atmosphere via one or two chimney stacks. The power station would require a cooling system to condense the exhaust steam from the steam turbine. It would also include an electricity sub-station on-site for the export of electricity to the grid. The sub-station could be one of two types – an air or a gas insulated sub-station (AIS or GIS). AIS switchgear occupy a larger footprint than GIS switchgear. In addition there would be smaller buildings for the station control room, offices, stores and water treatment plant. In total, the typical area occupied by a CCGT power station would be approximately 10 - 15 hectares. The key building elements could expected to be as follows:

- Turbine buildings – typically 35m wide, 65m long, 25 to 30m high
- HRSG buildings – typically 25m wide, 60m long, 35 to 45m high
- Cooling system – approximately 55m square, 25 to 30m high

- Chimney stacks – approximately 8m in diameter and in the region of 65 to 70m high

4.7. The capture and storage of carbon emissions (CCS) from power stations that burn fossil fuels is the subject of ongoing policy development by the government. At present, there is no requirement for the emissions of carbon to be captured from this power station and the technologies to do this are still under development. However, it is a requirement for sufficient land to be available to enable the retro-fitting of carbon capture technology at some future date. Up to 5 hectares of land could be needed for future carbon capture plant and equipment.

4.8. Large power generations facilities present a potential opportunity to provide local users (existing businesses and future new developments) with a secure and economic source of combined heat and power (CHP). This would require heat transport pipework and electrical cables to be installed typically through existing roads and verges.

4.9. The fuel burnt in the gas turbines is natural gas. The power station would therefore require a connection to the gas national transmission system (NTS) - a network of high pressure gas pipelines that is managed by National Grid.

4.10. The electricity generated by the power station would be transmitted to one of National Grid's electricity substations. This would be via overhead electricity cables on pylons or it could be through underground cables.

5. SITE SELECTION

Strategic Site Location

5.1. WPL's owners are undertaking a strategic search for potential power station sites in the UK, using a phased methodology. Search criteria include the availability of connections to the National Transmission System (NTS) for gas supply and connections to the National Grid for the export of electricity. The future availability of options for the export and storage of carbon dioxide is a further locational consideration.

5.2. There are relatively few places in Britain where these three requirements – gas supply, electricity export and potential future carbon export – coincide. One of those places is the Wrexham area.

5.3. Having identified Wrexham as an area of interest, specific opportunities to connect to the NTS and the National Grid are being investigated in consultation with the operators of these networks. Provisionally, a gas connection point has been identified between the villages Bowling Bank and Cross Lanes, to the south of the Wrexham Industrial Estate. The most appropriate place to connect a power station to the National Grid in the Wrexham area is the existing Legacy substation, to the west of Rhostyllen, south-west of Wrexham.

5.4. The next stage of the site selection process involves finding a suitable site with the potential to achieve the physical links to the identified connection points on the gas and electricity networks which is commercially available. To do this, it is necessary to define a basic site requirement. This may be summarised as:

- a broadly level site of c. 10 to 15 hectares, with:
- undeveloped corridors of land leading to the gas and electricity grid connection points, and -
- road access suitable for construction and operational traffic;
- avoiding areas of designated landscape, natural or heritage interest and land in flood risk areas, and with the potential to supply surplus heat to land uses neighbouring the site;
- in locations suitable separated from housing and other sensitive land uses such as schools and -
- ideally on previously developed or 'brownfield' land, and/or land allocated for industrial use, which –
- the landowner is prepared to lease or sell to WPL on commercial terms.

5.5. WPL has undertaken a broad search for sites in the Wrexham area that meet these criteria. In summary, the outcome of this search thus far has been that:

- no suitable sites are available within the urban area of Wrexham itself;
- areas to the west, south and north of Wrexham are constrained by the undulating terrain and a landscape characterised by well-defined small fields with wooded boundaries.
- areas to the north of Wrexham are similarly constrained, and are considered to be too remote from the gas and electricity grid connection points;
- several site options meeting many of the criteria listed above are available at the Wrexham Industrial Estate, a large industrial complex on the eastern side of Wrexham.

Site Selection

5.6. WPL proceeded to define three sites for further evaluation. These are:

1. The former Firestone factory site at Pentre Maelor on the southern side of the industrial estate;

2. The former Owens Corning fibre-glass factory site on the north-eastern side of the industrial estate;

3. Land to the north of the Owens Corning site off Bryn Lane ('the north site'), which is being promoted by the owner for industrial development.

5.7. Each of these sites is considered to be capable, physically, of accommodating a power station and the associated area that needs to be reserved for potential future carbon capture. Each has suitable road access and open corridors of land to the preferred the gas and electricity grid connection points.

5.8. A more detailed review of the three site options revealed the following.

5.9. The Firestone site is close to the Pentre Maelor residential neighbourhood, which is subject to development plan policies that seek to protect residential amenity from surrounding industrial uses. Existing commercial development in the area is low-lying, meaning that the power station would be a more prominent feature in the locality.

5.10. The Owens Corning site is well separated from residential uses and in an area of the industrial estate that is more industrial in character. To the west lies the Kellogg's factory, and to the south is a large high-bay logistics building. Planning permission has been granted for a large industrial or distribution shed on the site, although this has not been implemented. The site also benefits from some screening from the countryside to the north and east through the presence of mature vegetated field boundaries, which could be reinforced. Previous buildings on the site, which have now been demolished, exceeded 30m in height.

5.11. The north site has previously been refused planning permission for industrial and warehouse development, and is currently the subject of revised proposals for a similar development. It is a wholly greenfield and currently more rural in character.

5.12. Following assessment and subject to the current consultations, WPL's preference is to promote the Owens Corning land for the proposed CCGT development. With respect to the site selection criteria identified above, the site:

- is a broadly level site with sufficient room for all operational requirements and for a generous boundary landscape treatment;

- it has undeveloped corridors of land leading all the way to the gas and electricity grid connection points;

- road access is suitable for construction and operational traffic, and is currently being improved through the construction of the new Wrexham Industrial Estate Link Road;

- the site avoids areas of designated landscape, natural or heritage interest and land in flood risk areas;

- it affords the potential to supply surplus heat, and potentially gas and electricity to some of the larger existing occupiers on the industrial estate;

- neighbouring land uses are compatible with a modern CCGT development, and site is, as noted, suitably separated from housing and other sensitive land uses such as schools;

- the site is partly brownfield and partly greenfield and has an existing planning permission for a large scale industrial use on a similar footprint to a power station;

- the landowner is prepared to make the site available.

Operational Considerations

5.13. In selecting a suitable site for a new CCGT power station, the following factors must be considered:

- Sufficient space is needed to install, access, operate and maintain the facility in a safe and economic manner.

- A suitable source of gas is required that can be delivered to the site economically.

- Either a local consumer for the electricity generated, and / or the ability to economically export the electricity to the National Grid.

- A suitable medium (air and / or water) to provide cooling to the steam turbine exhaust steam condenser and for all other auxiliary cooling requirements.

- A suitable source of water for the boilers and for all other auxiliary requirements.

- Surface water run-off and other environmentally benign liquid effluents can be discharged to a local watercourse or to sewer.

- All other liquid effluents can be discharged to a suitable sewer or treated on-site.

- The ground conditions are suitable for the installation of the civil structures and major plant items.

- The effects of the construction and operation of the facility on humans and the environment from emissions to air, land and water including nuisance can be adequately mitigated.

- All necessary permits and licences are in place or can be reasonably obtained.

6. POWER STATION DESIGN OPTIONS

CCGT location within the Site

6.1. The Owens Corning site is relatively large and would allow for a variety of power station layout and orientation options. A number of technical, planning and environmental factors have been considered in identifying options for the location and layout of the CCGT within the site. It has been decided that the focus of attention should be a location in the south-western part of the broader area of land under review. This conclusion was based on a combination of reasons:

- The southern and western part of the site is adjacent to the existing industrial estate where the character of the site is more urban and industrial. The remainder of the site becomes progressively more rural in character to the north and the east.

- The south western location would afford the greatest separation from the nearest residential properties to the north and east. This would reduce the potential for nuisance such as noise and visual impacts.

- The southern part of the site has been previously developed for industrial use and as such is brownfield land. The remainder of the site is greenfield and is used as farmland.

- Connections to the gas and electricity grid are to the south of the site and therefore a southern location would minimise the length of these route corridors.

- Neighbouring land uses that might be customers for heat generated by the CCGT lie to the south and west of the site.
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Technical options for the configuration of the CCGT

6.2. The principal technical considerations for the development of options for the CCGT are:

- the performance of different configurations versus the relative costs;

- water supply and technology options for the cooling system;

- general technical criteria for layout of the CCGT plant.

6.3. The performance of a number of different configurations is being considered in terms of electrical output, thermal efficiency and heat rate (i.e. fuel input per unit electrical output) based on configurations for a number of UK technology suppliers (companies such as Siemens, GE and Alstom). This data is being compared to the relative capital and unit costs to provide an understanding of economic performance of the options.

6.4. The cooling options considered include:

- Once-through cooling – cooling water is abstracted continuously from a water source such as a river, passed through the steam condenser and discharged back to the water source at a higher temperature via an outfall pipe. However, the volume of water required for this application is significant and generally only suitable for coastal or estuary locations.

- Hybrid evaporative cooling – cooling water is abstracted continuously from a water source as for once-through cooling, but is cooled and re-circulated rather than being continuously discharged. Hybrid systems are used for new-build CCGT plant and incorporate a wet and a dry section to avoid visible water vapour being released. Whereas these use less water than once-through cooling and therefore the environmental effects of abstraction are reduced, they still require continued abstraction and discharge.

- Air-cooling – air cooled condensers are widely used for new-build CCGT plant. They avoid the need for large water abstraction and discharge, although they are less efficient than water cooled systems, and the relative costs and performance of air cooled condenser plants often makes them less attractive than water cooled plants.

6.5. Due to the lack of a suitable source of water and the adverse environmental effects associated with the abstraction and discharge of water for the once-through and hybrid evaporative options, air cooled condensers are under consideration as the preferred option for the Wrexham site.

6.6. The general technical criteria that then determine the layout options for the CCGT facility include the following:

- the air intakes to the gas turbine should be sheltered from the prevailing wind to minimise the risk of rain, snow or foreign objects being entrained in the intake causing damage;

- the air cooled condenser should be located downwind of the gas turbine air intake to prevent warm air being drawn into the air compressor and affecting its performance;

- access to the site would be in the south-west from Bryn Lane with forms the western boundary of the site.

Combined Heat and Power

6.7. An initial assessment of the potential to employ CHP at this site has been made with reference to the UK CHP Development Map, produced by the Department of Energy and Climate Change (DECC). The map shows that Wrexham Industrial Estate has a sizable heat load, with the usage sector being predominantly small industrial facilities.

6.8. The infrastructure of the estate would also indicate that the installation of a district heating ring main to serve users might be feasible however, in the case of other potential CHP developments progress has been halted due to ransom strip ownership issues.

6.9. Early indications on the feasibility of employing CHP at this site are therefore favourable but further study is required to confirm its technical and economic potential.

Environmental Considerations

6.10. Preliminary environmental information on the setting of the Wrexham Industrial Estate and the likely environmental aspects of the operation of a gas power station has been gathered. This information will be further developed through more detailed surveys and studies as the design of the proposals is developed, but at this stage it has enabled the options for the site to take account of environmental factors at an early stage.

6.11. The environmental aspects considered have included the following:

- Air quality – the emissions to atmosphere via the chimney stacks will mainly comprise water vapour, carbon dioxide and nitrogen oxides. Emissions of other substances including particulates are likely to be negligible as the combustion of gas in a CCGT is a highly efficient process. Nitrogen oxides can have implications for local air quality and public health, and can also impact on ecosystems through nitrogen deposition. Background concentrations in the locality of the industrial estate are likely to be relatively low given its semi-rural location. There are a number of internationally important ecological sites in the wider area such as the River Dee. Air emissions would be the subject of strict operational conditions imposed by the environmental regulators and would be the key determining factor in the height of the chimney stacks as these need to be of sufficient height to afford adequate dilution and dispersion of the air emissions.

- Noise – whereas the industrial estate has a number of local noise sources of which some are noticeable over a wide area, there are parts of the estate particularly on the fringe that represent a zone of noise transition from industrial/urban to rural. A gas fired power station could have the potential to increase this noise. A detailed and thorough consideration of the location of noise generating plant / equipment away from noise sensitive areas will be required and options for noise insulation should be included within the design.

- Ecology – the potential sites identified have comprised both derelict Brownfield land that has become increasingly re-naturalised in recent years and Greenfield sites. Within the sites and the wider area are a variety of wildlife habitats of ecological value. Ponds, woodland scrub and hedgerow features are of particular interest and there are ideal habitats for important and protected species. In general, it is likely that these features can be avoided, retained and enhanced as part of the development proposals, or their loss can be adequately mitigated.

- Landscape – the sites that have been considered are within areas of transition between the large industrial complexes of the Wrexham Industrial Estate and open countryside. The power station would be set against a backdrop of other structures of industrial character. Development of a power station presents the opportunity to create a more sympathetic edge to the industrial estate if located in a zone of transition from urban to rural, with a boundary landscape treatment that could provide ecological enhancement in addition.

- Cultural heritage and archaeology – the nearest Scheduled Monuments are at distances of over 2km from the Wrexham Industrial Estate. Within the local area are numerous Listed Buildings such as farm properties and churches. A gas-fired power station could affect the setting of such Listed Buildings and therefore its location should seek to minimise this and keep the development within the context of the existing industrial estate. Given that the sites under consideration at the industrial estate have either been developed previously, or in view of the limited extent of buried archaeological remains identified in the wider locality, the likelihood of there being buried remains that could affect the development of a power station at the Wrexham Industrial Estate is considered to be low. However more detailed studies will be undertaken as the proposals are developed.

- Flood risk – the land associated with the former Owens Corning site off Bryn Lane is not at risk of flooding from rivers or the sea. It is likely that surface water drainage associated with power station development in this locality can be managed within the development proposals. The land at the former Firestone site is partly within the flood plain and flood alleviation and/or compensation would be required.

- Land contamination – given that land under consideration has been used previously for industrial activities, there is potential for historical ground contamination to be present. This is not an unusual aspect of developing a former industrial site and can readily be managed through appropriate site investigations and remediation. Available information on the Owens Corning site indicates that contamination is limited comprising 'hotspots', for example where oils have been spilled or have leaked.

6.12. In summary, various environmental sensitivities have been identified including the landscape, ecological and noise effects of the project. However, it should be possible to arrive at an acceptable form of development through a design that responds proactively to these issues.

CCGT Layout and Orientation

6.13. The layout and orientation of the elements of the CCGT facility within the south western part of the site has taken account of the technical, environmental and planning criteria. Three layout options have been developed to inform preliminary consultation on the proposals. The three options all include a standard configuration for a CCGT with two turbine houses, heat recovery steam generator buildings, stacks and air cooled condensers and a single switchyard. The three options then present a range of orientations of this standard layout.

6.14. **Option East-West** – shows the standard configuration for a CCGT oriented west-east across the south western part of the site. In this option the vent stacks and the tallest buildings are located close to the existing industrial estate to minimise the visual impacts. The noise generating equipment is also located close to the existing industrial estate to provide separation from residential houses to the east. Alignment conforms to the general alignment of buildings off Bryn Lane. Some ecological features on site such as trees and ponds would need to be replaced and enhanced landscaping would be incorporated along the eastern boundary to mitigate some of the visual impacts. The land set aside for carbon capture is shown to the north of the CCGT footprint.

6.15. **Option North-South** – shows the standard configuration for a CCGT oriented north-south cross the site. This enables the carbon capture area to be located to south and west of the power station in close proximity to the stacks which would then minimises the length of pipework needed between the two for carbon capture retro-fitting. The stacks and tall buildings are in relatively close proximity to the existing industrial estate and the noise generating equipment is a little closer to the residential houses to the east. Many of the ecological features on site such as trees and ponds would be retained though some mitigation and enhancement would be required. Enhanced landscaping would be incorporated along the eastern boundary to mitigate some of the visual effects of the development.

6.16. **Option North East – South West** - shows the standard configuration for a CCGT oriented north east - south west across site in keeping with existing hedgerows boundaries and field patterns to the east. The stacks and tall buildings including the noise generating equipment are in close proximity to the existing industrial estate affording good separation from the residential houses to the east. The switchgear is located to the north-east corner of the site as this both minimises the length of cabling from the transformers and enables the carbon capture area to be adjacent to the stacks and towards the west of the site. Many of the ecological features on site such as trees and ponds would be retained though some mitigation and enhancement would be required. Enhanced landscaping would be incorporated along the eastern boundary to mitigate some of the visual impacts.

6.17. These options will continue to be tested in response to the feedback received from the current public consultation.

7. GAS CONNECTION

7.1. The proposed power station development would require a connection to the gas national transmission system (NTS) for its fuel supply. At its closest, the NTS is approximately 3km to the south west of the site. An alternative connection route would be to the NTS where it is located to the east of the site where it is east of the River Dee. However, this route would be twice as long, would have the technical issue of crossing the River Dee and could raise significant environmental concerns not least due to the international statutory ecological designation of the River Dee. Therefore the shortest connection route is considered to be the most feasible from a technical and environmental perspective.

7.2. At this stage, the exact location of the gas pipeline connection has not been determined as this would need to be informed by more detailed technical and environmental studies and the outcome of the current public consultation. A potential route corridor has been identified within which the connection is likely to fall. The pipeline would pass south from the site and on the eastern side of the industrial estate, cross Oak Road and the River Clywedog to the B5130 in the south west.

7.3. The topography of the route corridor is generally flat and level and there are no significant engineering challenges such as major highway or rail crossings. The land use is generally farmland with mature hedgerows and woodland. It should be possible to locate a route that would minimise the loss of trees. There are numerous small ponds and potential habitats for notable and protected species, and the construction of the pipeline will need to be carefully planned and managed to ensure that the potential effects on farms and ecology are adequately mitigated.

8. ELECTRICITY GRID CONNECTION

8.1. The proposed power station will need to connect to National Grid's electricity network. The consideration of grid connections has taken account of the power output from the new station and the maximum capacity that can be exported from the site considering the capacity of the current or planned future National Grid infrastructure. Preliminary discussions have been held with National Grid to gather information on their current and planned investments into the electricity infrastructure in this region. Whether the connections are overhead lines or underground cables has complex technical, cost and environmental pros and cons. Therefore the general options for such grid connections have been considered in the first instance in order to broadly identify the connection route corridors, before decisions regarding overhead lines versus undergrounding are made. At this stage, the general options are:

- connection to the network of existing 400kV lines;
- connection directly to a substation via new 400kV lines;
- connection to a substation requiring the upgrade of existing lines.

8.2. The nearest 400kV lines are at some distance from the site to the west of Wrexham and therefore connection to existing 400kV lines is not practicable.

8.3. The nearest substation to the proposed CCGT site is located at Legacy which is approximately 11km to the west of Wrexham, on the B5605 between Rhosllanerchrugog and Rhostyllen. An alternative that has been considered is the Capenhurst substation however, the connection route to Capenhurst is significantly longer at 26km to the north of the site and therefore has been discounted.

8.4. Between the CCGT site and the Legacy substation, passing to the south of Wrexham, are the existing overhead lines for the 132kV local distribution network. The conclusion to connect to the Legacy substation therefore presents two potential options:

- A direct connection to the Legacy substation via approximately 13km of new 400kV overhead lines, potentially within the route corridor of the existing 132kV lines.
- Connection to the Legacy substation through an upgrade to the existing 132kV overhead lines, requiring approximately 5km of new overhead lines.

8.5. The exact location of the grid connection has not been determined as this must to take account of more detailed technical and environmental studies. However, a potential route corridor has been identified within which the connection is likely to fall. The connection would pass south from the site and

to the east of the industrial estate, then continuing west to the Legacy substation around the southern outskirts of Wrexham.

8.6. The land use in the route corridor is generally farmland with mature hedgerows and woodland. There appears to be the potential to align connections in such a way as to achieve a reasonable separation from residential properties. There are numerous small ponds and potential habitats for notable and protected species. There is a potential for buried archaeology within the route corridor and many areas that would be sensitive to visual impacts.

8.7. The existing overhead cables cross Wat's Dyke and Offa's Dyke, and passes to the south of Erddig Park, a National Trust property. There are also Scheduled Ancient Monuments listed buildings in the route corridor.

8.8. No significant engineering challenges have thus far been identified in the route corridor such as major highway, rail or river crossings. The construction of the electrical connection will need to be carefully designed to ensure that the impacts are adequately mitigated.

9. CARBON CAPTURE AND STORAGE

9.1. The Department of Energy and Climate Change (DECC) has published a guidance note that requires applications for new power stations of greater than 300 MWe output to demonstrate that they are 'Carbon Capture Ready'. The guidance requires applicants to demonstrate that:

- there is sufficient space on or near the site to accommodate carbon capture equipment
- a suitable deep geological storage exists offshore
- it is technically and economically feasible to retrofit and operate the equipment in the future, and to transport the capture carbon dioxide to the proposed storage area.

9.2. The guidance requires that applications show the potential route corridors of the carbon pipelines and advises that the corridors considered should be 1km wide for the first 10km and then 10km wide thereafter.

9.3. Three potential carbon pipeline routes from the Wrexham Industrial Estate have been identified. These would pass in a north westerly direction towards the Irish Sea.

10. CONCLUSIONS

10.1. WPL is engaged in a comprehensive review of development options that embraces site selection, consideration of alternative route corridors for gas and electricity connections and potential future carbon export, the potential to supply energy to neighbouring land uses, and design and layout options for the power station itself.

WPL invites feedback on the adequacy of this approach and the means by which it can be implemented to best effect in the environmental, social and economic interests of Wrexham and surrounding communities.