Riverside Energy Park

Effect of Interconnectors on Riverside Energy Park Carbon Assessment

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CORY RIVERSIDE ENERGY

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1.1 Introduction

1.1.1 The application for the Riverside Energy Park (REP) Development Consent Order (DCO) was submitted to the Secretary of State on 16 November 2018.

1.1.2 A **Carbon Assessment (8.02.08, REP2-059)** for REP was submitted into the Examination at Deadline 2. This assessment demonstrated that REP will have a clear carbon benefit over landfill.

1.1.3 A written oral summary from the Issue Specific Hearing on Environmental Matters held on 5 June 2019 has been submitted by the Applicant at Deadline 3 (**8.02.19, REP3-027**). In **Paragraph 15.1** of this oral summary, the Applicant notes that the Examining Authority asked about the displacement of interconnectors in the context of the carbon assessment. This note responds to this question.

1.2 Purpose of this Note

1.2.1 The purpose of this note is:

- to explain how the interconnectors sit within the UK energy mix; and
- to explain whether this has an effect on the Carbon Assessment for the Proposed Development and, if so, how this affects the marginal electricity source associated with the Proposed Development.

1.2.2 This note demonstrates that:

- the main three interconnectors, from France, the Netherlands and Belgium, import power to the UK most of the time;
- while the power from interconnectors supports UK power demand, the variability is limited and for the majority of the time, unidirectional; and
- the conclusions of the Carbon Assessment for REP are remain unchanged because combined cycle gas turbines (CCGTs) represent the marginal power source.

1.3 Interconnectors from Mainland Great Britain

1.3.1 There are five interconnectors from mainland Great Britain to other countries:

- a 2,000 MW bidirectional connector to France (IFA);
- a 1,000 MW bidirectional connector to the Netherlands (BritNed);
- a 500 MW bidirectional connector from Scotland to N Ireland (the Moyle interconnector);

- a 500 MW bidirectional connector from Wales to the Irish Republic (the East-West Interconnector or EWIC); and
- a 1,000 MW bidirectional connector from Kent to Belgium (the Nemo interconnector) which came online in February 2019.

1.3.2 While the Moyle interconnector does not connect to a different country, the electricity grid in Northern Ireland is managed separately from the electricity grid in England, Scotland and Wales and so the interconnector is relevant to this note.

1.3.3 There are a further six interconnectors under development, as reported by the Office of Gas and Electricity Markets (Ofgem)[1], but these assets have been omitted from this assessment as they are not certain and are not operational at present.

1.4 Operational Interconnector Data

1.4.1 The Applicant has extracted data from the Gridwatch website[2], which aggregates data from the Balancing Mechanism Reporting Service (BMRS) website and reports it in a more usable form, so that comment on the operation of these interconnectors can be provided to the Examination. All data in this note is based on a 12 month period from 1 June 2018 to 30 May 2019.

- The French interconnector supplied energy to the UK for 93% of the time, with an average import of about 1.57 GW. For over 72% of the time, the import was more than 1 GW, which suggests that this interconnector normally supplies a significant amount of electricity to the UK.
- The BritNed interconnector supplied energy to the UK for 90% of the time, with an average import of about 0.85 GW. Again, the data suggests that this interconnector supplies a significant amount of electricity to the UK most of the time.
- The Moyle interconnector supplied energy to the UK about 41% of the time and exported energy from the UK for the remaining time. As it only supplied more than 200 MW for 10% of the time, this interconnector is a less significant contributor.
- The EWIC interconnector supplied energy to the UK about 44% of the time and for about half of this time supplied more than 400 MW. This interconnector therefore facilitates export of electricity to the Irish Republic more often than not.
- Since the Nemo interconnector became operational in February 2019. It has supplied energy to the UK almost all the time, importing an average of 800

[1] https://www.ofgem.gov.uk/electricity/transmission-networks/electricity-interconnectors

[2] http://www.gridwatch.templar.co.uk/

Data ascertained from Balancing Mechanism Reporting Service, a publicly available source of GB electricity Grid operational data.

MW. The data suggests that this interconnector supplies a significant amount of electricity to the UK most of the time, although its operational record is relatively short.

1.4.2 Adding together all the interconnectors, energy is imported to the UK for 95% of the time, averaging about 2.5 GW when importing. Since the Nemo interconnector came online in February 2019, this figure has increased to about 3.1 GW.

1.5 Interconnectors in the context of the GB Electricity Mix

1.5.1 The figures outlined in **Section 1.4** can be compared with typical electricity demand on the GB Grid, which was an average of 30.8 GW but with a maximum of 48.2 GW over the period. This demand was supplied by the sources identified in Table 2.1.

Table 2.1: Sources of GB Main Grid electricity (1st June 2018 – 31st May 2019) (data extracted from the Gridwatch website)

Source	Average (GW)	% of Average Demand	Min (GW)	Max (GW)
CCGT	13.19	42.8%	2.23	27.15
Nuclear	6.52	21.1%	4.26	7.98
Wind	4.69	15.2%	0.05	12.46
Biomass	1.94	6.3%	0.20	3.09
Solar	1.30	4.2%	0	9.63
Coal	1.11	3.6%	0	8.93
Hydro	0.38	1.2%	0	1.05
Pumped Storage	0.23	0.7%	0	2.39
Oil	<0.01	0.0%	0	0.78
French I/C	1.42	4.6%	-2.04	2.02
BritNed I/C	0.74	2.4%	-1.07	1.06
Moyle I/C	-0.10	-0.3%	-0.46	0.40
E-W I/C	0.04	0.1%	-0.54	0.52
Nemo I/C	0.25	0.8%	-1.01	1.00
Intermittent renewable generation sources				
Wind+Solar	5.99	19.4%	0.07	16.64

1.5.2 This data illustrates the continued importance of CCGT. Wind and solar contributed nearly 6 GW on average (nearly 20% of average grid demand) but ranged from virtually zero to 16.6 GW as a combination. Detailed analysis shows that peak wind generation and peak solar generation do not occur at the same time, and that peak solar generation tends to occur during periods of low demand.

1.5.3 With coal nearly eliminated, the only baseload plants are now nuclear and, to an extent, biomass. This means that only CCGTs can operate flexibly to match supply with demand, while allowing for the variability of wind and solar. Pumped storage, gas and diesel generators and battery plants also make a contribution in this regard although it is immaterial relative to CCGTs. As set out in Digest of UK Energy Statistics (DUKES) latest statistics[3], the installed capacity of pumped storage, gas and diesel generators totalled 4.42 GW at the end of December 2017, compared with 32.89 GW of CCGT capacity. Energy generated by gas and diesel engines is more carbon intensive than CCGTs and is therefore deprioritised by National Grid.

1.5.4 While the interconnectors support the balancing service, the data presented in Table 2.1 indicates that their contribution is limited. It is clear from the data that the French, BritNed and Nemo interconnectors are all transferring power to the UK mainland most of the time at more than 75% capacity, so their ability to balance demand is limited. The Moyle and EWIC Interconnectors do vary their operation, but only up to around 1 GW in combination. The Applicant considers that the directionality of electricity flow across the Moyle and EWIC Interconnectors is heavily influenced by the needs of the Irish grid, which is less secure than the GB Grid and is supplied primarily by fossil fuels.

1.6 REP Carbon Assessment Assumptions & Conclusions

1.6.1 Within the **Carbon Assessment** (**8.02.08, REP2-059**) provided for REP it was submitted that REP would displace the marginal electricity source, which is CCGTs. While it is noted that the need for CCGTs may be influenced by the level of imported power from the interconnectors, the variability of the interconnectors is quite limited since the majority of interconnector capacity (French, BritNed and Nemo) operates relatively constantly as a result of market mechanisms.

1.6.2 On review of GB grid data, it is CCGT capacity which is ramped up and down to account for intermittent renewable grid input, rather than the interconnectors and as such REP would have a negligible impact on the operation of the interconnectors. It is therefore not appropriate to consider interconnectors as the marginal generation source when assessing REP.

1.6.3 Considering REP would not displace the power imported through interconnectors, the conclusions of the **Carbon Assessment** (**8.02.08, REP2-059**) remain unchanged. These are as follows:

- The base case for the assessment shows that the benefit of REP is about 137,000 tonnes of CO_2-equivalent per year, or about 229 kg CO_2e per tonne of waste processed, compared to sending the same waste for disposal in a landfill site.

[3] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/731590/DUKES_5.7.xls

- If heat is exported, this benefit increases to 157,000 t CO_2e or 263 kg CO_2e per tonne of waste processed.

- The assessment has considered the sensitivity of changes in waste composition, changes in landfill gas recovery rates and changes in the source of displaced electricity. In all cases, REP continues to have a benefit over landfill.