9 January 2019

Revised baseline scenario and quantitative climate impact assessment in respect of Drax Re-power (App. No. EN010091)

Contents

Introduction

1. This submission is made by ClientEarth[1] at the request of the Examining Authority and in accordance with the timetable agreed during ISH1.[2]

2. Before setting out ClientEarth's revised baseline scenario and quantitative assessment of the Proposed Development's climate impact, we outline the requirements relating to baseline scenarios in Environmental Impact Assessments (EIA) and explain why the Applicant's baseline does not meet those requirements.

1 Requirements for baseline scenarios in EIA

3. Environmental statements are required by EU law and the relevant implementing regulations at the national level to include a baseline scenario. The baseline must take account of "the relevant aspects of the current state of the environment … and an outline of the likely evolution thereof without implementation of the development."[3]

4. The European Commission has published detailed guidance on the requirements of the EIA rules and on how baselines should be developed and used in particular, including in the specific context of climate change mitigation.[4] This guidance explains that baseline scenarios must:

    a. "form the foundation" against which both the project and alternatives to the project are assessed *at the outset*, and therefore allow for consideration of the

[1] Interested Party reference: 20011838. ClientEarth is an environmental law charity with offices in London, Brussels, Berlin, Warsaw, Beijing and New York (registered in England and Wales, Charity Registration No. 1053988. Company Registration No. 2863827).

[2] Unless specified otherwise, abbreviations and defined terms used in this submission are the same as those used in ClientEarth's Written Representation of 8 November 2018 and ClientEarth's Post-Hearing Submission of 13 December 2018.

[3] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, Sch. 4, para 3.

[4] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017 (http://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf); European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013 (http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf).

maximum extent to which a significant environmental impact can be either avoided or reduced, including by developing less, differently or not at all;[5]

b. be "dynamic", "moving baselines", taking into account future "trends and scenarios" over the life of the project and avoiding "snapshot analysis (i.e. at a single point in time)", particularly in the context of long-term infrastructure projects and in respect of greenhouse gas emissions;[6]

c. be based on rigorous and thorough analysis, proportionate to the scale of the project, with the development of the baseline often comprising "the bulk of the EIA process" and "a significant proportion of the final EIA Report";[7]

[5] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 39 ("For climate change mitigation, it is important to investigate and use options to eliminate GHG emissions as a precautionary approach in the first place, rather than having to deal with mitigating their effects after they have been released."); European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 33. See also IEMA, IEMA, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance (https://www.iema.net/assets/newbuild/documents/IEMA%20GHG%20in%20EIA%20Guidance%20Document%20V4.pdf), 2017, p. 1 ("The EIA process should, at an early stage, influence the location and design of projects to optimise GHG performance and limit likely contribution to GHG emissions."), p. 3 ("Mitigation should be considered as early as possible in accordance with the hierarchy for managing project related GHG emissions. (1) Avoid, (2) Reduce, (3) Substitute and (4) Compensate.") and p. 17 ("A variation of these steps is set out below and can be followed by the GHG emissions practitioner in the EIA to identify opportunities that direct GHG mitigation action for a project. *1. Do not build: evaluate the basic need for the project and explore alternative approaches to achieve the desired outcome/s*…" (our emphasis)).

[6] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, pp 17 and 33; European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, pp 33-34.

[7] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, pp 33-34.

d. take into account "relevant greenhouse gas reduction targets at the national, regional, and local levels" and the extent to which the project and its alternatives would contribute to these targets;[8] and

e. consider trends in key indicators over time such as greenhouse gas emissions and the drivers of such trends (including "already approved developments that have not been implemented yet, changes in economic incentives and market forces and changes in the regulatory or policy frameworks"), using the best available scenario studies and projections, including proxy indicators where necessary.[9]

5. Crucially, the baseline scenario – and the EIA process in general – is not aimed at assessing a project's climate impact *only once it is built and in operation*.[10] Rather the baseline scenario must allow for an assessment of the full climate impact of the project by reference to a scenario *without implementation of the development*, i.e. where the project is not built and operated, including by assessing the impact of alternatives.[11] The

[8] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 39.

[9] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 34. See also p. 17 ("Since we cannot fully understand all aspects of complex systems at the point in which we make decisions, we need to be able to use what we have. For example, we can analyse trends — the general direction in which things seem to move — based on available studies, reports and other sources of information.").

[10] Contrast this with the Applicant's exclusive focus on how the Proposed Development would interact with other generation on the grid if it were to be connected today. This equates to an assessment of the extent to which the Proposed Development might be utilised when built, rather than an assessment against a scenario in which the Proposed Development is not constructed and operated and where the full range of alternative technologies can be considered. By narrowly focusing on present capacity, the Applicant also ignores that from commencement of generation in 2023 there may also be a number of equally (or more) efficient CCGT on the grid. See, e.g., Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.5.6, Applicant's Response to ClientEarth's Written Representation, paras 4.14.21-22, and Applicant's Written Summary of Oral Case at ISH1, paras 3.73-74 and 3.81.

[11] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 17 ("EIA should … consider trends and scenarios with and without the proposed project (and its reasonable alternatives)."), and p. 39 ("Mitigation measures identified and introduced as a result of an EIA, e.g. construction and operational activities that use energy and resources more efficiently, may contribute to climate change mitigation as well. However, this does not always mean

baseline must therefore serve as a benchmark that takes account of the full extent of possible climate mitigation opportunities *at the outset and before a project design or specification is selected*.[12]

2 Why the Applicant's baseline does not meet the EIA requirements

6. In the present application, the Applicant has taken the opposite approach to that outlined above. Specifically, it has selected the highest possible emissions intensity on the grid for non-peaking capacity as of 2025 as the baseline against which to assess the Proposed Development's climate impact. This fails to take account of the alternative and least carbon-intensive forms of energy generation expected to supply the grid over the life of the Proposed Development; it also happens to be a benchmark against which all but the worst performing generation technology is shown as having a positive climate impact. The Applicant asserts that the Proposed Development is essential for grid reliability and security of supply, but it has consistently failed to identify any actual need for the project on this basis.[13]

7. This is not the only problem with the Applicant's baseline scenario. Even if – contrary to our arguments – the Applicant's approach to setting the baseline by reference to the highest emitting capacity on the grid was in principle correct, it would in any event be deficient in at least the following respects:

    a. The Applicant has chosen to 'freeze' its baseline scenario in 2025 on the commencement of the coal-phase out emissions limit – i.e. before the Proposed Development becomes fully operational – despite acknowledging that this does

---

that the project will have overall positive impacts as regards GHG emissions. Impact may be less negative in terms of quantity of emissions, but still have overall negative impact, unless the carbon used in development and transport is unequivocally equal to zero.").

[12] See, e.g., European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 39. This approach is also consistent with (i) the overarching objective of EN-1 of avoiding carbon lock-in, and (ii) the primary role of the planning system in regulating the use of land in the public interest and ensuring the environmental acceptability of all projects granted development consent (see EN-1, paras 3.3.16 and 4.10.2).

[13] See, e.g., Applicant's Response to ClientEarth's Written Representation, paras 4.14.37 and 4.14.62], and Applicant's Written Summary of Oral Case at ISH1, paras 3.73 and 3.76.

not reflect the likely evolution of circumstances over the life of the project in line with Government projections that it apparently views as credible:

> Following the Government's intended end to unabated coal generation, it is assumed that generation units 5 & 6 will either be decommissioned or adapted to meet the new emission intensity limit of 450 gCO2/kWh; just 54% of the current emissions intensity. In the case that they are decommissioned, it is assumed that equivalent generation capacity will be provided elsewhere on the grid, at the same emissions intensity.[14]
>
> …
>
> The emission intensity of electricity generation by the Proposed Scheme (380 gCO2e/kWh) therefore compares favourably to the average for UK grid electricity *at present*. It should be noted that *the Government projects a major reduction in the GHG intensity for average UK grid electricity over the coming years meaning that by 2050 the Proposed Scheme will be significantly less 'clean' (higher GHG intensity) than the UK average which will by then be dominated by renewable generation*.[15]

However, as explained above, European Commission guidance confirms that baseline scenarios should not be based on such a "snapshot analysis" and underscores the "critical" nature of understanding the proposed project's impacts over time by developing a "moving baseline". This, it says, is especially the case in relation to large-scale projects such as the present application.[16]

b. The Applicant dedicates just two sentences to its climate baseline for 2026-2050 in its Environmental Statement – without evidential support or reference to further

[14] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.5.6.

[15] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.6.13 (our emphasis). See also Applicant's Response to ClientEarth's Written Representation, para 4.14.56 ("One would expect that as more renewable technology and low carbon generating capacity is developed, then the intensity of carbon emissions associated with electricity generation will continue to fall as, toward 2050, unabated fossil plant generation is curtailed.").

[16] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 33.

analysis.[17] The further discussion in the Applicant's subsequent submissions continues to rely on conclusory and generic statements without reference to any detailed assessment of the specific circumstances of the application.[18] This is in contrast to the Applicant's CCR Statement, for example, which includes a detailed assessment of economic feasibility.[19] It is also in stark contrast to the Commission's guidance that the development of the baseline should generally comprise "the bulk of the EIA process", occupying "a significant proportion of the final EIA Report" (and all the more so in the case of large-scale projects).[20]

c. In respect of its partial CCS and co-firing scenarios, the Applicant has failed – in its own terms – to show that these are reasonably likely scenarios.[21] However, at an even more fundamental level, the Applicant also ignores the fact that Units 5 and 6 would in all likelihood not be able to run for the majority of the relevant period, abated or otherwise. With the typical lifetime of a coal unit being 45

[17] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.5.6 (as cited under para 7(a) above). The same lack of analysis arises in the context of biodiversity where the Applicant simply assumes that its biomass units will continue to operate past the end of their renewables subsidies in 2027. See Applicant's Response to ClientEarth's Written Representation, para 4.12.5 ("If the inference from ClientEarth is that without the Proposed Scheme taking place, the land on which the infrastructure associated with Units 5 and 6 is located would become habitat, then that is incorrect. The brownfield site on which the infrastructure currently sits would most likely be developed to support the continued operation of Units 1, 2, 3 and 4 (in line with Selby District Local Plan policies EMP10 and SP13) ….").

[18] See ClientEarth's Post-Hearing Submission, 13 December 2018, paras 22-27. See also, e.g., Applicant's Response to ClientEarth's Written Representation, paras 4.14.31-4.14.63.

[19] CCR Statement, Section 10. A further example of a failure to justify an assumption in the Climate chapter of the Applicant's Environmental Statement concerns the possible effect of the battery storage included in the application. It is simply assumed without further explanation or reference to evidence that "battery storage … may serve to slightly reduce the total emissions", when in fact the existence of battery storage could *increase* total emissions as it would allow the gas-fired generation units to continue to generate when they are not supplying the grid (Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.7.3).

[20] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, pp 33-34.

[21] See ClientEarth's Written Representation, 8 November 2018, and ClientEarth's Post-Hearing Submission, 13 December 2018. To recall, these abated coal scenarios were not included at all in the Applicant's Environmental Statement and were developed only in response to concerns raised in Interested Parties' written representations (see Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.5.6 and, e.g., Applicant's Response to ClientEarth's Written Representation, para 4.14.35).

years, Units 5 and 6 would require significant additional investment to run beyond 2031.[22] Added to this are the increasingly stringent emissions limits and performance standards that can be expected to apply under the Industrial Emissions Directive or equivalent rules over the life of the Proposed Development.[23] This approach clearly contravenes the obligation under the EIA rules to consider the "likely evolution" of circumstances.[24]

d. The Applicant has set the quantity of generation in the baseline scenario by reference only to the current on-site generating capacity of Units 5 and 6, which is significantly lower than that of the Proposed Development.[25] However, it is a core principle of EIA that assessments should be based on system boundaries appropriate to the project in question, including in respect of the baseline scenario.[26] In the context of capacity connected to the electricity grid, this means setting the baseline scenario on a grid-wide basis and by reference to the quantity of generation produced by the Proposed Development.[27] All things being equal, applying a baseline with an equivalent generation capacity would result in

---

[22] Department of Energy & Climate Change (DECC), Coal and gas assumptions, March 2014 (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/315717/coal_and_gas_assumptions.PDF), p. 66.

[23] DECC, Coal and gas assumptions, March 2014, p. 71 ("The costs presented in this section do not include costs to upgrade plant e.g. to meet new emission limits (other than the "Lifetime extension work" for CCGT). As plant gets older and more obsolete, and emissions limits become more and more stringent, it is probable that more and more limits will be imposed…").

[24] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, Sch. 4, para 3.

[25] See, e.g., Environmental Statement, Vol. I, Chapter 15 – Climate, Table 15-13.

[26] IEMA, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2017, pp 7 and 10-11.

[27] World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), The GHG Protocol for Project Accounting, 2005, (https://ghgprotocol.org/sites/default/files/standards/ghg_project_accounting.pdf), pp 14-15, 39-40 and 42 ("Where the baseline candidates are constrained by the availability of physical infrastructure, such as supply networks for electricity and fuels, an area that represents the extent of infrastructure may be the most appropriate geographic area. For instance, the power grid is appropriate for grid-connected electricity projects."). The Applicant appears to accept the need to consider alternative generation supplying the grid in setting the third of its baseline scenarios and when it refers to replacement emissions in its climate impact assessment. See, e.g., Environmental Statement, Vol. I, Chapter 15 – Climate, Table 15-3 and paras 15.4.2 and 15.5.6.

significantly higher emissions (and a reduced climate impact) than in the Applicant's impact assessment. However, as considering the baseline on a grid-wide basis also allows for consideration of the full range of alternative generating technologies, the opposite is the case.[28]

e. Finally, the Applicant's baseline scenario fails entirely to take account of relevant greenhouse gas reduction targets. This contradicts the European Commission guidance referred to above,[29] as well as the IEMA practitioner guidance relied on by the Applicant at ISH1:

> Future baseline should capture both operational and use GHG emissions irrespective of their source (i.e. direct and indirect emissions). … *With regards to energy supply … future baseline should report on operational GHG emissions and how these may change over time (based on … UK grid decarbonisation projection scenarios or the adoption of renewables for example).*[30]

In the few occasions that the Applicant does refer to the UK's carbon targets (in the context of assessing the significance of the Proposed Development's emissions), it presents a misleading picture. Specifically, it neglects to mention the targets and projections that the Government and the Committee on Climate Change (CCC) have allocated to the power sector, and it refers only to the project's emissions that are additional to its baseline scenario rather than the project's total emissions.[31] Using the allocation to the power sector envisaged in

[28] See the revised quantitative climate impact assessment below.

[29] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 39.

[30] IEMA, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2017, p. 8. See also p. 16 ("Similarly the Committee on Climate Change (CCC) has determined a UK wide carbon budget *broken down by the following key sectors: power generation* …" (our emphasis)).

[31] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.16.6 ("To provide some context in relation to the magnitude of GHG emissions; the Government's 5th carbon budget (the final one agreed) for the period 2028-2032 is 1,725,000,000 tCO2e (Ref. X.7). For most of the operational life of the Proposed Scheme (i.e. from 2027 to 2046), there is an increase of 6,779,000 tCO2e/year in comparison to the baseline scenario (additional emissions in relation to generation at Drax). Over the same 5 year carbon budget period, this would be 33,895,000 tCO2e which is equivalent to 2% of the carbon budget for the UK.")

the Clean Growth Strategy (2017) for example – of 16 MtCO2e per year from 2028[32] – the Proposed Development's emissions – of up to 12 MtCO2e per year[33] – represent *approximately three-quarters (75%)* of the emissions for the *entire UK power sector*.

8. A further, related deficiency in the Applicant's EIA climate assessment is its failure to consider adequately the reasonable alternatives to the Proposed Development. By assessing the possible alternative means of providing the Proposed Development's outputs, taking into account its adverse environmental effects, the Applicant would have considered in detail the full extent to which other generation technologies would deliver increased mitigation. However, instead of considering alternatives that might mitigate the project's significant climate impact as much as possible – as required by the EIA Regulations[34] – the Applicant assessed alternatives against its own commercial objectives:

---

[32] BEIS, Clean Growth Strategy, 2017, Fig. 25, p. 122 and Annex D.

[33] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.6.8.

[34] The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, reg. 14(2)(d) ("An environmental statement is a statement which includes at least—…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*;" (our emphasis)). See also European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 52 ("'Reasonable Alternatives' must be relevant to the proposed Project and its specific characteristics … *On the one hand, an Alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer*. At the same time, if an Alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible Alternative. …. *The final set of reasonable Alternatives identified will then undergo a detailed description and assessment in the EIA Report*."), and p. 53 ("An open mind should be kept when considering the scope and nature of Alternatives. *Indeed, depending on the Project at hand, Alternatives that should be considered may refer to the fundamental design of the Project itself*, or may concern finer details, such as the technical specifications of the Project. *In some cases, Alternatives to the type of Project should also be considered. It may even be the case that important Alternatives fall outside the expertise or remit of the Developer (i.e. that could not be implemented by the Developer). If relevant, these should not to be dismissed as being unreasonable from the outset.* … However, Alternatives are to be identified and assessed both by the developer and the competent authorities *and it is very important that the identification and consideration of Alternatives should not be treated as a mere formality*." (our emphasis)). See also European Commission, Guidance on

> *Drax's objectives* for the Proposed Scheme are to:
>
> A. Reduce the reliance of Drax Power Station on coal as a source of power for electricity generation ...
>
> B. Ensure that Drax Power Station maintains its position as one of the UK's main power generators …
>
> C. Utilise as much existing operational land within the Existing Drax Power Station Complex as possible so as to maximise the use and efficiency of existing infrastructure.
>
> D. Maximise the efficiency of Drax Power Station; and
>
> E. Increase the flexible, response generating capacity of Drax Power Station to meet increasing demand across the UK ….
>
> *The consideration of the reasonable alternatives by the Applicant, has been undertaken only for the alternatives [sic] could realistically achieve these objectives.*[35]

9. By only considering alternatives to the Proposed Development falling within the above parameters, the Applicant failed to assess at all (let alone in sufficient detail) the possibility of designing the development to deliver the maximum overall carbon mitigation. This failure is all the more stark given the finding in the Environmental

---

Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 10 ("Assess alternatives that make a difference in terms of climate change…") and p. 35 ("In the early stages of the process, alternatives are essentially different ways in which the developer can feasibly meet the project's objectives, for example by carrying out a different type of action, choosing a different location or adopting a different technology or design for the project. The zero option should also be considered, either as a specific alternative or to define the baseline. At the more detailed level of the process, alternatives may also merge into mitigating measures, where specific changes are made to the project design or to methods of construction or operation to 'prevent, reduce and where possible offset any significant adverse effects on the environment'.").

[35] Environmental Statement, Vol. I, Chapter 4 – Consideration of Alternatives, paras 4.1.1-4.1.3.

Statement that the Proposed Development would result in a "major, permanent, direct [and] long-term" adverse climate impact.[36]

3 ClientEarth's revised baseline and quantitative climate impact assessment

10. In line with the guidance cited above, the high load factor and 'baseload' character of the Proposed Development envisaged by the Applicant[37] means that it is appropriate in the baseline scenario to use an average intensity that captures the full range of technologies supplying the grid over time.[38] Indeed, the Applicant acknowledges the relevance of average emissions intensity in its Environmental Statement – claiming that the Proposed Development "compares favourably to the average for UK grid electricity at present"[39] – but fails to consider this benchmark in setting its baseline.

11. ClientEarth's revised baseline scenario is based on BEIS's projected average grid emissions intensities as set out at Annex A.[40] These emissions intensities are taken from BEIS guidance to HM Treasury (which uses the same modelling as BEIS's Updated

[36] Environmental Statement, Vol. I, Chapter 15 – Climate, Table 15-16.

[37] The Applicant's CCR Statement assumes a 75% load factor over the life of the Proposed Development (p. 16), and the Applicant's Environmental Statement assumes a load factor of 100% (Table 15-9), on the basis that it is unable to exclude possibility of the Proposed Development operating at full load. See Applicant's Written Summary of Oral Case at ISH1, para 3.80 ("… we do not know the amount of time the Scheme will run. This will depend on how often the scheme's services are required by the National Grid. This, amongst other factors, will depend on the weather. As such we do not know how often the plant will run …").

[38] See WBCSD / WRI, Guidelines for Quantifying GHG Reductions from Grid-Connected Electricity Projects, 2007 (http://pdf.wri.org/GHGProtocol-Electricity.pdf), p. 37 ("*In general, a "baseload" power plant can displace all types of generators, including plants that are load-following*. The reverse, however, is not true; load-following power plants will generally not displace baseload power. For the purposes of identifying baseline candidates, therefore, load-following project activities should be distinguished from baseload." (our emphasis)).

[39] Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.6.13.

[40] As opposed to the emissions intensity of the most carbon-intensive form of non-peaking capacity currently on the grid as used by the Applicant. See, e.g., Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.5.6, and Applicant's Response to ClientEarth's Written Representation, paras 4.14.37 and 4.14.62.

Energy and Emissions Projections), with the emissions intensities used in the revised assessment being 'blended rates' over the relevant period.[41]

12. In line with applicable EIA rules and guidance, using the BEIS projections for average grid emissions intensity over the operating life of the Proposed Development:

    a. allows consideration of a range of reasonable alternatives including developing less, differently or not at all;[42]

    b. is "dynamic", taking into account future "trends and scenarios" over the life of the project, avoiding a "snapshot analysis";[43]

    c. is clearly proportionate being based on publically available and rigorously tested data;[44]

    d. takes into account relevant greenhouse gas reduction targets and the extent to which the project and its alternatives would contribute to these targets;[45] and

[41] BEIS, Valuation of Energy Use and Greenhouse Gas – Supplementary guidance to the HM Treasury Green Book on Appraisal and Evaluation in Central Government, January 2018, (https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal). See Annex A to this document, which sets out these figures (in bold, under the 'generation-based' grid average column).

[42] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, p. 39; European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 33. See also IEMA, IEMA, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2017, pp 1 and 17.

[43] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, pp 17 and 33; European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, pp 33-34.

[44] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, pp 33-34.

[45] European Commission, Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report, 2017, p. 39.

e. considers trends in key indicators over time, using the best available scenario studies and projections.[46]

13. ClientEarth's revised quantitative assessment of the Proposed Development's climate impact is presented in the tables below, which in accordance with the Examining Authority's request are updated versions of Tables 15-13 and 15-15 from the Applicant's Environmental Statement. ClientEarth has been supported by Sandbag[47] in reviewing and revising these calculations. An explanation of the revisions is provided in the text below both Tables.

Revised Table 15-13 – Net GHG emissions

Item	**Years**	**Baseline scenario**	**Proposed Development**	**Net effect of Proposed Development**
Total GHG emissions per year (tCO2e/year)	2023-2026	Alternative generation (1.8GW @137gCO2): 2,160,216	Unit X (1.8GW @380gCO2): 5,991,840	+3,831,624 (+177%)
	2027-2046	Alternative generation (3.6GW @61gCO2): 1,923,696	Unit X (1.8GW @380gCO2): 5,991,840 Unit Y (1.8GW @380gCO2): 5,991,840 = 11,983,680	+10,059,984 (+523%)
	2047-2050	Alternative generation (1.8GW @29gCO2): 457,272	Unit Y (1.8GW @380gCO2): 5,991,840	5,534,568 (+1,210%)
Total GHG emissions (tCO2e)	2023-2050	48,943,872	287,608,320	+238,664,448 (+488%)

[46] European Commission, Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013, pp 34 and 17.

[47] Sandbag is a not-for-profit climate change policy think tank based in Brussels and London (registered as a Community Interest Company in England and Wales: Company No. 6714443).

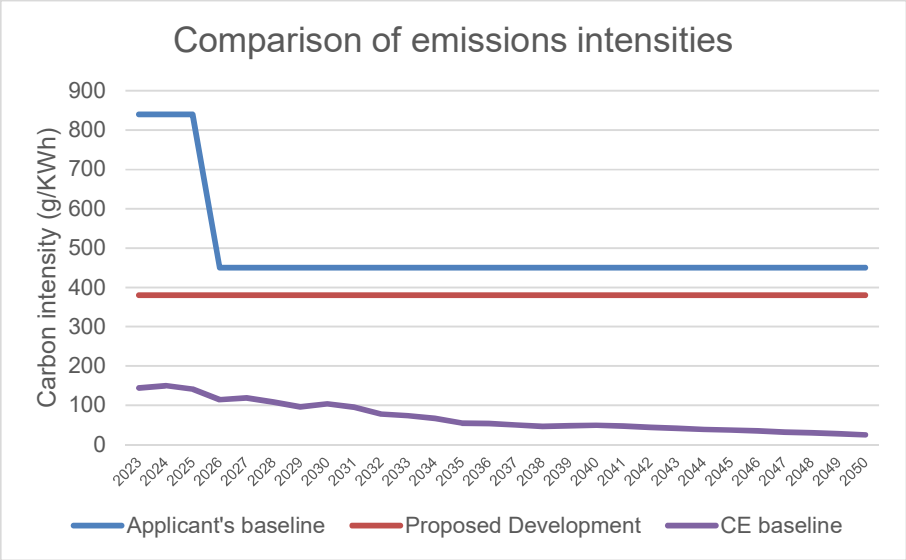
Maximum electricity generation capacity	2023-2050	3.6GW	3.6GW	--
GHG emissions intensity (gCO2e/kWh)	2023-2050	70	380	+310 (+443%)

Revised Table 15-15 – Summary of GHG emissions

Item	**Years**	**Baseline scenario**	**Proposed Development**	**Net effect of Proposed Development**
Total GHG emissions (tCO2e)	2023-2050	48,943,872	287,608,320	+238,664,448 (+488%)
Maximum electricity generation capacity	2023-2050	3.6GW	3.6GW	--
GHG emissions intensity (gCO2e/kWh)	2023-2050	70	380	+310 (+443%)

14. As the revised tables indicate, applying ClientEarth's revised baseline results in the Proposed Development having a total net emissions effect of +238.7 MtCO2e / +488% and an emissions intensity +443% higher than the baseline. This compares to a total net emissions effect of +168.6 MtCO2e / +90% and an emissions intensity effect of between -16% and -55% in the Applicant's assessment. The Applicant's Tables 15-13 and 15-15 are included at Annex B for reference.

15. The below graphic illustrates the difference between the Proposed Development's emissions intensity, the Applicant's baseline emissions intensity and the Government projections for average emissions intensity used in the ClientEarth (CE) baseline.



16. In addition to the revised baseline, we have made the following changes to the Applicant's assessment methodology:

    a. The start date for the assessment has been moved to 2023 to reflect the anticipated commencement of Unit X's operation.

    b. Emissions from Unit 6 before commencement of Unit Y are no longer included in the Proposed Development scenario as they are outside the scope of the Proposed Development.

    c. Emissions from Units 5 and 6 are no longer included in the baseline pre-2025 phase-out period as the assessment is required to capture alternative forms of generation on the grid at the same quantity as the Proposed Development (with the generation capacity of Units 5 and 6 being approximately a third of the

Proposed Development and only operated at low utilisation rates[48]). Using the same generation quantity in both scenarios means that the two scenarios are compared like for like, with the increase in total emissions resulting solely from emissions intensity rather than increased generation capacity.

d. Finally, the Unit X 'replacement emissions' in 2047-2050 have been removed as it is not clear that these are caused by or connected to the implementation of the Proposed Development.[49]

17. To be clear, it is not the case that ClientEarth considers that the Proposed Development will necessarily lead to the emissions set out in the above tables – if it is built, it may not operate at all or cease operating short of its planned life, becoming a stranded asset.[50] However, *assuming that the Proposed Development is operated as the Applicant anticipates*,[51] the projected average grid emissions intensity is the best available proxy for the emissions intensity of the range of technologies that could provide the equivalent generation.

18. If anything, the BEIS projections used in ClientEarth's revised baseline are likely to be conservative estimates of future emissions intensity. For example, in contrast to BEIS's projection of 104gCO2/kWh in 2030:

---

[48] For example, Aurora data from 2017/18 shows Drax coal units operating at lower than 40% capacity on average. Aurora Energy Research, GB Plant Performance Summary, March 2018, p. 4 (https://www.auroraer.com/wp-content/uploads/2018/04/aer-gb-plant-performance-summary-march-2018.pdf).

[49] See Environmental Statement, Vol. I, Chapter 15 – Climate, Table 15-3 ("Decommissioning of Unit X – Assume replacement generation capacity provided elsewhere on the grid at same GHG intensity as the baseline."). We also note that while the Applicant suggests that it has assumed that "the operational life of Units X and Y would be 25 years followed by decommissioning", its calculations only include 24 years of operation (Environmental Statement, Vol. I, Chapter 15 – Climate, para 15.4.5). Allowing for 25 years would extend Unit X's operation to include 2047 and Unit Y's operation to include 2051, resulting in an increase in the Proposed Development's total emissions.

[50] See ClientEarth's Written Representation, 8 November 2018, paras 22-40.

[51] As explained above, the Applicant's CCR Statement assumes a 75% load factor over the life of the Proposed Development (p. 16), and the Applicant's Environmental Statement assumes a load factor of 100% (Table 15-9), on the basis that it is unable to exclude possibility of the Proposed Development operating at full load (See Applicant's Written Summary of Oral Case at ISH1, para 3.80).

a. the Government's Clean Growth Strategy models emissions from the power sector of 16MtCO2e per year by 2032, implying an emissions intensity of approximately 50gCO2/kWh (conservatively assuming that annual UK demand remains at approximately 320TWh);[52] and

b. National Grid's latest Future Energy Scenarios foresees intensities of 48gCO2/kWh and 75gCO2/kWh by 2030 in its two scenarios that comply with the UK's 2050 carbon reduction target.[53]

19. Instead of simply making the obvious point that the Proposed Development is not low carbon and therefore negative in terms of its climate effects,[54] ClientEarth's revised baseline allows the Applicant to engage with the question of how the Proposed Development fits into an energy mix characterised by a rapidly decreasing emissions intensity. To borrow the words of Oil & Gas UK, it allows the Applicant to explain how the Proposed Development is consistent with "a largely renewable electricity system that only requires minimal back-up generation from fossil fuels" and in which "gas will only play a residual role."[55]

[52] ClientEarth's Written Representation, 8 November 2018, para 35(b).

[53] National Grid, Future Energy Scenarios, July 2018, Table 5.1.

[54] See EN-1, para 3.3.4.

[55] Oil & Gas UK, Energy Transition Outlook 2018 (https://oilandgasuk.cld.bz/Energy-Transition-Report-2018), p. 8.

Annex A – BEIS average grid emissions intensities

Table 1: Electricity emissions factors to 2100, kgCO_2e/kWh

Consumption and generation-based emissions factors.

Analysts should use **consumption-based emissions factors** for measuring GHG emissions per unit of final energy demand. These emissions factors include transmission and distribution losses, i**ncluding significant losses due to power station inefficiency**. **Generation-based emissions factors** measure GHG emissions per unit of electricity generated.

Long-run marginal emissions factors should be used for measuring *small changes* in consumption or generation. **Grid average** emissions factors are used for footprinting.

Year	Grid average			
	Consumption-based			Generation-based
	Domestic	Commercial/ Public sector	Industrial	
2015	0.368	0.362	0.355	**0.336**
2016	0.279	0.274	0.269	**0.255**
2017	0.233	0.229	0.225	**0.213**
2018	0.224	0.220	0.216	**0.205**
2019	0.213	0.209	0.205	**0.195**
2020	0.198	0.194	0.191	**0.181**
2021	0.187	0.183	0.180	**0.171**
2022	0.162	0.159	0.156	**0.148**
2023	0.158	0.155	0.152	**0.144**
2024	0.164	0.161	0.158	**0.150**
2025	0.154	0.151	0.148	**0.141**
2026	0.125	0.123	0.120	**0.114**
2027	0.131	0.128	0.126	**0.119**
2028	0.119	0.116	0.114	**0.108**
2029	0.105	0.103	0.101	**0.096**
2030	0.114	0.112	0.110	**0.104**
2031	0.104	0.103	0.101	**0.095**
2032	0.085	0.083	0.082	**0.078**
2033	0.081	0.080	0.078	**0.074**
2034	0.073	0.071	0.070	**0.067**
2035	0.060	0.059	0.058	**0.055**
2036	0.060	0.058	0.057	**0.054**

2037	0.055	0.054	0.053	**0.050**
2038	0.051	0.050	0.049	**0.046**
2039	0.053	0.052	0.051	**0.048**
2040	0.054	0.053	0.052	**0.049**
2041	0.051	0.050	0.049	**0.047**
2042	0.048	0.047	0.047	**0.044**
2043	0.046	0.045	0.044	**0.042**
2044	0.043	0.042	0.042	**0.039**
2045	0.041	0.040	0.039	**0.037**
2046	0.038	0.037	0.037	**0.035**
2047	0.035	0.035	0.034	**0.032**
2048	0.033	0.032	0.032	**0.030**
2049	0.030	0.030	0.029	**0.028**
2050	0.028	0.027	0.027	**0.025**

[…]

Note: GHGs include CO_2, CH_4 and N_2O.

Source: *BEIS modelling*

https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

Annex B – Applicant's original Tables 15-13 and 15-15

Table 15-13- Net GHG Emissions

Item	Years	Baseline Scenario (2 x 660 MW)	Proposed Scheme (2 x 1,800 MW)	Net effect of Proposed Scheme
Total GHG emission per year (tCO_2e/year)	2020-2022	Unit 5: 4,854,000 Unit 6: 4,854,000 = 9,708,000	Unit 5: 4,854,000 Unit 6: 4,854,000 = 9,708,000	No net change (Unit X not yet fully commissioned)
	2023-2025		Unit X: 5,991,000 Unit 6: 4,854,000 = 10,845,000	+1,137,000 (+12%)
	2026	Unit 5: 2,601,500 Unit 6: 2,601,500 = 5,203,000	Unit X: 5,991,000 Unit 6: 4,854,000 = 10,845,000	+5,642,000 (+108%)
	2027-2046		Unit X: 5,991,000 Unit Y: 5,991,000 = 11,982,000	+6,779,000 (+130%)
	2047-2050		Unit X: 5,203,000 Unit Y: 5,991,000 = 11,194,000	+5,991,000 (+115%)
Total GHG emissions (tCO_2e)	2020-2050	188,323,000	287,568,000	+168,597,000 (+90%)
Maximum electricity generation capacity	2020-2050	2 x 660 MW = 1,320 MW	2 x 1,800 MW = 3,600 MW	+2,280 MW (+173%)
GHG emissions intensity (gCO_2e/kWh)	2020-2050	***2020 to 2025:*** 840 ***2026 to 2050:*** 450	***2023 to 2050:*** 380	***2023 to 2025:*** -460 (-55%) ***2026 to 2050:*** -70 (-16%)

Table 15-15 – Summary of GHG Emissions

Item	Years	Baseline Scenario (2 x 660 MW)	Proposed Scheme (2 x 1,800 MW)	Net effect of Proposed Scheme
Total GHG emissions (tCO_2e)	2020-2050	188,323,000	287,568,000	+168,597,000 (+90%)
Maximum electricity generation capacity	2020-2050	2 x 660 MW = 1,320 MW	2 x 1,800 MW = 3,600 MW	+2,280 MW (+173%)
GHG emissions intensity (gCO_2e/kWh)	2020-2050	***2020 to 2025:*** 840 ***2026 to 2050:*** 450	***2023 to 2050:*** 380	***2023 to 2025:*** -460 (-55%) ***2026 to 2050:*** -70 (-16%)

Sam Hunter Jones
Lawyer
020 7749 5975
shunterjones@clientearth.org
www.clientearth.org