

## **PROPOSED MEAFORD ENERGY CENTRE**

### **THE NEED CASE TECHNICAL NOTE**

#### **INTRODUCTION**

1. Meaford Energy Limited (MEL) is promoting the development of the Meaford Energy Centre and Connections (MEC) which is a new combined cycle gas turbine (CCGT) power station at Meaford Business Park, Staffordshire. The CCGT power station will have an electrical generation capacity of up to 299 megawatts (MW). The development will comprise the power station and the integral gas pipeline between MEC and the local gas transmission network.
2. The proposal constitutes a Nationally Significant Infrastructure Project (NSIP) under the terms of the Planning Act 2008, as its capacity is greater than 50MW, and therefore an application for a development consent order (DCO) is to be made to the Planning Inspectorate (PINS), who will examine the DCO application on behalf of the Secretary of State.
3. This technical note is to support the preliminary consultation on the MEC proposals and provide a background on the need for a CCGT power station at Meaford Business Park.

#### **NATIONAL NEED**

4. The Gas Generation Strategy from Dec 2012 has a foreword from Ed Davey MP, Secretary of State for Energy and Climate Change. He says, *'As we put the UK on course to meet our ambitious emissions reduction targets, existing and ageing power plants will close, large amounts of it through the next decade. Gas – as a flexible source of generation, which emits half the CO<sub>2</sub> of coal – will be needed to help balance the relatively inflexible and intermittent low-carbon generation our policies will bring forward. It will provide crucial capacity to keep the lights on and the economy working. New gas plants, which are relatively cheap and quick to build, will be needed to support the system during this period, providing significant power while greater amounts of renewables technologies are deployed.'*
5. The Overarching National Policy Statement for Energy (EN-1) sets out the need for new electricity generating stations. EN-1 states, at paragraph 3.3.1 *'Electricity meets a significant proportion of our overall energy needs and our reliance on it is likely to increase as we move towards our 2050 goals'*, and at paragraph 3.3.2 states that *'The Government needs to ensure sufficient*

*electricity generating capacity is available to meet maximum peak demand, with a safety margin or spare capacity to accommodate unexpectedly high demand and to mitigate risks such as unexpected plant closures and extreme weather events’.*

6. EN-1 also indicates, at paragraph 3.3.7 that *‘at least 22 GW of existing electricity generating capacity will need to be replaced in the coming years, particularly to 2020. This is as a result of tightening environmental regulation and ageing power stations.’* In addition, at paragraph 3.3.9 that *‘any reduction in generation capacity from current levels will need to be replaced in order to ensure security of supply is maintained’.*
7. EN-1 also states at paragraph 3.3.15 the urgency of the need for new electricity capacity: *‘In order to secure energy supplies that enable us to meet our obligations for 2050, there is an urgent need for new (and particularly low carbon) energy NSIPs to be brought forward as soon as possible, and certainly in the next 10 to 15 years, given the crucial role of electricity as the UK decarbonises its energy sector.’*

8. It is within this context that paragraphs 3.1.1 to 3.1.3 state:

*‘3.1.1 The UK needs all the types of energy infrastructure covered by this NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions.*

*3.1.2 It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.*

*3.1.3 The Planning Inspectorate should therefore assess all applications for development consent for the types of infrastructure covered by the energy NPSs on the basis that the Government has demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described for each of them in this Part.*

9. According to paragraph 2.2.23 of EN-1:

*The UK must ... reduce over time its dependence on fossil fuels, particularly unabated combustion. The Government plans to do this by improving energy efficiency and pursuing its objectives for renewables, nuclear power and carbon capture and storage. However some fossil fuels will still be needed during the transition to a low carbon economy.*

10. At the same time, the government is committed to ensuring that homes and businesses do not suffer through intermittent loss of electricity. Maintaining security of energy supply is therefore an important consideration. EN-1 indicates that the main challenges facing security of supply during the transition to a low carbon economy are:

- *Increasing reliance on imports of oil and gas as North Sea reserves decline in a world where energy demand is rising and oil and gas production and supply is increasingly politicised; and*

- *The requirement for substantial and timely private sector investment over the next two decades in power stations, electricity networks and gas infrastructure.*
11. The required increase in renewable energy capacity, to meet commitments under the EU Renewable Energy Directive, will require some back-up generating stations to support intermittent renewable sources of electricity. EN-1, paragraph 3.3.11 states:
- ‘...some renewable sources (such as wind, solar and tidal) are intermittent and cannot be adjusted to meet demand. As a result, the more renewable generating capacity we have the more generation capacity we will require overall, to provide back-up at times when the availability of intermittent renewable sources is low. If fossil fuel plant remains the most cost-effective means of providing such back-up, particularly at short notice, it is possible that even when the UK’s electricity supply is almost entirely decarbonised we may still need fossil fuel power stations for short periods when renewable output is too low to meet demand, for example when there is little wind.’*
12. CCGT power stations are well suited to providing a role as back-up plant at such times that are needed given that they can vary their generating capacity at relatively short notice, generating more electricity when required, and less when electricity consumption is lower.
13. A CCGT power station at the Meaford Business Park would therefore satisfy national need for electricity in the short-medium term resulting from the closure of existing generating stations, and provide back-up capacity in the longer term for renewable energy generation when required.

#### **THE CURRENT UK ENERGY MIX**

14. The Digest of UK Energy Statistics (DUKES) provides an annual review of energy generation and use in the UK. Table 5.7 from the 2013 digest details the contribution each generating plant type provides, which is reproduced at table 1 overleaf.

Table 1: Electricity generation capacity in the United Kingdom

	2008	2009	2010	2011	2012
<b>All generating companies</b>					
<b>Total capacity (MW)</b>	<b>83,678</b>	<b>84,831</b>	<b>90,471</b>	<b>89,050</b>	<b>89,241</b>
Conventional steam stations	35,572	35,660	36,036	34,170	30,970
Combined cycle gas turbine stations	28,191	28,631	33,305	32,389	35,320
Nuclear stations	10,979	10,858	10,865	10,663	9,946
Gas turbines and oil engines	1,641	1,779	1,779	1,706	1,651
Hydro-electric stations:					
Natural flow	1,518	1,524	1,521	1,545	1,549
Pumped storage	2,744	2,744	2,744	2,744	2,744
Wind	1,467	1,904	2,316	2,785	3,769
Renewables other than hydro and wind	1,566	1,732	1,905	3,048	3,292

15. Table 1 shows that generation capacity in the UK is dominated by conventional steam stations (predominantly fired by coal) and CCGT power stations, providing approximately 35% and 40% of the UK capacity respectively. Renewable energy capacity at 2012, including hydro-electric stations, accounted for less than 13% of capacity.

## **THE FUTURE UK ENERGY MIX**

16. Future energy mix in the UK is dependent on the deployment of renewable energy sources of electricity generation, with the government aiming to increase significantly the amount of electricity generated this way. Furthermore, electricity demand is anticipated to increase in the future, as outlined further below.
17. EN-1 notes at paragraph 3.3.22 that *'the UK would need at least 113 GW of total electricity generating capacity (compared to around 85 GW now), of which at least 59 GW would be new build.'*
18. This is further broken down in the policy statement as follows:
- around 33 GW of the new capacity by 2025 would need to come from renewable sources to meet renewable energy commitments;
  - it would be for industry to determine the exact mix of the remaining 26 GW of required new electricity capacity, acting within the strategic framework set by the government;
  - of these figures of 33 GW and 26 GW respectively, around 2 GW of renewables and 8 GW of non-renewable technologies are already under construction. This leaves a balance of 18 GW to come from new non-renewable capacity; and
  - the government would like a significant proportion of this balance to be filled by new low carbon generation and believes that, in principle, new nuclear power should be free to contribute as much as possible towards meeting the need for around 18 GW of new non-renewable capacity by 2025.
19. EN-1 continues at paragraph 3.3.24 to state that:
- 'It is not the Government's intention in presenting the above figures to set targets or limits on any new generating infrastructure to be consented in accordance with the energy NPSs. It is not the PINss role to deliver specific amounts of generating capacity for each technology type. The Government has other mechanisms to influence the current delivery of a secure, low carbon, affordable electricity mix.'*
- 'However, Section 3.6 of EN-1 outlines the role envisaged by the Government for fossil fuel electricity generation. Paragraph 3.6.1 states that "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.'*
20. Paragraph 3.3.2 goes on to say that 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.

## **PREDICTED UK ENERGY DEMAND**

21. The government has carried out an analysis of the potential future energy demand for the period up to 2050 in its 2050 Pathways Analysis, published in 2010. Whilst this indicates that the demand for energy as a whole is unlikely to change significantly, it indicates that demand for electricity could double by 2050 as a result of the electrification of much of industry, heating and transport which traditionally met their energy requirements through other sources.
22. Consequently, EN-1 states at paragraph 3.3.14 that *'Depending on the choice of how electricity is supplied, the total capacity of electricity generation (measured in GW) may need to more than double to be robust to all weather conditions. In some outer most circumstances, for example if there was very strong electrification of energy demand and a high level of dependence on intermittent electricity generation, then the capacity of electricity generation could need to triple. The Government therefore anticipates a substantial amount of new generation will be needed.'*
23. CCGT power stations, such as that proposed at the Meaford Business Park, are currently the most efficient method of generating electricity from fossil fuels (for example modern car combustion engines operate at an average efficiency of 25-30%, whilst CCGT power stations operate at an efficiency of upto 60%).

## **LOCAL NEED**

24. Meaford Business Park comprises 85 acres of land with planning permission for 1.2million sq ft of new employment use development.
25. Large power generation facilities such as Meaford Energy Centre 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).
26. CHP can be implemented more successfully where the necessary network is established prior to the construction of new buildings, and the Meaford Business Park site offers the opportunity to develop such a network to stimulate development of the remainder of the site.
27. A CCGT power station on Meaford Business Park would make the location more attractive to manufacturing, hi-tech industries and logistics occupiers, all of which would benefit from being located in close proximity to a secure supply of power together with the potential opportunity to take surplus heat generated by the proposed Meaford Energy Centre which will help reduce their carbon footprint.
28. Whilst not specifically a 'need', development of a CCGT power station at Meaford Business Park would be a catalyst for local economic development.

## **ELECTRICAL AND GAS CONNECTIONS**

29. As noted previously, the proposed CCGT power station would need to connect to the electricity network to allow electricity generated to be exported.
30. The consideration of an electrical connection has taken account of the power output from the new CCGT power station and the maximum capacity that can be exported from the site considering the capacity of the current or planned future infrastructure. Preliminary discussions have been held with the distribution network operator, Western Power Distribution (WPD), to gather information on their current and planned investments into the electricity infrastructure in this region.
31. During initial discussions with WPD various options were discussed. These options included:-
  - Connecting directing into WPD's 132kV lines or substations located within Meaford Business Park
  - Connection directly to a remotely located WPD substation via new 132kV lines
  - Connection to WPD network requiring the upgrade of existing 132kV lines
32. At this stage it has been identified that the existing WPD infrastructure within Meaford Business Park could accommodate the connection of the CCGT power station without the need for new 132kV lines or significant network reinforcement. If however following more detailed investigations the existing 132kV network cannot accept the power station, replacement/new 132kV lines could be required. Whether these lines are overhead lines or underground cables has complex technical, cost and environmental pros and cons.
33. The proposed CCGT power station would need a connection to the gas network for its fuel supply. Meaford Business Park is located less than 700m from existing National Grid local gas transmission system pipelines to the north and east of the site. An area in which a connection could be made by underground pipeline has been identified.
34. 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 feedback received during the current public consultation.

**CONCLUSION**

35. The national need for the development is set out in government policy through the relevant National Policy Statements.
36. The selection of Meaford Business Park as a location for the proposals is the direct result of technical and special needs which are required to facilitate the development of a CCGT power station, including an adequate sized site and proximity to gas and electricity networks.