Little Crow
Solar Park

Little Crow Solar Park, Scunthorpe

APPLICANT'S RESPONSE TO EXAMINING AUTHORITY QUESTIONS EXQ4

DEADLINE 7

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On behalf of INRG Solar (Little Crow) Ltd

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APPLICANT'S RESPONSE TO THE EXAMINING AUTHORITY'S WRITTEN QUESTIONS AND REQUESTS FOR INFORMATION (EXQ4)

ON BEHALF OF INRG SOLAR (LITTLE CROW) LTD

DEADLINE 7

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1. APPLICANT'S RESPONSE TO EXAMINING AUTHORITY'S QUESTIONS (ExQ4)

Purpose of this Document

1.1 This document is submitted by INRG Solar (Little Crow) Ltd ("the Applicant") and contains the Applicant's response to the fourth round of Examining Authority's written questions and requests for information (ExQ4) dated 7 September 2021.

- Section 2 of this document provides the Applicant's response to Question 4.1.1.
- Section 3 of provides the Applicant's response to Question 4.1.2.
- Section 4 provides the Applicant's response to Question 4.4.1.

2. APPLICANT RESPONSE TO QUESTION 4.1.1

2.1 This section responds to Question 4.1.1 and provides the Applicant's position on the implications of the revised draft National Policy Statements published by the Department for Business, Energy and Industrial Strategy for consultation on 6 September 2021.

2.2 The following draft National Policy Statements are enclosed as appendices to this document: -

- **Appendix 1**: Draft Overarching National Policy Statement for Energy (EN-1)
- **Appendix 2:** Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)
- **Appendix 3**: Draft National Policy Statement for Electricity Networks Infrastructure (EN5)

Implications of Consultation Version of the Reviewed NPS EN-1

2.3 With regards to Part 1.6, the Applicant notes the advice at paragraph 1.6.2 that the amendments in the draft NPSs will only "have effect" in relation to applications which are accepted for examination after the designation of the amendments. Accordingly, whilst this application would be one which would be determined under section 104 Planning Act 2008 ("the Act") following designation, the publication of the draft NPSs and the associated consultation exercise does not affect the Applicant's position that the application should be determined under section 105 Planning Act 2008.

2.4 Section 105(3) of the Act states that in determining the application the Secretary of State must have regard to any matters which he considers "are both important and relevant" to his decision. In the opinion of the Applicant the consultation draft EN-1, EN-3 and EN-5 are both important and relevant to the determination of the application, particularly so since draft EN-3 now incorporates policy specifically dealing with solar photovoltaic generation which is absent from the current EN-3, and provides the latest expression of emerging policy over how large scale solar PV schemes should be determined.

2.5 The Applicant's position on the weight to be given to the extant EN-1 was discussed at Issue Specific Hearing 2 and is confirmed in the Applicant's Post Hearing

Submissions in respect of ISH2 at item 4a (Document reference 9.32 LC OTH, PINS reference REP4-017). The Applicant considers that additional weight should be afforded to the consultation draft EN-1, for the reasons set out below.

2.6 As a matter of principle, the Applicant welcomes the direction of travel set out set out in the revised national policy statement (specifically Section 2 of the draft EN-1), which reflects the Government's aspirations set out in the Energy White Paper (and other most up to date government policies for decarbonisation and expansion of electricity generation) to deliver the essential infrastructure required, which includes ground mounted PV, to achieve the transition to net zero.

2.7 The Applicant welcomes the recognition made at paragraph 2.1.2 that significant amount of energy is needed at both local and national scale. The Applicant supports the approach set out in Section 2 of EN-1 which outlines the strategies to transform the energy system, tackling emissions while continuing to ensure secure and reliable supply, and affordable bills for households and businesses. The Little Crow Solar Park would contribute towards all these goals, please refer to Planning Statement (Document Reference 9.17A LC OTH, PINS reference REP5-017).

2.8 Reference is made to paragraphs 3.3.21 to 3.3.23 of draft EN-1 which outline that the Government is looking for sustained growth in solar over the next decade to assist in achieving its net zero target. This current trend of solar growth is the opposite, as explained at page 6 of the Applicant's Response to ExQ3.1.3 (Document reference 9.44 LC OTH. PINS reference REP6-019). The Applicant considers that this should be an important consideration for the decision-making process and planning balance for Little Crow Solar Park. An update to the need and urgency for new electrical infrastructure, including generation, as specifically noted in paragraphs 3.3.43 to 3.3.45 and paragraphs 3.3.59 to 3.3.65 is welcomed by the Applicant.

2.9 The Applicant welcomes the further information provided on the role and need of storage in providing flexibility to enable decarbonisation (paragraphs 3.3.24 to 3.3.25).

2.10 The Applicant notes the new text to Section 4 of consultation draft EN-1, which provides additional detail regarding environmental principles and requirements for biodiversity net gain (paragraphs 4.5.1 to 4.5.4). The Applicant's biodiversity net gain calculation was presented as Appendix 7 of Applicant's Response to ExQ1 (Document reference 9.24 LC OTH, PINS reference REP2-022).

2.11 Health has been introduced under the general assessment principles and reference is made to paragraph 4.3.1 which identifies that access to energy is clearly beneficial to society and health as a whole. Turning to paragraphs 4.32 and 4.33, the Environmental Statement has duly considered the effects on human beings (the Environmental Statement has various chapters and technical appendices covering, dust, traffic, water pollution, and noise).

2.12 With regards to the criteria for good design, at paragraph 4.6.1, the draft introduces an emphasis on how the visual appearance of the development and how it relates to the landscape it sits in, this is fully addressed in Chapter 6 of the Environmental Statement (Document reference 6.6N LC ES6, PINS reference REP5-008). Paragraph 2.6.2 introduces how good design, including siting, should be applied early during the early stages of the project lifecycle, the Applicant applied this approach - design refinement is discussed in the Design and Access Statement (Document reference 9.2 LC OTH, PINS reference REP5-019).

2.13 With regards to section 4.9 of the consultation draft EN-1, paragraph 4.9.6 introduces how an environmental statement should consider how the proposal takes into account the projected impacts of climate change. For Little Crow, this is discussed through various chapters sand technical appendices of the Applicant's Environmental Statement and demonstrates how the development remains resilient to a credible maximum climate change scenario.

2.14 Turning to Part 5 of the consultation draft EN-1, generic impacts – the Applicant notes the new revised section on Greenhouse Gas emissions and text updates to various themes including Jobs and regional / local opportunities from new infrastructure; Biodiversity and geological conservation; Air quality; Coastal change; historic environment; Landscape and visual; and Flood risk. With reference to the proposed requirements regarding Greenhouse gas emissions, the Application is duly supported by a Carbon Assessment (include within Document reference 7.12C LC TA4.5, PINS reference REP6-010). There are no other specific text updates that warrant any further detailed consideration.

Implications of Consultation Version of the Reviewed NPS EN-3

2.15 In responding to the ExA on draft EN-3 the Applicant has highlighted in the table below those elements which it believes are important and relevant to the determination of the application and then either signposted where it has addressed those issues in documents submitted either as part of the application or during the

examination, or made further comment where it considers matters therein have not been previously addressed. The Applicant's position is that it should now be afforded greater weight for this development for the reasons set out at paragraph 2.4 above and discussed in the table below.

Draft EN-3 paragraph	**Applicant's response / signpost.**
1.1.1	The Applicant welcomes the modification to paragraph 1.1.1 whereby electricity generation from renewables is now an essential element of the transition to low carbon economy.
1.3.1	The Applicant welcomes the modifications to the second bullet point which introduces how NSIP's renewables contribute towards security of energy supply and are consistent with net zero emissions in 2050.
2.47.1	The Applicant agrees with all statements in this paragraph.
2.48.2	Irradiance and topography were considered by the Applicant as part of the site selection process, Chapter 4 Environmental Statement (Document reference 6.4 LC ES CH4, PINS reference REP5-006). This was also considered ISH1 3b) (Document reference 9.17 LC OTH, PINS reference REP1-008)
2.48.3	The Applicant has established design parameters which seek to maximise the performance of the development, the overall design for each solar park is different, see paragraph 5.5 of the Technical Guide (Document Reference 9.20A LC OTH, PINS reference REP4-014).
2.48.5	Solar Farm design is discussed within the Technical Guide (Document Reference 9.20A LC OTH, PINS reference REP4-014).
2.48.7	The Applicant welcomes the clarification for determining the capacity threshold for qualifying NSIP schemes,
2.48.8	The Applicant agrees that the maximum physical extent of the development, such as site area (as set out through the environmental parameters set out in the Environmental Statement), should be use to set a maximum development threshold as appose to setting an AC installed capacity, please refer to Applicant's response to ISH 3a (Document reference 9.17 LC OTH, PINS reference REP1-001) and the Applicant's response to the ExA's suggested changes to the draft DCO (Document reference 9.48 submitted at Deadline 7).
2.48.9	Reflecting on paragraph 2.48.8, the Applicant considers that any permission should be interpreted on the basis of the maximum physical extent of the development. However should the ExA be minded to recommend a maximum installed capacity limit to the Secretary of State then it should be clear that such capacity is set in AC not DC, please refer to Applicant's response to the Schedule 1, Paragraph 1 of ExA's recommended amendments to the Applicant's draft DCO (Document reference 9.48 LC OTH)
2.48.10	The Applicant agrees that the point of connection is an important consideration for site selection, please refer to Chapter 4 Environmental Statement (Document reference 6.4 LC ES CH4, PINS reference REP5-006) and applicant's response to ISH1 3b (Document reference 9.17 LC OTH, PINS reference REP1-008).
2.48.12	Details explaining the importance of grid connection access in initial site selection are set out in the Applicant's Technical Guide, Chapter 4 of the Environmental Statement (Document reference 6.4 LC ES CH4, PINS reference REP5-006) and applicant's response to ISH1 3a) (Document reference 9.17 LC OTH, PINS reference REP1-008).

Draft EN-3 paragraph	Applicant's response / signpost.
	The Applicant confirms that cumulative impact with nearby energy projects are considered in the Environmental Statement (various technical chapters).
2.48.13	As set out in Applicant's Response to Relevant Representation (Document Reference 9.18 LC OTH, PINS Reference REP1-009), North Lincolnshire Council are in agreement that due to the limited supply of brownfield/previously developed land within North Lincolnshire, a location such as the application site is required for large scale renewable energy schemes.
2.48.14	As per 2.48.13, and ALC survey was undertaken to establish the soil grading (Document reference 6.10A LC ES CH10, PINS Reference REP5-012). Soil management during construction and decommissioning has been considered through the Outline Soil Management Plan (Document Reference 7.11 LC TA4.4, PINS Reference APP-080).
2.48.15	The explanation for the choice of siting is principally provide by Chapter 4 of the Environmental Statement (Document reference 6.4 LC ES CH4, PINS reference REP5-006) and further explained through the Planning Statement (paragraphs 5.55 to 5.59 (Document reference 9.1A LC OTH, PINS Reference REP5-017).
2.48.16	Suitability of the access has been considered by Chapter 9 of the Environmental Statement (Document Reference 6.9 LC ES CH9, PINS Reference APP-066); Transport Statement (Document Reference 7.35A Lc TA9.1, PINS Reference AS-003); and Outline Construction Traffic Management Plan (Document Reference 9.36 LC TA9.2, PINS Reference APP-105).
2.49.1	The elements of the scheme are principally described in through Chapter 4 of the Environmental Statement (Document Reference 6.4 LC ES CH4, PINS Reference REP5-006).
2.49.2	The Application includes the full extent of the access tracks necessary, see Works Detail – Whole Site Plan (Document reference 2.10 LC DRW, PINS Reference APP-015). An assessment of their effects is provided in the Environmental Statement (various chapters).
2.49.3	The Applicant duly acknowledges that the overall design for each solar park is different, see paragraph 5.5 of the Technical Guide (Document Reference 9.20A LC OTH, PINS reference REP4-014).
2.49.4	Please refer to above response.
2.49.5	The candidate layout allows for continued recreational use of the public rights of way and for health and safety considerations these will only be temporarily diverted during construction and decommissioning, please refer to Chapter 4 of the Environmental Statement (Document Reference 6.4 LC ES CH4, PINS Reference REP5-006).
2.49.6	Details of how the public right of way would be managed is provide in the Outline CEMP; Outline Decommissioning Plan, the Outline LEMP, and Chapter 4 of the Environmental Statement (Document Reference 6.4 LC ES CH4, PINS Reference REP5-006).
2.49.7	Method statement for installing underground cables is provide within the Outline SMP (Document reference 7.11 LC TA4.4, PINS reference APP-080), the Outline CEMP (Document reference 7.8D LC TA4.1, PINS reference REP6-006), the Outline Decommissioning Strategy (Document reference 7.9C LC TA4.2, PINS reference REP6-008), Arboricultural Impact Assessment (Document reference 7.15 LC TA4.8,

Draft EN-3 paragraph	Applicant's response / signpost.
	PINS reference APP-084), and the Outline Construction Environmental Management Plan for Biodiversity (Document reference 7.27 LC TA7.7. PINS reference APP-096).
2.49.8	Visual impacts of the security measures are duly assessed in the LVIA (Document reference 6.6B LC ES CH6, PINS reference REP5-008)
2.49.9	Little Crow Solar Park will have an operational lifespan of 35 year.
2.49.10	An overview of the decommissioning activities is set out in the Outline Decommissioning Strategy (Document reference 7.9C LC TA4.2, PINS reference REP6-008).
2.49.11	An overview of the decommissioning activities is set out in the Outline Decommissioning Strategy (Document reference 7.9C LC TA4.2, PINS reference REP6-008). Clarification over the substation is provided through the Applicant's Post Hearing Submission ISH1 and response to item 3i) (Document reference 9.17 LC OTH, PINS reference REP1-008)
2.49.12	Decommissioning is secured through Requirement 4 of the draft DCO (Document reference 3.1G LC DCO submitted at deadline 7) and as suggested the operational life of the project commences from the date on which the project first starts to generate electricity commercially
2.49.17	The environmental assessment has been undertaken in consideration of parameters based on the worst case physical characteristics and footprint of the development, as described in Chapter 4 of the Environmental Statement (Document Reference 6.4 LC ES CH4, PINS reference REP5-006).
2.50.2	A detailed evaluation of a range of habitats and protected species supported by the land within and adjacent to the Order Limits is set out in section 7.4 of the Ecology ES Chapter (Document Ref 6.7A LC ES CH7, PINS reference REP5-010) This includes a desk study of existing ecological records. Potential impacts on those ecological features, as well as specification for avoidance and mitigation measures, are described in section 7.6 of the Ecology ES Chapter (Document Ref 6.7A LC ES CH7, PINS reference REP5-010).
2.50.3	Soil handling is considered through the Outline Soil Management Plan (Document reference 7.11 LC TA4.4, PINS refence APP-080).
2.50.4	Paragraphs 7.6.109 and 7.6.110 of the Ecology ES chapter (Document Ref 6.7A LC ES CH7, PINS reference REP5-010) details how the minimal lighting requirements expected for the development will not result in significant impacts on nocturnal wildlife. The sensitive lighting strategy prescribed within the Outline CEMP (Biodiversity) (Document Ref 7.27 LVC TA7.7, PINS reference APP-096) has been prepared to avoid impacts on wildlife should lighting be required temporarily during construction.
2.50.5	An assessment of impacts on boundary habitats (and species using them) is made in Section 7.6 of the Ecology ES chapter Protective measures for the boundary features (including fencing and buffer zones) for the construction phase of the development are prescribed within the Outline CEMP (Biodiversity) (Document Ref 7.27 LVC TA7.7, PINS reference APP-096). Long-term management of boundary features and buffer strips for the benefit of biodiversity and visual amenity are prescribed within the Outline LEMP (Document Ref 7.28D LC TA7.8, PINS reference REP6-012).

Draft EN-3 paragraph	Applicant's response / signpost.
2.50.6	Draft paragraph 2.50.6 is not applicable as mobile arrays/trackers are not proposed.
2.50.7	The application accords with the requirements of draft paragraph 2.50.7 and the identifies design measures are set out in the Flood Risk Assessment (Document Reference 7.3 LC TA3.1, PINS reference APP-072).
2.50.8	Ecological mitigation and enhancement measures are described in sections 7.6 and 7.10 of the Ecology ES Chapter (Document Ref 6.7A LC ES CH7, PINS reference REP5-010). Section 7.6 of the ES Chapter describes how the scheme will deliver a number of benefits for the habitat and species present at the site. This section sets out how a key driver behind the proposals delivering biodiversity benefits is the cessation of intensive arable farming practices, and reversion of the majority of the land within the Order Limits to ecologically valuable grass. The Outline LEMP (Document Ref 7.28C LC TA7, PINS reference REP6-012) sets out the management prescriptions for achieving those benefits. The LEMP sets out a long-term ecological monitoring schedule, which will be used to inform any required changes to the management regimes prescribed.
2.50.9	Geotechnical and hydrological information is duly presented through the Phase 1 Ground Conditions Survey (Document reference 7.4 LC TA3.2, PINS reference APP-073) and the Geotechnical & Phase II Contamination Report (Document reference 7.5 LC TA3.2, PINS reference APP-074).
2.50.10	The ecological enhancement measures are described in Sections 7.6 and 7.10 of the Ecology ES Chapter (Document Ref 6.7A LC ES CH7, PINS reference REP5-010). These include areas of land within the Order Limits given to providing suitable conditions for arable plants and farmland birds, creation of species-rich acid grassland, as well as substantial new hedgerow planting. A number of new features for the benefit of wildlife species are also proposed, such as bird nesting boxes, bat roosting boxes and wildlife hibernacula. The Outline LEMP (Document Ref 7.28D LC TA7, PINS reference REP6-012) sets out the management prescriptions for the provision and maintenance of the enhancement measures. The Outline LEMP (under PR14) sets out a long-term ecological monitoring schedule, which will track the establishment of the newly created habitats and identify how key wildlife species use the land during the operational phase. The findings of monitoring will be used to inform any required changes to the management regimes prescribed.
2.50.11	The Flood Risk Assessment and Drainage Strategy duly assesses the maximum adverse effects (Document reference 7.3 LC TA3.1, PINS reference APP-072).
2.50.12	Paragraph 2.50.12 is not applicable as development is not proposed on peat.
2.51.1	The generic landscape and visual impacts set out in Section 5.10 of EN-1 are assessment within the LVIA Document Reference 6.6B LC ES CH6, PINS Reference REP5-008).

Draft EN-3 paragraph	Applicant's response / signpost.
2.51.2	The Applicant's approach towards the consideration of cumulative landscape and visual has been agreed and accepted by North Lincolnshire Council.
2.51.3	The Applicant has prepared an LVIA within the Environmental Statement (Document Reference 6.6B LC ES CH6, PINS Reference REP5-008). Visualisations have been produced to demonstrate the potential effects on public footpath 214 through the site.
2.51.4	Fencing Chapter 6 of the Environmental Statement (Document reference 6.6B LC ES CH6, PINS reference REP5-008) at Para 6.4.6 notes *The arrays would be set within 1.8m high perimeter fencing, (the battery energy storage system would be made secure by a 3.0m high gated palisade security fence and the substation would be enclosed with 2.4m high palisade security fencing with an electrical fence backing of 3m high from ground level).* The security fencing has been deigned to be as low key and as visually intrusive as possible whilst balancing security requirements. Para 6.4.4. notes that, *Native hedgerow planting would be introduced adjacent to the security fencing along the length of the existing public right of way.* This is to minimise the effects of the fencing from public viewpoints.
2.51.5	All existing hedgerows and trees are to be retained and protected by the installation of the security fencing at construction. The layout of the panels has been designed to fit the existing landscape framework. An Arboricultural Impact Assessment has been prepared for the project (Document reference 7.15 LC TA4.8, PINS reference App-084).
2.51.6	The existing framework of trees, hedges and woodlands have been used to integrate and screen the proposals. Additional mitigation planting and habitat creation proposals are set out in the Detailed Landscape Proposals (Document reference 7.21B LC TA6.5, PINS reference REP5-014).
2.52.2	The Glint and Glare Assessment for the Little Crow Solar Park was undertaken using industry best practice established through Pager Power's own glint and glare guidance – this was established through experience and consultation over 700 glint and glare assessments. Subsequently, the Glint and Glare Assessment methodology that has been applied is aligned with the Draft EN-3 document. The Applicant agrees with the definition of glint and glare defined in 2.52.1 of EN-3, this is presented in Section 1.3 of the Glint and Glare Assessment (Document reference 9.19 LC OTH, PINS reference REP1-010). The Applicant agrees that a Glint and Glare Assessment is appropriate as noted in 2.52.2 of EN-3. This was the reason for undertaking Glint and Glare Assessment, which captures the considerations set out in EN-3. The content of EN-3 does not change the assessment methodology or results.

Draft EN-3 paragraph	Applicant's response / signpost.
2.52.3	As per 2.52.3 of EN-3, mitigation is sometimes required. This may include additional techniques over those stated (use of anti-reflective coating – which has limited use) which include layout changes and implementation of screening. In the case of the Little Crow Solar Park, no mitigation requirement has been identified.
2.53.4	The Applicant has assessed the impact on nearby homes and motorists as set out in 2.52.4 of EN-3. These receptors are defined in Sections 4.2 and 4.3 of the Glint and Glare Assessment (Document reference 9.19 LC OTH, PINS reference REP1-010). The modelling results and subsequent impact assessment is presented in Sections 6 and 7. Furthermore, Pager Power's methodology goes above and beyond that stated within EN-3 and includes consideration of railway receptors and PRoWs. Railways are a key receptor in pager Power's experience, and this has been confirmed through past consultation with Network Rail.
2.54.5	Whilst it is stated within 2.52.5 of EN-3 that aviation is not a consideration, in Pager Power's experience it is. This is again backed by consultation with key aviation stakeholders and past assessment experience, including reviews of studies where significant glare towards aviation receptors has been identified. However, assessment of the impact upon aviation was not required in this instance for the Little Crow Solar Park due to the separation distances from nearby aerodromes. The assessment remains accurate and has been completed considering best practice.
2.53.2	A full and detailed assessment of the potential heritage impacts of the scheme were undertaken and were presented in: • Little Crow, Santon, North Lincolnshire – Cultural Heritage Baseline Study (Pegasus Group, August 2019) (Document reference 7.30 LC TA8.1, PINS refence APP-099). • Little Crow, Santon, North Lincolnshire – Geophysical Survey Report (SUMO, September 2018) (Document Ref: 7.31 LC TA8.2, PINS reference APP-100). • Little Crow Solar Park, Scunthorpe, DN20 0BG – Archaeological Watching Brief (Cotswold Archaeology, November 2018) (Document Ref: 7.32 LC TA8.3, PINS reference APP-101). • Little Crow Solar Park, Scunthorpe, DN20 0BG – Archaeological Fieldwalking Survey (Cotswold Archaeology, November 2018) (Document Ref: 7.33 LC TA8.4, PINS reference APP-102). • Little Crow Solar Park, Scunthorpe, DN20 0BG – Archaeological Evaluation (Cotswold Archaeology, August 2019) (Document Ref: 7.34 LC TA8.5, PINS reference APP-103). The results of these works were used to inform the ES Chapter on Cultural Heritage (Document Ref 6.8 LC ES CH8, PINS reference APP-065).
2.53.3	The North Lincolnshire HER was utilised to inform the Cultural Heritage Baseline Study (Pegasus Group, August 2019) (Document Ref: 7.30 LC TA8.1, PINS refence APP-099). The Desk Based Study was followed up with a programme of archaeological site investigation works:

Draft EN-3 paragraph	Applicant's response / signpost.
	• Geophysical Survey Report (SUMO, September 2018) (Document Ref: 7.31 LC TA8.2, PINS reference APP-100). • Archaeological Watching Brief (Cotswold Archaeology, November 2018) (Document Ref: 7.32 LC TA8.3, PINS reference APP-101). • Archaeological Fieldwalking Survey (Cotswold Archaeology, November 2018) (Document Ref: 7.33 LC TA8.4, PINS reference APP-102). • Archaeological Evaluation (Cotswold Archaeology, August 2019) (Document Ref: 7.34 LC TA8.5, PINS reference APP-103).
2.53.4	All stages of fieldwork were undertaken following detailed discussion on scope with the North Lincolnshire Historic Environment Officer at North Lincolnshire Council. In accordance with industry best practice all were undertaken following the submission of Written Schemes of Investigation that had been signed off by the North Lincolnshire Historic Environment Records Officer.
2.53.5	The assessment works identified a sensitive area towards the centre of the site that was the location of a medieval Cistercian Nunnery. This area and a wide buffer zone was exclude from the development in order to protect the archaeological features present. The exclusion zone is set out in the paragraphs 8.5.7 – 8.5.9 of the ES chapter (Document Ref 6.8 LC ES CH8, APP-065, PINS reference APP-065) and further explained in paragraphs 3.1 – 3.10 of the Outline Archaeology Management Plan (Document Reference: 9.42 LC OTH, PINS reference REP6-018).
2.53.6	Further to the Gokewell Farm Exclusion Zone a 'ring ditch', probably representing a ploughed out Bronze Age burial mound, was identified during the field evaluation works. As result a 'no dig area of construction has been agreed to ensure its preservation in situ (see paragraph 8.5.10 of the ES Chapter (Document Ref 6.8 LC ES CH8, PINS reference APP-065) and Paragraphs 3.11 – 3.15 of the Outline Archaeology Management Plan (Document Reference: 9.42 LC OTH, PINS reference REP6-018). A further ring ditch was identified in the desk based Assessment, but not located during the field evaluation. As a precaution the scheme was amended e to remove a proposed track from this area ((see paragraph 8.5.10 of the ES Chapter (Document Ref 6.8 LC ES CH8, PINS reference APP-065) and Paragraph 3.16 of the Outline Archaeology Management Plan (Document Reference: 9.42 LC OTH, PINS reference REP6-018). Archaeological monitoring of areas identified as of higher archaeological potential have also been agreed with the North Lincolnshire Historic Environment Records Officer. These areas are set out ion Figure 1 and described in paragraphs 3.17 – 3.24, with abroad approach to the works set out Appendix 1 of the Outline Archaeology Management Plan (Document Reference: 9.42 LC OTH, PINS reference REP6-018).
2.54.2	Little Crow Solar Park is served by the B1208. This road is already used by HGVs associated with the Steel Works and is suitable for the vehicles associated with the construction phase of the Proposed Development. Details of the route to the Site are set out in Paragraphs

Draft EN-3 paragraph	Applicant's response / signpost.
	3.3-3.6 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105). Details of the types of vehicles used in the construction phase are set out in Table 5.1 and Table 5.2 of the same document. A construction compound will be provided on Site. This is set out in Section 4 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105).
2.54.3	Details of the route to the Site is set out in Paragraphs 3.3-3.6 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105). The most appropriate route between the Site and the strategic road network has been identified.
2.54.4	Details of the route to the Site is set out in Paragraphs 3.3-3.6 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105). The most appropriate route between the Site and the strategic road network has been identified.
2.54.5	Extensive consultation with the Local Highway Authority and Highways England was undertaken. This is set out in Table 9.1 of the Environmental Statement (Document Reference: 6.9 LC ES CH9, PINS reference APP-066). All transport and access matters were agreed with the Local Highway Authority and Highways England. This is shown in the relevant Statements of Common Ground. (Statement of Common Ground with NLC Document Reference: 9.4A LC OTH, PINS reference REP6-014); Statement of Common Ground with Highways England Document Reference: 9.7A LC OTH, PINS reference PDA-018).
2.54.6	The agreed mitigation measures are set out in Section 6 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105).
2.54.7	With regards to construction traffic on surrounding offsite roads and highways, Paragraph 5.12 of the Transport Statement (Document Ref 7.35A LC TA9.1, PINS reference AS-003) summarises: "*During the construction period, there will be approximately eight HGVs and 10-14 LGVs visiting the site per day. It is unlikely that these trips will occur during the highway network peak hours. Therefore, there will not be a material effect on the highway network. A Construction Traffic Management Plan (CTMP) will be implemented during the construction phase. This will minimise the effect of construction vehicles on the highway network*" Accordingly, the anticipated effect in terms of noise and vibration is expected to be negligible. In terms of construction traffic on the onsite access track, this has been reviewed according to British Standard 5228: 2009 '*Code of practice for noise and vibration control on construction and open sites*' as detailed in Section 7 of the Noise Impact Assessment (Document Ref 7.16A LC TA4.9, PINS reference REP2-014).

Draft EN-3 paragraph	Applicant's response / signpost.
	This assessment found that no significant effects are anticipated due to construction traffic on the access road. With regards to operational traffic on surrounding offsite roads and highways, Paragraph 5.11 of the Transport Statement (Document Ref 7.35 LC TA9.1, PINS reference AS-003) summarises: "*Once operational, very few vehicle trips will be associated with the development. Just four visits to the site a year (one per quarter) is required to provide maintenance to equipment*." Accordingly, the anticipated effect in terms of noise and vibration is expected to be negligible. In terms of operational traffic on the onsite access track, this has been reviewed according to British Standard 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*' as detailed in Section 6.3 of the Noise Impact Assessment (Document Ref 7.16A LC TA4.9, PINS reference REP2-014). This assessment found that no significant effects are anticipated due to operational traffic on the access road. As the latest NPS has not led to any changes to the Transport Statement (Document Ref 7.35 LC TA9.1, PINS reference AS-003), there are similarly no changes to the findings of the Noise Impact Assessment (Document Ref 7.16A LC TA4.9, PINS reference REP2-014).
2.54.9	Abnormal loads are not expected to be associated with the construction of the Proposed Development. This is set out in Paragraph 5.4 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference APP-105).
2.54.10	The expected traffic movements associated with the operational phase of the development are set out in Paragraph 5.20 of the Construction Traffic Management Plan (Document Reference 7.36 LC TA9.2, PINS reference, PINS reference APP-105).

3. APPLICANT RESPONSE TO QUESTION 4.1.2

ExQ4: Question 4.1.2

Further to the Applicant's response to ExQ3 3.6.1 (generating capacity) [REP6-019], with respect to the grid connection of 99.9 megawatts that has been secured, please explain how you consider it '… may be possible to increase this in the future'

3.1 The Applicant has secured 99.9MW capacity which would typically accommodate the construction of a c130 megawatt peak solar park which is the size of project initially envisaged. This was in early 2017[1].

3.2 Continued improvements in PV technology has increased the project megawatt peak potential whilst maintaining the same development footprint. This has allowed the Applicant to explore a range between 150 – 200MWp. Nevertheless, whilst there are PV modules with higher outputs continuously entering the market, it takes a few years before they become commonly viable and available. Therefore, the Applicant may opt to construct with lower output modules and staying around the 150MWp mark. The procurement timeline between obtaining consent and starting on site is probably 12 months for this project, and technology advancements should be expected within that time period. Considering that there is no change to the footprint or the parameters used in the Environmental Statement, it represents a sound development strategy to allow for the potential use of advancing technology, thus the Applicant has a explored a range of between 150 to 200MWp.

3.3 The opportunity to make use of the technological improvements would not be possible without the addition of the batteries because the export capacity limits the project size but adding the battery storage allows production (both excess and otherwise) from the PV to be stored and released to the grid later in the day when the demand is higher. This also assists in balancing the network.

3.4 The Grid Constraints Report identifies that no additional capacity is available locally and the Applicant will keep this under review prior to construction in case additional

[1] Please refer to applicant's Grid Network Constraints Report (Document Reference 7.10 LC TA4.3, PINS reference APP-080)

capacity becomes available (document reference 7.10 LC TA4.3, PINS reference APP-079).

4. APPLICANT RESPONSE TO QUESTION 4.4.1

ExQ4: Question 4.4.1

With respect to footpath 214, please advise on how long (quoting minutes and seconds) you consider: a) it currently takes to cross the Order Limits using footpath 214; and b) how long it would take to walk the proposed temporary diversion.

4.1 The existing route of Footpath 214 and the proposed diversion is set out on Application Document APP-043 Document Ref no. 2.39 LC DRW Proposed Temporary Diversion of Public Footpath 214.

4.2 The distances set out on the drawing are as follows:

- Points A-B (existing) 1,550m
- Points A-C 1385m + C-D 1290m + D-B 1820m (diversion) 4,495m

4.3 The following table sets out the distances involved and a calculation of potential time based on four different potential average speeds in order to provide figures to account for a range of potential walkers.

	Length	**Time based on average adult walking pace* 24 min/mile (2.5 miles/hour) or 15 min/km (4km per hour)**	**Time based on average walking pace on country and forestry footpaths** 20 min/mile (3 miles/hour) or 12 min/km (5km per hour)**	**Time based on a person with excellent fitness, at an approximate moderate walking pace.** 15 min/mile (4 miles/hour) or 9 min/km (6.4km per hour)**	**Time based on a fast walking pace.** 12 min/mile (5 miles/hour) or 7.5 min/km (8km per hour)**
Existing route of Footpath 214	1550m (1.55km)	23 mins 715 seconds	18 mins 36 seconds	14 mins 32 seconds	11 mins 38 seconds

Proposed temporary diversion of Footpath 214	4495m (4.495km)	67 mins 26 seconds	53 mins 56 seconds	42 mins 8 seconds	33 mins 43 seconds	

*Data derived from Ramblers association (WWW.ramblers.org.uk)

**Data derived from the British Heart Foundation (WWW.bhf.org.uk)

Potential variables to consider are fitness, age and height of the walker, terrain/direction of travel (e.g. on FP214 east-west is downhill and west-east is uphill), purpose of journey e.g. travel or leisure, stopping to take in views or take photos, weather conditions, solo or group dynamics, any weight being carried e.g. back pack and type of ground.

APPENDIX 1

DRAFT OVERARCHING NATIONAL POLICY STATEMENT

FOR ENERGY (EN-1)

Department for
Business, Energy
& Industrial Strategy

Draft Overarching National Policy Statement for Energy (EN-1)

September 2021

Any enquiries regarding this publication should be sent to us at:
enquiries@beis.gov.uk

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1 Introduction

1.1 Background

1.1.1 This National Policy Statement (NPS) sets out national policy for the energy infrastructure described in Section 1.3 below. It has effect for the decisions by the Secretary of State on applications for energy developments that are nationally significant under the Planning Act 2008. For such applications this NPS, combined with any technology specific energy NPS where relevant, provides the primary policy for decisions by the Secretary of State. Under the Planning Act 2008 the Secretary of State must also have regard to any local impact report submitted by a relevant local authority, any relevant matters prescribed in regulations, the Marine Policy Statement (MPS) and any applicable Marine Plan, and any other matters which the Secretary of State thinks are both important and relevant to the planning decision.

1.1.2 The Planning Act 2008 also requires that, where an NPS has effect, the Secretary of State must decide an application for energy infrastructure in accordance with the relevant NPSs except to the extent the Secretary of State is satisfied that to do so would:

- lead to the UK being in breach of its international obligations
- be in breach of any statutory duty that applies to the Secretary of State
- be unlawful
- result in adverse impacts from the development outweighing the benefits
- be contrary to regulations about how its decisions are to be taken

1.1.3 Applicants should therefore ensure that their applications, and any accompanying supporting documents, are consistent with the instructions and guidance in this NPS, any relevant technology specific NPS and any other NPSs that are relevant to the application in question.

1.1.4 This NPS, in particular the policy and guidance on generic impacts in Part 5, may also be helpful to local planning authorities (LPAs) in preparing their local impact reports[1].

1.2 Role of this NPS in the wider planning system

1.2.1 In England and Wales this NPS may be a material consideration in decision making on applications that fall under the Town and Country Planning Act 1990 (as amended). Whether, and to what extent, this NPS is a material consideration will be judged on a

1 A report prepared under section 60 of the Planning Act 2008.

case by case basis and will depend upon the extent to which the matters are already covered by applicable planning policy.

1.2.2 The Secretary of State may also receive applications for variations to existing consents for energy infrastructure under section 36C of the Electricity Act 1989 for which this NPS, in combination with any relevant technology specific NPSs, may be a relevant consideration.

1.2.3 Under the Marine and Coastal Access Act 2009, the Marine Management Organisation (MMO) will determine applications under section 36 and section 36A of the Electricity Act 1989 where they relate to a generating station in waters adjacent to England and Wales or in a Renewable Energy Zone (except any part in relation to which Scottish Ministers have functions) provided that the application does not exceed the capacity threshold set out in the Planning Act 2008. The MMO will determine applications in accordance with the MPS and any applicable marine plans, unless relevant considerations indicate otherwise. This NPS, in combination with any relevant technology specific NPSs, may be a relevant consideration for the MMO when it is determining such applications. The MMO may also receive applications for a marine licence for other energy infrastructure that falls outside the scope of the Planning Act 2008 or the Electricity Act 1989 for which the NPSs may be a relevant consideration. They may also be a relevant consideration in the preparation of relevant marine plans. The role of the MPS and marine plans in relation to Secretary of State decisions is set out in Section 4.4.

1.3 Scope of the Overarching National Policy Statement for Energy

1.3.1 This Overarching National Policy Statement for Energy (EN-1) is part of a suite of NPSs issued by the Secretary of State for Business, Energy and Industrial Strategy. It sets out the Government's policy for delivery of major energy infrastructure. A further five technology specific NPSs for the energy sector cover: natural gas electricity generation (EN-2); renewable electricity generation (both onshore and offshore) (EN-3); gas supply infrastructure and gas and oil pipelines (EN-4); the electricity transmission and distribution network (EN-5); and nuclear electricity generation (EN-6). Further technology specific NPS may be designated and added to the suite if it becomes appropriate to do so. These should be read in conjunction with this NPS where they are relevant to an application.

1.3.2 The Planning Act 2008[2] sets out the thresholds for nationally significant infrastructure projects (NSIPs) in the energy sector. The Act defines the following forms of energy infrastructure as being an NSIP[3]:

- electricity generating stations, (meeting the thresholds set out in the Planning Act 2008). This includes onshore generating stations (but not onshore wind) generating more than 50 megawatts in England and 350 megawatts in Wales. It also includes offshore generating stations generating more than 100 megawatts offshore in territorial waters adjacent to England and within the English part of the Renewable Energy Zone and those generating more than 350 megawatts in territorial waters adjacent to Wales and the Welsh part of the Renewable Energy Zone (the Welsh Zone as defined by section 158 of the Government of Wales Act 2006). For these types of infrastructure, this Overarching NPS (EN-1) in conjunction with any of the relevant technology-specific NPSs will be the primary policy for Secretary of State decision making
- large gas reception and liquefied natural gas (LNG) facilities and underground gas storage facilities (meeting the thresholds set out in the Planning Act 2008). For this infrastructure EN-1 in conjunction with EN-4 (for natural gas only) will be the primary policy for Secretary of State decision making
- cross-country gas and oil pipelines and Gas Transporter pipelines (meeting the thresholds and conditions set out in the Planning Act 2008). For this infrastructure EN-1 in conjunction with EN-4 (for natural gas only) will be the primary policy for Secretary of State decision making
- above ground electric lines at or above 132kV (meeting the thresholds set out in the Planning Act 2008). For this infrastructure, EN-1 in conjunction with the Electricity Networks NPS (EN-5) will be the primary basis for Secretary of State decision making

1.3.3 Where the need for a particular type of energy infrastructure set out above is established by this NPS, but that type of infrastructure is outside the scope of one of the technology specific NPSs, this NPS will have effect alone and will be the primary basis for Secretary of State's decision making. This will be the case for, but is not limited to, hydrogen pipeline and storage infrastructure, Carbon Capture Storage

2 Part 3 Planning Act 2008.

3 Since the Energy NPSs were first designated, there have been four relevant amendments to the Planning Act 2008 which affect the application of the Act to electric lines and energy generating stations: i) the Planning Act 2008 (Nationally Significant Infrastructure Projects) (Electric Lines) Order 2013 removed lines of less than 2km and certain replacement lines from the definition of nationally significant electricity lines; ii) the Infrastructure Planning (Onshore Wind Generating Stations) Order 2016 removed all onshore wind generating stations in England and Wales from the definition of nationally significant energy generating stations; iii) the Wales Act 2017 devolved responsibility for development consent decisions in relation to all electricity generating stations with 350MW capacity or less in Wales (and made amendments to remove electricity lines associated with such stations from the definition of nationally significant electricity lines); and iv) the Infrastructure Planning (Electricity Storage Facilities) Order 2020 removed all forms of electricity storage, other than pumped hydroelectric storage, from the definition of nationally significant energy generating stations.

(CCS) pipeline infrastructure and other forms of low carbon generation infrastructure not included in EN-2 or EN-3.

1.3.4 As set out in the Written Ministerial Statement of 7 December 2017[4], EN-6 only has effect in relation to nuclear electricity generation deployable by the end of 2025, but also continues to provide information that may be important and relevant for projects which will deploy after 2025. This NPS (EN-1) will have effect[5] in relation to any new applications for nuclear electricity generation deployable after 2025, particularly in so far as it continues to establish the need for energy generation, including nuclear. A new technology specific NPS for nuclear electricity generation deployable after 2025 is proposed and will be developed to sit alongside this NPS.

1.3.5 In addition to these specific categories of NSIP, section 35 of the Planning Act 2008 allows the Secretary of State to give a direction that a particular development that does not meet one of the statutory NSIP categories, should nonetheless be treated as development for which development consent is required. The Secretary of State may give a direction, on receipt of a qualifying request, in relation to a proposed development in England or English waters. The Secretary of State must be satisfied that the proposed development is or forms part of a project in the field of energy and that it is nationally significant either by itself or in combination with one or more other developments in the field of energy. EN-1, in conjunction with any relevant technology specific NPS, will be the primary policy for Secretary of State decision making on projects in the field of energy for which a direction has been given under section 35.

1.3.6 The Planning Act 2008 enables the Secretary of State to issue a development consent order including consent for development which is associated with the energy infrastructure NSIP (subject to certain restrictions set out in section 115 of the Act). Government has issued guidance to which the Secretary of State must have regard in deciding whether development is associated development[6]. EN-1, in conjunction with any relevant technology specific NPS, will be the primary policy for Secretary of State decision making on associated development.

1.3.7 The Planning Act 2008 enables the Secretary of State to issue a development consent order that can make provision relating to, or to matters ancillary to, the development of the energy infrastructure NSIP. This may include, for example, the granting of wayleaves, the authorisation of tree lopping and the compulsory acquisition of land. EN-1 in conjunction with any relevant technology-specific NPSs will be the primary policy for Secretary of State decision making on such matters.

4 https://questions-statements.parliament.uk/written-statements/detail/2017-12-07/HCWS321
5 Subject to the transitional arrangements set out at Section 1.6 below.
6 https://www.gov.uk/government/publications/planning-act-2008-associated-development-applications-for-major-infrastructure-projects

1.4 Geographical coverage

1.4.1 The Secretary of State will decide all applications (other than as specified in this paragraph) for nationally significant infrastructure projects in England and Wales, adjacent territorial waters and the offshore Renewable Energy Zone (REZ) (except any part in relation to which Scottish Ministers have functions).

1.4.2 In Wales, the Secretary of State will not examine applications for LNG facilities, gas reception facilities or gas transporter pipelines. The Secretary of State will only examine applications for underground gas storage facilities in Wales where the applicant is a licensed gas transporter and the storage is in natural porous strata (rather than in cavities); precise details are set out in EN-4 and section 17 of the Planning Act 2008. The Secretary of State will only examine electricity generating stations in Wales, in territorial waters adjacent to Wales or in the Welsh Zone if their capacity is greater than 350MW.

1.4.3 In Scotland and in those areas of the REZ where Scottish Ministers have functions, the Secretary of State will have no functions under the Planning Act 2008 in relation to consenting energy infrastructure projects except as set out in paragraph 1.4.4. However, energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland.

1.4.4 The Secretary of State will examine applications for cross country oil and gas pipelines (meeting the conditions set out in section 21 of the Planning Act 2008) that have one end in England or Wales and the other in Scotland.

1.4.5 In Northern Ireland, planning consents for all nationally significant infrastructure projects, as well as most energy policy, are devolved to the Northern Ireland Executive, so the Secretary of State will not examine applications for energy infrastructure in Northern Ireland and the NPS will not apply there.

1.5 Period of validity and review

1.5.1 This NPS will remain in force in its entirety unless withdrawn or suspended in whole or in part by the Secretary of State. It will be subject to review by the Secretary of State in order to ensure that it remains appropriate. Information on the review process is set out in paragraphs 10 to 12 of the Annex to CLG's letter of 9 November 2009[7] and the MHCLG guidance on Review of NPSs. [8]

7 https://www.gov.uk/guidance/planning-guidance-letters-to-chief-planning-officers
8 https://www.gov.uk/guidance/planning-act-2008-guidance-on-the-process-for-carrying-out-a-review-of-existing-national-policy-statements

1.6 Transitional provisions following review

1.6.1 The suite of energy NPSs were first designated in 2011. In the 2020 Energy White Paper[9] a review of the NPS was announced under section 6 of the Planning Act. That review resulted in a number of amendments to the NPSs. [Those amendments were designated in [X]].

1.6.2 Applications for development consent will have been prepared, and may already be in examination, in reliance upon the 2011 suite of NPSs (or for nuclear development based on the position set out in the Written Ministerial Statement of 7 December 2017[10]). The Secretary of State has decided that for any application accepted for examination before designation of the 2021 amendments, the 2011 suite of NPSs should have effect in accordance with the terms of those NPS. The 2021 amendments will therefore have effect only in relation to those applications for development consent accepted for examination after the designation of those amendments.

1.6.3 However, any emerging draft NPSs (or those designated but not having effect) are potentially capable of being important and relevant considerations in the decision-making process. The extent to which they are relevant is a matter for the relevant Secretary of State to consider within the framework of the Planning Act and with regard to the specific circumstances of each development consent order application.

1.7 The Appraisal of Sustainability and Habitats Regulations Assessment

1.7.1 All the energy NPSs have been subject to an Appraisal of Sustainability (AoS), as required by the Planning Act 2008. The AoSs also incorporate the analysis of likely significant environmental effects required by the Environmental Assessment of Plans and Programmes Regulations 2004 (the SEA Regulations).

1.7.2 The purposes and methods of the AoSs are explained in the draft of the AoS for EN-1 (AoS-1) which is published alongside this document. Their primary function is to inform consultation on the draft NPSs by providing an analysis of the environmental, social and economic impacts of implementing the energy NPSs.

1.7.3 The AoS process has provided a series of recommendations which have been addressed where appropriate and incorporated into the NPS to ensure that they remain in line with current considerations of sustainability.

9 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future
10 https://questions-statements.parliament.uk/written-statements/detail/2017-12-07/HCWS321

AoS assessment of EN-1

1.7.4 Some key points from the assessment of EN-1 (AoS-1) are set out below:

- The energy NPSs will be transformational in enabling England and Wales to transition to a low carbon economy and thus help to realise UK climate change commitments sooner than continuation under the current planning system. However, there is also some uncertainty as it is difficult to predict the mix of technology that will be delivered by the market against the framework set by the government.
- It is important to recognise that the energy NPSs will still generate residual carbon emissions which will need to be addressed if the government target of net zero by 2050 is to be met. It should also be recognised that some climate change is inevitable and as such, there is a need for energy infrastructure to be resilient to climate change – the NPS sets out a clear and robust approach for ensuring this is done.
- The energy NPSs are likely to contribute positively towards improving the vitality and competitiveness of the UK energy market by providing greater clarity for developers. This should improve the UK's security of supply and, less directly through increased economic opportunities for local communities, have positive effects for health and well-being.
- Due to the nature and size of potential schemes (as well as likely potential locations in areas such as coastal areas), opportunities for landscape mitigation will be limited and while the energy NPS sets out a robust approach to addressing impacts on landscape, townscape and seascape across the short, medium and long timeframes, significant adverse effects are likely to remain.
- There is potential from construction and operation activities for significant negative effects on biodiversity as a result of the energy NPS implementation in the short, medium and long term. However, due to the possibility of enhancement of the natural environment and biodiversity net gains, there is also potential for minor positive effects in the medium to long term.
- There may also be cumulative negative effects on biodiversity, landscape, water and air quality, water resources, flood risk, coastal change and health at the regional or sub-regional levels depending upon location and the extent of clustering of new energy and other infrastructure. Proposed energy developments will still be subject to project level assessments, including Environmental Impact Assessment (EIA), and this will address locationally specific effects. The energy NPSs set out mitigation for cumulative negative effects by requiring the Secretary of State to consider accumulation of effects as a whole in their decision-making on individual applications for development consent.

1.7.5 The AoS assessments of EN-2 to EN-5 (AoS-2 to AoS-5) noted additional specific adverse effects related to individual technologies, over and above those noted within EN-1. For example, in relation to EN-2 it was noted that natural gas electricity

generating infrastructure development will have additional considerations in respect of air quality, the water environment, carbon and biodiversity. Similar additional considerations are noted in respect of EN-3, EN-4 and EN-5 (which also noted issues in relation to landscape and health and wellbeing). In all cases, each technology specific NPS (EN-2 to EN-5) notes a range of mitigation measures, which will act to bolster the approaches outlined in EN-1, to reduce the adverse effects of these technology specific issues.

Assessment of alternatives to EN-1

As required by the SEA Regulations, AoS-1 also includes an assessment of reasonable alternatives to the policies set out in EN-1 at a strategic level. Four alternatives to the plan have been considered as set out in the table below.

Plan	Overview of technologies
EN-1	EN-1 combines infrastructure set out in Part 3 of this NPS. In summary: generation from Renewables (including Biomass and Energy from Waste with or without CCS), Natural Gas-fired electricity generation with or without CCS, Hydrogen-fired electricity generation, Pumped Hydro Storage and Nuclear; associated electricity network infrastructure; and transport and storage infrastructure for natural gas, oil, hydrogen and CCS.
Alternative 1 (A1)	As EN-1 without Nuclear and Unabated Natural Gas.
Alternative 2 (A2)	As EN-1 without Unabated Natural Gas.
Alternative 3 (A3)	As EN-1 without Nuclear.
Alternative 4 (A4)	As EN-1 but with an even stricter protection of the marine environment.

1.7.6 The key differences between the different alternatives and the plan are highlighted below:

1.7.7 Alternative A1, which is the same as EN-1 but without Nuclear and Unabated Natural Gas, would be:

- materially beneficial for the achievement of Net Zero due to no emissions from unabated gas, although reliant on smaller group of low carbon technologies for delivery

- materially adverse on Security of Supply as reliant on technologies still under development such as Hydrogen and Energy Storage at scale to ensure peak supply and maintain the stability and security of the electricity system
- have a mix of beneficial and adverse effects on the built and natural environment due to positive environment effects through, for example, mitigation of climate change, and negative due to larger areas of land and sea required for renewables and natural gas with CCS to meet the same energy output as EN-1

1.7.8 Alternative A2, which is the same as EN-1 but without Unabated Natural Gas, would be:

- materially beneficial for the achievement Net Zero due to no emissions from unabated gas
- adverse on Security of Supply, as although it would be less reliant (than alternative A1) on yet to be fully proven technologies such as Hydrogen and Energy Storage at scale, there would still be a need for them to ensure peak supply and maintain the stability and security of the electricity system

1.7.9 Alternative A3, which is the same as EN-1 but without Nuclear, would be:

- adverse for the achievement of Net Zero due to greater ongoing emissions from unabated gas
- adverse on Security of Supply as reliant on a smaller range of electricity generating technologies
- adverse for the Natural Environment as emphasis on renewables and natural gas with CCS would require larger areas of land and sea to meet the same energy output as EN-1

1.7.10 Alternative A4, which is the same as EN-1 but with an even stricter protection of the marine environment, would be:

- materially adverse for the achievement of Net Zero as reliant on a smaller range of low carbon technologies
- adverse on Security of Supply as reliant on a smaller range of electricity generating technologies
- adverse on the Built Environment due to increased pressure on land.

1.7.11 None of these alternatives are as good as, or better than, the proposals set out in EN-1 and therefore the government's preferred option is to take forward the proposals set out herein. The assessments of technology-specific alternatives to EN-2 to EN-5 are given in the AoS reports for these NPSs.

Habitats Regulation Assessments

1.7.12 Habitats Regulation Assessment (HRA) has also been carried out under the Conservation of Habitats and Species Regulations 2017 and the Conservation of

Offshore Marine Habitats and Species Regulations 2017 (the Habitats Regulations) and published for NPSs EN-1 to EN-5. As EN-1 to EN-5 do not specify locations for energy infrastructure, the HRA is a high-level strategic overview. Although the lack of spatial information within EN-1 to EN-5 made it impossible to reach certainty on the effect of the plan on the integrity of any HRA site, the potential for proposed energy infrastructure projects of the kind contemplated by EN-1 to EN-5 to have adverse effects on the integrity of such sites cannot be ruled out, following the precautionary principle. The HRA explains why the government considers that EN-1 to EN-5 are, nevertheless, justified by imperative reasons of overriding public interest, while noting that its conclusions are only applicable at the NPS level and are without prejudice to any project-level HRA, which may result in the refusal of consent for a particular application.

2 Government policy on energy and energy infrastructure development

2.1 Introduction

2.1.1 This Part outlines the policy context for the development of nationally significant energy infrastructure. The Energy White Paper, published in December 2020[11], outlined a strategy to transform the energy system, tackling emissions while continuing to ensure secure and reliable supply, and affordable bills for households and businesses.

2.1.2 To produce enough energy required for the UK and ensure it can be transported to where it is needed, a significant amount of infrastructure is needed at both local and national scale. High quality infrastructure is crucial for economic growth, boosting productivity and competitiveness. Part 3 provides further details on the need for and importance of energy to economic prosperity and social well-being

2.1.3 The National Infrastructure Strategy (NIS) committed to boosting growth and productivity across the whole of the UK, levelling up and strengthening the Union through investment in rural areas, towns, and cities, from major national projects to local priorities. It also committed to government putting the UK on the path to meeting its net zero emissions target by 2050 by taking steps to decarbonise the UK's power networks which together account for over two-thirds of the UK emissions – and take steps to adapt to the risks posed by climate change.

2.1.4 This energy NPS considers the large-scale infrastructure which will be required to ensure the UK can provide a secure, reliable, and affordable supply of energy, while also meeting our decarbonisation targets.

2.2 Net zero by 2050

2.2.1 The UK has continually demonstrated its global leadership on climate change mitigation through robust and ambitious targets to reduce carbon emissions. Through the Climate Change Act 2008 (CCA), the UK became the first country to set a legally binding emissions reduction target for 2050 and carbon budgets which limit the amount of Greenhouse Gas (GHG) the UK emits over successive five-year periods. These carbon budgets are set to ensure the UK keeps to a trajectory consistent with meeting its 2050 target.

11 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

2.2.2 The original iteration of EN-1 was drafted when the UK had a GHG emission reduction target of at least 80 per cent by 2050, set following advice from the Committee on Climate Change – (now known as the Climate Change Committee (CCC)) - to ensure the UK played its role in limiting global warming to 2 degrees.

2.2.3 In 2016, the UK ratified the Paris Agreement under which Parties agreed to hold the increase in global average temperature to well below 2 degrees above pre-industrial levels, and to pursue efforts to limit this to 1.5 degrees. Within the Agreement each Party is required to prepare, communicate and maintain successive Nationally Determined Contributions (NDCs), which will reflect the highest possible ambition of the Party.

2.2.4 In June 2019, the UK became the first major economy to legislate for a 2050 net zero GHG emissions target through the Climate Change Act 2008 (2050 Target Amendment) Order 2019. In December 2020, the UK set out its NDC to reduce GHG emissions by at least 68 per cent from 1990 levels by 2030. In April 2021, the Government announced the sixth carbon budget (CB6) and as a result will legislate to reduce GHG emissions by ~78% by 2035 compared to 1990 levels.

2.2.5 Building on last Autumn's Energy White Paper and the Prime Minister's Ten Point Plan for a Green Industrial Revolution, we will publish a Net Zero Strategy ahead of COP26. This will set out the Government's vision for transitioning to a net zero economy, and raise ambition as we outline our path to meet net zero by 2050, making the most of new growth and employment opportunities across the UK.

2.3 Meeting net zero

2.3.1 Energy underpins almost every aspect of our way of life. It enables us to heat and light our homes; to produce and transport food; to travel to work and for leisure. Our businesses and jobs rely on the use of energy. Energy is essential for the critical services we rely on – from hospitals to traffic lights and mobile devices. It is difficult to overestimate the extent to which our quality of life is dependent on adequate energy supplies.

2.3.2 Our objectives for the energy system are to ensure our supply of energy always remains secure, reliable, affordable, and consistent with meeting our target to cut GHG emissions to net zero by 2050, including through delivery of our carbon budgets and NDC. This will require a step change in the decarbonisation of our energy system.

2.3.3 Meeting these objectives necessitates a significant amount of energy infrastructure, both large and small-scale. This includes the infrastructure needed to convert primary sources of energy (e.g. wind) into energy carriers (e.g. electricity or hydrogen), and to store and transport them into and around the country. It also includes the infrastructure needed to capture, transport and store carbon dioxide. The requirement for new

energy infrastructure will present opportunities for the UK and contributes towards our ambition to support jobs in the UK's clean energy industry and local supply chains.

2.3.4 The sources of energy we use will also need to change. Today, our energy system is dominated by fossil fuels. Although representing a record low, fossil fuels still accounted for just over 79 per cent of energy supply in 2019[12]. We will need to dramatically increase the volume of energy supplied from low carbon sources and reduce the amount provided by fossil fuels.

2.3.5 We need to transform the energy system, tackling emissions while continuing to ensure secure and reliable supply, and affordable bills for households and businesses. This includes increasing our supply of clean energy from renewables, nuclear and hydrogen manufactured using low carbon processes[13] (low carbon hydrogen) and, where we still emit carbon, developing the industry and infrastructure to capture, transport and store it.

2.3.6 Decarbonisation also means we are likely to become more dependent on some forms of energy compared to others. Using electrification to reduce emissions in large parts of transport, heating and industry could lead to more than half of final energy demand being met by electricity in 2050, up from 17 per cent in 2019, representing a doubling in demand for electricity[14]. Low carbon hydrogen is also likely to play an increasingly significant role.

2.3.7 This switch will break down the siloes which have traditionally existed between separate heat, transport, and electricity networks. We will need to adapt existing networks or build new ones to integrate low carbon hydrogen into the system and enable the transport and storage of carbon dioxide. To ensure that supplies remain reliable and to keep our energy affordable we will also need to reduce the amount of energy we waste, using new and innovative low carbon technologies and more energy efficiency measures.

2.3.8 The transformational approach tackles long-term problems to deliver growth that creates high-quality jobs across the UK and makes the most of the strengths of the Union. However, this transformation cannot be instantaneous. The use of unabated natural gas and crude oil fuels for heating, cooking, electricity and transport, and the production of many everyday essentials like medicines, plastics, cosmetics and household appliances, will still be needed during the transition to a net zero economy. This will enable secure, reliable, and affordable supplies of energy as we develop the means to address the carbon dioxide and other greenhouse gases associated with their use, including the development and deployment of low carbon alternatives. The UK's oil and gas sector recognises the demand for oil and gas will be much reduced in

12 https://www.gov.uk/government/statistics/energy-trends-march-2021
13 This includes production of both green hydrogen (through water electrolysis with low carbon power) and blue hydrogen (through methane reformation with Carbon Capture and Storage)
14 The Impact Assessment for CB6 shows an illustrative range of 610-800TWh in 2050: https://www.legislation.gov.uk/ukdsi/2021/9780348222616/impacts

the future, but also recognise the key role that it can play in helping the UK meet its net zero commitment. Clear action will need to be taken to build on the proven capabilities within the sector to lead in new and emerging energy technologies.

2.3.9 Some limited residual use of unabated natural gas and crude oil may even be needed beyond 2050 to meet our energy objectives. Due to policy uncertainties for the post 2050 period, a detailed assessment for this period has not been conducted at this stage. However, this can be consistent with our net zero target if any emissions are balanced by negative emissions from GHG Removal technologies.

2.4 Decarbonising the power sector

2.4.1 Since the designation of the original EN-1 overall GHG emissions from the power sector have more than halved, from ~145MtCO_2e in 2011 to ~60MtCO_2e in 2019 (see figure 1). This can be mainly attributed to the proportion of renewable generation quadrupling from 9% to 37% between 2011 and 2019 whilst the share of electricity generation from coal reduced from 27% to 2% over the same period.[15]

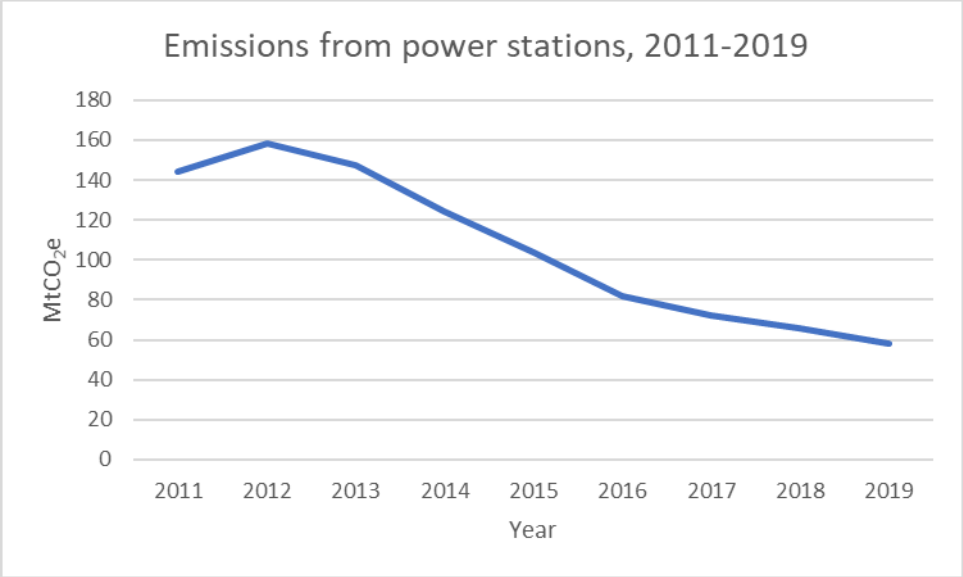


Figure 1: GHG emissions from power stations 2011-2019[16]

2.4.2 A key mechanism for increasing deployment of low carbon generation has been the implementation of Contracts for Difference (CfD). The CfD scheme allows generators to be paid the difference between the 'strike price' – a price for electricity reflecting the cost of investing in a particular low carbon technology – and the 'reference price' – a cost measure of the average Great Britain (GB) market price for electricity. If the market value of electricity is higher than the 'strike price', the generator returns the difference and likewise, if the market value is below the 'strike price', the consumer

15 BEIS (2021), Energy Trends, Table 5.1, https://www.gov.uk/government/statistics/energy-trends-march-2021
16 BEIS (2020), Provisional UK greenhouse gas emissions national statistics, Table 1, https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2020

tops up the value to the 'strike price'. In this way, the CfD scheme incentivises investment by giving greater certainty and stability of revenues to electricity generators by reducing their exposure to volatile wholesale prices, whilst protecting consumers from paying for higher support costs when electricity prices are high.

2.4.3 There have been 3 CfD allocation rounds to date (the first having opened in October 2014) with CfDs being awarded to developers of eligible projects through a competitive bidding process administered by National Grid's Electricity Systems Operator (ESO). The scheme has been very successful in driving substantial deployment of renewable electricity capacity at scale whilst rapidly reducing costs. The clearing prices achieved in the third allocation round (which opened in May 2019) were well below the Administrative Strike Prices for each of the successful technologies (Administrative Strike Prices representing the maximum strike price, presented on a price per megawatt hour basis, a project of a particular technology type in a given delivery year can receive during an allocation round). For example, the costs of offshore wind have fallen by around 30% from the previous allocation round in 2017, with prices falling from £150 per megawatt hour in 2014 to £40 per megawatt hour in 2019.

2.4.4 Government is developing business models to incentivise the deployment of Carbon, Capture, Utilisation and Storage (CCUS) facilities and hydrogen in the UK. We will put in place a commercial framework which will enable developers to finance the construction and operation of power and Industrial CCUS facilities, stimulating a pipeline of projects and building a UK supply chain. For Power CCUS, we will introduce a business model based on the existing CfD framework, adapted so that price signals incentivise power CCUS to play a role in the system which complements renewables. In addition, for Industrial CCUS, we will incentivise the deployment of carbon capture technology through the Industrial Carbon Capture Business Model for industrial users who often have no viable alternatives available to achieve deep decarbonisation, this could include Energy from Waste facilities. We will be providing updates on CCUS business models throughout 2021. We will also be consulting in 2021 on our preferred hydrogen business model, or models, to bring through private sector investment and support jobs in low carbon hydrogen projects.[17]

2.4.5 In addition, the Government has other levers to encourage further decarbonisation within the power sector:

- UK Emissions Trading Scheme (UK ETS) - The UK ETS will promote cost-effective decarbonisation, allowing businesses to cut carbon where it is cheapest to do so and thereby promote innovation and growth for UK businesses. The government is developing the scheme to expand its remit to help support the UK's negative emissions capacity. The UK ETS replaces the UK's participation in the EU Emissions Trading System (EU ETS) and is a crucial step in achieving the UK's net zero target.

17 See https://www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen

- Carbon Price Support (CPS) – The CPS is a tax on power sector CO_2 emissions that was established to accelerate decarbonisation by strengthening the price signal from the EU ETS allowance price. Currently, the CPS is added to the level of the UK ETS allowance price and HMT announced at the Budget 2021 that it would remain at £18/tCO_2 until 2022/23.
- Emissions Performance Standard (EPS) - The EPS is a regulatory backstop to ensure that new fossil fuel-fired electricity generation contributes to electricity security of supply in a manner consistent with the UK's decarbonisation objectives. It places a limit on the carbon dioxide emissions produced by fossil-fuel generation plants, which is currently set at of 450gCO_2/kWh for those plants above 50MWe operating at baseload and which received development consent after 18 February 2014.

Security of energy supplies

2.4.6 Given the vital role of energy to economic prosperity and social well-being, it is important that our supply of energy remains secure, reliable and affordable.

2.4.7 The Capacity Market (CM) is at the heart of the government's plans for a secure and reliable electricity system. The CM provides all forms of capacity capable of contributing to security of supply with the right incentives to be on the system and to deliver during periods of electricity system stress, for example during cold, still periods where demand is high and wind generation is low.

2.4.8 The CM works by allowing eligible Capacity Providers to bid into competitive, annual auctions – either four years (T-4) or one year (T-1) ahead of delivery. Capacity Providers who are awarded an agreement in an auction receive a steady payment intended to ensure sufficient reliable capacity is in place to meet demand at times of system stress. Revenue from Capacity Payments incentivises the necessary investment to maintain and refurbish existing capacity, and to finance new capacity. Capacity Providers face penalties if they fail to deliver when needed.

2.4.9 The CM is technology neutral, meaning it does not seek to procure specific volumes of capacity from particular types of technology. All types of capacity are able to participate – except for Capacity Providers in receipt of other specific categories of government support – but they must demonstrate sufficient technical performance to contribute to security of supply. The CM operates alongside the GB wholesale electricity market and the services the National Electricity Transmission System Operator (NETSO) contracts to provide ancillary services to ensure second-by-second balancing of the electricity system.

2.4.10 In July 2019 the Government introduced CO_2 emissions limits to the Capacity Market. Plants burning fossil fuels that began generating after July 2019 must demonstrate that they emit below 550gCO_2/kWh electricity generated in order to be able to hold Capacity Market agreements from 2020 onwards. Plants burning fossil fuels that

began generating before July 2019 must either demonstrate that they emit below 550gCO_2/kWh electricity generated or must not emit more than 350kgCO_2 per year on average. Plants unable to comply with these requirements will be excluded from holding Capacity Market agreements from the Delivery Year 2024 onwards. This will ensure the CM is aligned with broader decarbonisation objectives by preventing the most polluting plants from participating.

2.5 Sustainable development

2.5.1 The government's wider objectives for energy infrastructure include contributing to sustainable development[18] and ensuring that our energy infrastructure is safe. Sustainable development is relevant not just in terms of addressing climate change, but because the way energy infrastructure is deployed affects the well-being of society and the economy, for both current and future generations. For example, the availability of appropriate infrastructure supports the efficient working of the market so as to ensure competitive prices for consumers. The regulatory framework also encourages the energy industry to protect the more vulnerable.

2.5.2 The government was at the forefront of negotiating the UN's 2030 Agenda for Sustainable Development, which included seventeen Sustainable Development Goals, and is committed to being at the forefront of delivering them. Among the Sustainable Development Goals are goals to "take urgent action to combat climate change and its impacts", to "ensure access to affordable, reliable, sustainable and modern energy for all" and to "build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation"[19].

2.5.3 The planning framework set out in this NPS and the suite of energy NPSs takes full account of the objective of contributing to the achievement of sustainable development and this has been tested through the AoS. The AoS has examined whether the NPS framework for the development of new energy infrastructure projects is consistent with the objectives for sustainable development, including consideration of other government policies such as those for the environment, economic development, health and transport.

2.5.4 Whatever incentives, rules or other signals developers are responding to, the government believes that the NPSs set out planning policies which both respect the principles of sustainable development and can facilitate, for the foreseeable future, the consenting of energy infrastructure on the scale and of the kinds necessary to help us maintain safe, secure, affordable and low carbon supplies of energy.

18 As defined in 1987 by the World Commission on Environment and Development report Our Common Future - https://sustainabledevelopment.un.org/milestones/wced

19 https://www.gov.uk/government/publications/implementing-the-sustainable-development-goals/implementing-the-sustainable-development-goals--2

3 The need for new nationally significant energy infrastructure projects

3.1 Introduction

3.1.1 This Part of the NPS explains why the government sees a need for significant amounts of new large-scale energy infrastructure to meet its energy objectives. However, as noted in Section 1.7, it will not be possible to develop the necessary amounts of such infrastructure without some significant residual adverse impacts.

3.1.2 This Part also shows why the government considers that the need for such infrastructure will often be urgent. The Secretary of State should give substantial weight to considerations of need. The Secretary of State is not required to consider separately the specific contribution of any individual project to satisfying the need established in this NPS.

3.2 Secretary of State decision making

3.2.1 The government's objectives for the energy system are to ensure our supply of energy always remains secure, reliable, affordable, and consistent with net zero emissions in 2050 for a wide range of future scenarios, including through delivery of our carbon budgets and NDC.

3.2.2 We need a range of different types of energy infrastructure to deliver these objectives. This includes the infrastructure described within this NPS but also more nascent technologies, data, and innovative infrastructure projects consistent with these objectives.

3.2.3 New coal or large-scale oil-fired electricity generation are not consistent with the trajectory of our carbon budgets and the transition to net zero and so are not included within this NPS, and the government is taking active steps to phase them out of the energy system.

3.2.4 It is for industry to propose new energy infrastructure projects within the strategic framework set by government. With the exception of new coal or large-scale oil-fired electricity generation, the government does not consider it appropriate for planning policy to set limits on different technologies but planning policy can be used to support the government's ambitions in energy policy and other policy areas.

3.2.5 The Secretary of State 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, as described for each of them in this Part.

3.2.6 In this Part, the Secretary of State identifies the level of need for new energy infrastructure. In relation to the weight to be given to that identified need, the Secretary of State has determined that substantial weight should be given to this need when considering applications for development consent under the Planning Act 2008.

3.2.7 This NPS, along with any technology specific energy NPSs, sets out policy for nationally significant energy infrastructure covered by sections 15-21 of the Planning Act.

3.2.8 Other novel technologies or processes may emerge during the life of this NPS, which are covered by sections 15-21 of the Planning Act and can help deliver our energy objectives. Where these contribute towards our objectives, such contribution should be given substantial weight.

3.2.9 Where an energy infrastructure project is not covered by sections 15-21 of the Planning Act but is considered to be nationally significant, there is a power under section 35 of the Planning Act for the Secretary of State, on request, to give a direction that a development should be treated as a nationally significant infrastructure project for which development consent is required. This could include novel technologies or processes which may emerge during the life of this NPS. In these circumstances any application for development consent would need to be considered in accordance with this NPS. In particular:

- where the application is for electricity generation infrastructure not covered by sections 15-21 of the Planning Act, the Secretary of State should give substantial weight to the need established at paragraphs 3.3.20 to 3.3.47 of this NPS
- where the application is for electricity network infrastructure not covered by sections 15-21 of the Planning Act, including underground or offshore infrastructure, the Secretary of State should give substantial weight to the need established at paragraphs 3.3.46 to 3.3.58 of this NPS
- where the application is for hydrogen infrastructure not covered by sections 15-21 of the Planning Act, the Secretary of State should give substantial weight to the need established at paragraphs 3.4.11 to 3.4.15 of this NPS
- where the application is for CCS infrastructure not covered by sections 15-21 of the Planning Act, the Secretary of State should give substantial weight to the need established at paragraphs 3.5.1 to 3.5.7 of this NPS

3.3 The need for new nationally significant electricity infrastructure

Replacing retiring plants and meeting increased demand

3.3.1 Electricity meets a significant proportion of our overall energy needs and our reliance on it will increase as we transition our energy system to deliver our net zero target. We

need to ensure that there is sufficient electricity to always meet demand; with a margin to accommodate unexpectedly high demand and to mitigate risks such as unexpected plant closures and extreme weather events.

3.3.2 The larger the margin, the more resilient the system will be in dealing with unexpected events, and consequently the lower the risk of a supply interruption. This helps to protect businesses and consumers, including vulnerable households, from volatile prices and, eventually, from physical interruptions to supply that might impact on essential services. But a balance must be struck between a margin which ensures a reliable supply of electricity and building unnecessary additional capacity which increases overall costs of the system.

3.3.3 To ensure that there is sufficient electricity to meet demand, new electricity infrastructure will have to be built to replace output from retiring plants and to ensure we can meet increased demand. Our analysis suggests that even with major improvements in overall energy efficiency, and increased flexibility in the energy system, demand for electricity is likely to increase significantly over the coming years and could more than double by 2050 as large parts of transport, heating and industry decarbonise by switching from fossil fuels to low carbon electricity. The Impact Assessment for CB6 shows an illustrative range of 465-515TWh in 2035 and 610-800TWh in 2050[20].

Delivering on affordable decarbonisation

3.3.4 The Prime Minister's Ten Point Plan for a Green Industrial Revolution and the Energy White Paper set out the government's ambition for increasing the deployment of low carbon infrastructure consistent with delivering our carbon budgets and the 2050 net zero target. The white paper made clear the commitment that the cost of the transition to net zero is fair and affordable. Value for money assessments are not required on applications for development consent for specific energy infrastructure projects. However, government will work to ensure there are market frameworks which promote effective competition and deliver an affordable, secure and reliable energy system and government support for specific technologies and projects will be dependent on clear value for money for consumers and taxpayers.

3.3.5 If demand doubles by 2050, we may need a fourfold increase in low carbon generation. This means that the majority of new generating capacity needs to be low carbon. However, electricity generated from unabated natural gas will continue to be needed during the transition to net zero while we develop and deploy the low carbon alternatives that can replicate its role in the electricity system. This will ensure that the system remains reliable and affordable.

20 https://www.legislation.gov.uk/ukdsi/2021/9780348222616/impacts

3.3.6 Although we are aiming for a fully decarbonised[21], reliable, and low-cost power system by 2050, our understanding of precisely what this looks like, and the level of demand it will need to meet, will evolve over time. This will be informed by the approach to decarbonising other sectors, and what we learn about the cost and achievability of those approaches. It will also be informed by the costs and availability of GHG Removal technologies, such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Carbon Capture and Storage (DACCS). Any emissions from the power sector in 2050 can be consistent with net zero, as long as these are balanced by negative emissions from GHG Removal technologies.

3.3.7 In addition, our understanding of the type of electricity infrastructure that can deliver this system, in line with our energy objectives, will also evolve over time. This will be affected by the different characteristics of existing and new technologies, their relative costs and deliverability.

3.3.8 Given the changing nature of the energy landscape, we need a diverse mix of electricity infrastructure to come forward, so that we can deliver a secure, reliable, affordable, and net zero consistent system in 2050 for a wide range of demand, decarbonisation, and technology scenarios.

Alternatives to new electricity infrastructure

3.3.9 The government has considered alternatives to the need for new large-scale electricity infrastructure[22] and concluded that these would be limited to reducing total demand for electricity through efficiency measures or through greater use of low carbon hydrogen in decarbonising the economy; reducing maximum demand through demand side response; and, increasing the contribution of decentralised and smaller-scale electricity infrastructure.

3.3.10 Reducing total demand for energy is a key element of the government's strategy for meeting its energy objectives and we expect that increased energy efficiency measures will lead to a reduction in final energy demand from around 1750 TWh in 2019 to 1200 TWh in 2050[23]. However, decarbonisation is likely to require an increased use of electricity in domestic and industrial heating and transport, which is expected to outweigh increases in energy efficiency (see paragraph 3.3.3), potentially leading to a doubling or more of electricity demand by 2050.

3.3.11 The precise level of electricity demand in 2050 as the energy system transitions is uncertain and could be affected by alternative means of decarbonising these sectors, such as the use of low carbon hydrogen. However, it is prudent to plan on a

[21] A system where all our power comes from low carbon sources and where the only residual operational emissions are due to a carbon capture rate of <100% from gas, biomass or waste generation with CCS.

22 This included considering alternatives in the Appraisal of Sustainability
23 Energy White Paper: Powering Our Net Zero Future, Figure 1.4 Illustrative UK Final Energy Use in 2050, p.9. https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future

conservative basis to ensure that there is sufficient supply of electricity to meet demand across a wide range of future scenarios, including where the use of hydrogen is limited.

3.3.12 Demand side response, such as the use of thermal stores and smart charging of electric vehicles, can shift electricity demand, reducing the maximum amount of electricity required and therefore reduce the need for additional infrastructure. However, it cannot increase the total amount of electricity generated in the UK, or reduce the total amount of electricity consumed, and so cannot fully replace the need for new generating capacity to deliver our energy objectives.

3.3.13 Decentralised and community energy systems such as micro-generation contribute to our targets on reducing carbon emissions and increasing energy security. These technologies could also lead to some reduction in demand on the main generation and transmission system. However, the government does not believe they will replace the need for new large-scale electricity infrastructure to meet our energy objectives.

3.3.14 This is because connection of large-scale, centralised electricity generating facilities via a high voltage transmission system enables the pooling of both generation and demand, which in turn offers a number of economic and other benefits, such as more efficient bulk transfer of power and enabling surplus generation capacity in one area to be used to cover shortfalls elsewhere.

Different types of electricity infrastructure

3.3.15 There are several different types of electricity infrastructure that are needed to deliver our energy objectives. Additional generating plants, electricity storage, interconnectors and electricity networks all have a role, but none of them will enable us to meet these objectives in isolation. The following paragraphs explain how the government has come to this conclusion.

3.3.16 New generating plants can deliver a low carbon and reliable system, but we need the increased flexibility provided by new storage and interconnectors (as well as demand side response, discussed above) to reduce costs in support of an affordable supply[24].

3.3.17 Storage and interconnection can provide flexibility, meaning that less of the output of plant is wasted as it can either be stored or exported when there is excess production. They can also supply electricity when domestic demand is higher than generation, supporting security of supply.

3.3.18 This means that the total amount of generating plant capacity required to meet peak demand is reduced, bringing significant system savings alongside demand side response (up to £12bn per year by 2050)[25]. Storage can also reduce the need for new

24 See section 2.1. in “Modelling 2050: Electricity System Analysis”, https://www.gov.uk/government/publications/modelling-2050-electricity-system-analysis
25 Ibid

network infrastructure. However, neither of these technologies, as with demand side response, are sufficient to meet the anticipated increase in total demand, and so cannot fully replace the need for new generating capacity.

3.3.19 Electricity networks are needed to connect the output of other types of electricity infrastructure with consumers and each other. However, they are a means of transporting electricity rather than generating or storing it, so cannot replace those other types of electricity infrastructure in meeting the substantial increase in demand expected over the coming decades.

The need for new electricity generating capacity.

3.3.20 There is an urgent need for new electricity generating capacity to meet our energy objectives.

The role of wind and solar

3.3.21 Wind and solar are the lowest cost ways of generating electricity, helping reduce costs and providing a clean and secure source of electricity supply (as they are not reliant on fuel for generation). Our analysis shows that a secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar[26].

3.3.22 As part of delivering this, government announced a target of 40GW of offshore wind by 2030, including 1GW of floating wind, and the requirement for sustained growth in the capacity of onshore wind[27] and solar in the next decade.

3.3.23 However, ensuring affordable system reliability, today and in the future, means wind and solar need to be complemented with technologies which supply electricity, or reduce demand, when the wind is not blowing, or the sun does not shine. Applications for onshore wind of all sizes should be consented outside of the Planning Act 2008 process, unless the Secretary of State directs otherwise under section 35 of the Planning Act 2008. Applications for offshore wind or solar above 50MW in England, or 350MW in Wales, will continue to be defined as NSIPs, requiring consent from the Secretary of State.

The role of storage

3.3.24 Storage has a key role to play in achieving net zero and providing flexibility to the energy system, so that high volumes of low carbon power, heat and transport can be integrated. There is currently around 4GW of electricity storage operational in GB, around 3GW of which is pumped hydro storage and around 1GW is battery storage.

3.3.25 Storage is needed to reduce the costs of the electricity system and increase reliability by storing surplus electricity in times of low demand to provide electricity when demand is higher. Storage can provide various services, locally and at the national

26 https://www.gov.uk/government/publications/modelling-2050-electricity-system-analysis
27 Applications for onshore wind should be considered by the relevant local planning authority.

level. These include maximising the usable output from intermittent low carbon generation (e.g. solar and wind), reducing the total amount of generation capacity needed on the system; providing a range of balancing services to the NETSO and Distribution Network Operators (DNOs) to help operate the system; and reducing constraints on the networks, helping to defer or avoid the need for costly network upgrades as demand increases.

3.3.26 Many of the storage facilities currently being deployed provide storage over a period of hours but cannot cost effectively cover prolonged periods of low output from wind and solar. There are a range of storage technologies that may be able to provide storage over longer periods of low wind and solar output (e.g. days, weeks or months) but many of these technologies are not yet available at scale or have an upper limit on deployment due to geographical constraints.

3.3.27 We have launched a £68m innovation competition, to accelerate the commercialisation of first-of-a-kind longer duration energy storage technologies. The competition encompasses electrical storage, thermal storage and power-to-x technologies which can provide novel grid services and demonstrate cost reductions and improvement in technology performance.

3.3.28 Electricity storage is treated as a form of electricity generation under the Planning Act 2008. However, government has made legislation to amend the way that electricity storage is treated in the planning system. Applications for electricity storage facilities (except pumped hydro with a capacity above 50MW in England, or 350MW in Wales) of all sizes should be consented outside of the Planning Act 2008 process, unless the Secretary of State directs otherwise under section 35 of the Planning Act 2008.

3.3.29 Applications for adding electricity storage to an existing generation station which has consent under the NSIP regime or under section 36 of the Electricity Act 1989 may also be consented outside of the Planning Act 2008 process, unless the Secretary of State directs otherwise under section 35 of the Planning Act 2008.[28] Applications for pumped hydro storage facilities below 50MW in England, or 350MW in Wales, will continue to be consented outside of the Planning Act 2008 process, unless the Secretary of State directs otherwise under section 35 of the Planning Act 2008. Those above 50MW in England, or 350MW in Wales, will continue to be defined as NSIPs, requiring consent from the Secretary of State.

The role of interconnectors

3.3.30 Interconnection facilitates a secure, low carbon electricity system at the lowest cost. The UK recognises the benefits of increasing levels of interconnection and has an ambition to realise at least 18GW of existing and planned interconnector capacity by

28 A development consent order may still be required where the extension also involves non-storage development. Developers proposing storage-based extensions will need to consider whether any new planning permission granted under the TCPA regime would be compatible with existing consent(s) and/or whether an amendment or variation of the existing consent(s) may be required.

2030. At present our interconnection capacity consists of 6 GW: 2 GW and 1 GW links with France, 1 GW to the Netherlands, 1 GW to the island of Ireland (500 MW to Northern Ireland and 500 MW to the Republic of Ireland) and 1 GW to Belgium. Further interconnectors are under construction to France, Norway and Denmark, with a pipeline of further projects in development. We also foresee the potential for future multi-purpose projects to combine offshore wind with market-to-market interconnection, which are considered in the section below.

3.3.31 However, there are limitations on the amount of capacity that can be deployed and although in theory interconnectors can provide additional supply whenever there is a shortfall in the domestic market, this is dependent on there being sufficient supply from other markets.

The role of combustion power stations

3.3.32 Combustion power stations use fuel for generation. This means that it is possible for them to provide dispatchable generation when the output from intermittent renewables is low but they are dependent on the supply of fuel for generation. Most forms of combustion power also produce residual emissions, and where this is the case their use will need to be limited over time unless they can decarbonise. All commercial scale (at or over 300 MW) combustion power stations fuelled by gas, coal, oil or biomass have to be constructed Carbon Capture Ready (CCR). More information on Government policy on the CCR requirements is set out in Section 4.8[29].

3.3.33 Energy from Waste (EfW) plants operate at 90%+ availability but also produce residual carbon emissions. The principal purpose of the combustion of waste, or similar processes (for example Advanced Conversion Technologies (ACTs) such as pyrolysis or gasification) is to reduce the amount of waste going to landfill in accordance with the Waste Hierarchy[30] and to recover energy from that waste as electricity or heat. Only waste that cannot be re-used or recycled with less environmental impact and would otherwise go to landfill should be used for energy recovery. Energy recovery from residual waste has a lower GHG impact than landfill[31]. The amount of electricity that can be generated from EfW is constrained by the availability of its feedstock, which is set to reduce further by 2035 as a result of government policy[32].

3.3.34 Bioenergy could provide either baseload or dispatchable low carbon generation. The need for negative emissions to offset residual emissions through BECCS, might

29 The Energy White Paper, published in December 2020, committed to consult on proposals to update the Carbon Capture Readiness requirements to reflect technological advances, such as conversion to low carbon hydrogen and apply them more broadly, by removing the 300MW threshold. That separate process, on new proposals for Decarbonisation Readiness, is running in parallel to the review of the national policy statements. If that leads to changes in the relevant legal or policy framework then those new requirements will apply and this NPS will be updated to reflect any revised requirements ahead of designation. In the meantime, CCR policy remains as set out in this section.
30 Waste Hierarchy as set out in regulation 12 of the Waste (England and Wales) Regulations 2011.
31 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/284612/pb14130-energy-waste-201402.pdf
32 https://www.gov.uk/government/publications/circular-economy-package-policy-statement

provide a case for baseload deployment. In addition, the amount of bioenergy for generating electricity will be constrained by the availability of sustainable biomass and the extent to which it may be more cost effective in decarbonising other sectors (such as heat and transport) over the long-term.

3.3.35 Natural gas-fired plants without CCS can provide dispatchable generation, and when used in an Open Cycle Gas Turbine (OCGT), or reciprocating engine, is currently the only way of providing generation that can be turned on, off or adjusted at very short notice to provide 'peaking capacity' at scale, which is essential for system reliability. However, without CCS, the emissions it produces means that its role will need to be reduced over time and it is expected to be replaced by low-carbon options by 2050, such as low carbon hydrogen and long-duration storage.

3.3.36 Dispatchable peaking capacity is designed to be used infrequently, but when it is required may need to produce large amounts of electricity for short periods. Therefore, whilst the annual output (and therefore any associated emissions) of peaking capacity is expected to be small, and may reduce over time, there will be a requirement for significant amounts of capacity to be dispatched at short notice to ensure a secure, reliable, and affordable electricity system. Although the expectation is that low carbon alternatives will be able to replicate the role of natural gas in the electricity system over time, some natural gas-fired generation without CCS, running very infrequently, may still be needed for affordable reliability even in 2050 but this can still be net zero consistent if the emissions from their use are balanced by negative emissions from GHG Removal technologies.

3.3.37 Gas-fired plants with CCS can provide reliable low carbon generation capacity and are intended to reduce emissions compared to unabated gas-fired plants by 90% or more. Plants equipped with post-combustion CCS could provide flexible generation that is able to ramp up or down to meet demand, however, the technology is not currently suited to providing fast-start peaking capacity and has not been deployed in the UK to date. Although the barriers to deployment are commercial rather than technical, deployment of power CCS is reliant on the availability of infrastructure for the transportation and storage of CO_2. Its potential will become clearer by 2030 by which time we expect at least one power CCS plant to be operational.

3.3.38 Hydrogen could be a low carbon alternative for natural gas if production of that hydrogen is coupled with CCS, or through electrolysis powered by low carbon electricity. This would be capable of replicating the role of natural gas in the electricity system, providing low carbon 'peaking capacity' in the future. However, the supply of low carbon hydrogen for electricity generation is uncertain, and the operability of turbines fuelled solely by 100% hydrogen (rather than blended with natural gas), needs to be developed and demonstrated at commercial scale.

The role of nuclear power

3.3.39 Nuclear plants provide continuous, reliable, safe low-carbon power. They produce no direct emissions during operation and have indirect life-cycle GHG emissions

comparable to off-shore wind. Power stations with an estimated lifetime of 60 years provide large amounts of low carbon electrical power, using a relatively small amount of land[33]. Nuclear, alongside other technologies could also offer broader system benefits, such as low carbon hydrogen production through electrolysis, or low carbon heat. In addition, nuclear generation provides security of supply benefits by utilising an alternative fuel source to other thermal plants, with a supply chain independent from gas supplies.

3.3.40 Our analysis suggests additional nuclear beyond Hinkley Point C will be needed to meet our energy objectives. Nuclear technology is developing and opportunities for flexible use may grow as the energy landscape evolves. The role of nuclear power could be fulfilled by large-scale nuclear, Small Modular Reactors, Advanced Modular Reactors, and fusion power plants.

The role of hydropower and marine technologies

3.3.41 Hydropower can provide relatively predictable and, in some cases, flexible low carbon generation but total capacity is limited by the topography of the UK. Wave and tidal can also provide relatively predictable low carbon power and could play a role in future if their costs can be reduced. However, total capacity is limited for tidal power and wave power is very closely correlated with wind. These technologies, as with most other renewables, help provide security of supply as they are not reliant on fuel for generation and can improve reliability where they are not correlated with wind and solar.

3.3.42 However, due to limitations on the total capacity that could be installed, as they may not always be able to provide electricity when there is low output from wind and solar and their current costs, further additional forms of generating capacity will be required to meet our energy objectives.

The scope of this NPS for electricity generating capacity

3.3.43 All the generating technologies mentioned above are urgently needed to meet the Government's energy objectives by:

- providing security of supply (by avoiding concentration risk and not relying on one fuel or generation type)
- providing an affordable, reliable system (through the deployment of technologies with complementary characteristics)
- ensuring the system is net zero consistent (by remaining in line with our carbon budgets and maintaining the options required to deliver for a wide range of demand, decarbonisation and technology scenarios, including where there are difficulties with delivering any technology)

33 Missing Link to a Livable Climate, Lucid Catalyst, 2020 https://www.lucidcatalyst.com/hydrogen-report

3.3.44 Known technologies that are included within the scope of this NPS are: Offshore Wind (including floating wind), Solar PV, Wave, Tidal Range, Tidal Stream, Pumped Hydro, Energy from Waste (including ACTs) with or without CCS, Biomass with or without CCS, Natural Gas with or without CCS, low carbon hydrogen, large-scale nuclear, Small Modular Reactors, Advanced Modular Reactors, and fusion power plants. The need for all these types of infrastructure is established by this NPS and is urgent. New coal or large-scale oil-fired electricity generation are not consistent with the transition to net zero due to their high specific emissions and so are not included within the need case of this NPS and we are taking active steps to phase them out of the energy system.

3.3.45 Other novel technologies or processes may emerge during the life of this NPS, which are nationally significant and can help deliver our energy objectives. Where these contribute towards our objectives, such contribution should be given substantial weight.

The need for new electricity networks

3.3.46 As described above electricity networks are needed to connect the output of other types of electricity infrastructure with consumers and with each other. Therefore, as new generation, storage and interconnection facilities are built, we will also need electricity networks that connect these sources of electricity with each other, and with centres of consumer demand.

3.3.47 However, the need to connect to new sources of electricity generation and new sources of demand is not the only driver for new electricity network infrastructure. As the electricity system grows in scale, dispersion, variety, and complexity, work will be needed to protect against the risk of large scale supply interruptions in the absence of sufficiently robust electricity networks. While existing transmission and distribution networks must adapt and evolve to cope with this reality, development of new transmission lines of 132kV and above will be necessary to preserve and guarantee the robust and reliable operation of the whole electricity system.

3.3.48 The need for onshore reinforcement works of this kind is substantial. National Grid ESO forecasts that over the next decade the onshore transmission network will require: a doubling of north-south power transfer capacity due to increased wind generation in Scotland; substantial reinforcement in the Midlands to accommodate increased power flows from Scotland and the North of England; substantial reinforcement in London and the South of England to allow for Europe-bound export of excess wind generation from Scotland and the North of England; and substantial reinforcement in East Anglia to handle increased power flows from offshore wind generation.[34]

34 National Grid ESO, Electricity Ten Year Statement (October 2020)

3.3.49 It is important to note that the crucial national benefits of increased system robustness through new electricity network infrastructure projects are shared by all users of the system.

3.3.50 Of particular strategic importance this decade is the role of offshore wind in our generation mix. The Government expects that offshore wind (including floating wind) will play a significant role in decarbonising the energy system and has set an ambitious target to have 40GW of offshore wind capacity (including 1GW floating wind) by 2030, with an expectation that there will be a need for substantially more installed offshore capacity beyond this to achieve net-zero by 2050. This presents the challenge of connecting a large volume of generation located beyond the periphery of the existing transmission network.

3.3.51 The current approach to connecting offshore wind has resulted in individual radial connections developed project-by-project. While this may continue to be the most appropriate approach for some areas with single offshore wind projects that are not located in the proximity of other offshore wind infrastructure, it is expected that for regions with multiple windfarms a more coordinated approach will be adopted wherever possible. For these areas, such an approach is likely to reduce the network infrastructure costs as well as the cumulative environmental impacts and impacts on coastal communities by installing a smaller number of larger connections, each taking power from multiple windfarms instead of individual point-to-point connections for each windfarm.

3.3.52 Connecting the volume of offshore wind capacity targeted by the government will require not only new offshore transmission infrastructure but also reinforcement to the onshore transmission network, to accommodate the increased power flows to regional demand centres. Due to the time required to plan, approve and construct the required new onshore transmission infrastructure, the completion of these onshore reinforcements can take longer than the completion of the offshore wind farms for which they are being built. This could present a material barrier to the delivery of 40GW of offshore wind by 2030. It is likely to be most efficient if the network planning of offshore transmission is done in coordination with necessary reinforcement works to the onshore transmission network.

3.3.53 The final Phase 1 report for National Grid ESO's Offshore Coordination Project[35] found that a more integrated approach to offshore transmission, which included efficient planning of the onshore network, could deliver consumer benefits of up to £6bn by 2050, depending on how quickly it could be implemented. It also found that the number of new electricity infrastructure assets, including cables and onshore landing points could be reduced by up to 50% over the same period, significantly reducing environmental impacts and impacts on coastal communities.

35 https://www.nationalgrideso.com/document/183031/download

3.3.54 Multi-purpose interconnector projects also have the potential to deliver benefits by combining offshore transmission with market-to-market interconnectors – enabling reduced curtailment of offshore wind, and reduced landing points and capital expenditure. These benefits can be maximised if the planning of this infrastructure and the associated offshore wind farms are aligned.

3.3.55 In light of paragraphs 3.3.46-3.3.49 the Secretary of State should consider that the need for a new connection or network reinforcement has been demonstrated if the proposed development represents an efficient and economical means of: connecting a new generating station to the network; reinforcing the network to accommodate such connections; or reinforcing the network to ensure that it is sufficiently resilient and capacious (per any performance standards set by Ofgem) to reliably supply present and/or anticipated future levels of demand.

3.3.56 Moreover, given the crucial role of networks in connecting all of the other kinds of electricity infrastructure described in paragraph 3.3.15, it is especially important that the Secretary of State consider network projects as elements of a coherent and strategically necessary system, whether or not they are linked together in specific NSIPs. For instance, when evaluating applications for new electricity networks infrastructure the Secretary of State should have regard to the fact that given i) the Government's strategic commitment to ambitious levels of interconnection capacity and offshore wind generation; and ii) the tightly interdependent infrastructure chain linking interconnection and offshore generation with onshore demand centres, delays in the approval of associated new network developments could cause significant economic waste and set back the strategically vital goal of decarbonisation.

3.3.57 Correlatively, and in light of the potential for unwarranted and avoidable disruption, inefficiency, and visual blight along the onshore - offshore boundary, where possible the preference should be for coordination of onshore transmission, offshore transmission, and offshore generation and interconnector developments. This coordinated approach is likely to provide the highest degree of consumer, environmental, and community benefits.

3.3.58 The importance of accelerating such developments does not, however, mitigate against the need for standalone electricity networks projects, and these projects should continue to be assessed on their own merits.

The urgency of need for new electricity infrastructure

3.3.59 Paragraphs 3.3.1-3.3.15 set out the need for additional electricity required over the coming decades with 3.3.15 to 3.3.19 setting out the electricity infrastructure needed to support this.

3.3.60 Government has committed to reduce GHG emissions by ~78% by 2035 under carbon budget 6. According to the Impact Assessment for CB6. this could lead to a 40-60% increase in demand from electricity by 2035, most of which will need to be low carbon.

3.3.61 Given this need for new electricity infrastructure and the time it takes for electricity NSIPs to move from design conception to operation, there is an urgent need for new (and particularly low carbon) electricity NSIPs to be brought forward as soon as possible, given the crucial role of electricity as the UK decarbonises its economy.

3.3.62 It is not the Government's intention in presenting any of the figures or targets in this NPS to propose limits on any new electricity infrastructure that can be consented in accordance with the energy NPSs. It is not the role of the planning system to deliver specific amounts or limit any form of electricity infrastructure covered by this NPS. A large number of consented projects can help deliver an affordable electricity system, by driving competition and reducing costs within and amongst different technology and infrastructure types. Consenting new projects also enables projects utilising more advanced technology and greater efficiency to come forward.

3.3.63 The delivery of an affordable energy system does not always mean picking the least cost technologies. A diversity of supply can aid in ensuring affordability for the system overall and relative costs can change over time, particularly for new and emerging technologies. It is not the role of the planning system to compare the costs of individual developments or technology types.

3.3.64 The government has other mechanisms to influence the delivery of its energy objectives and imposing limits on the consenting of different types of electricity infrastructure would reduce competition, increasing costs, and disincentivise newer, more efficient solutions from coming forward. This does not reduce the need for individual projects to demonstrate compliance with planning and environmental requirements or mean that everything that obtains development consent will get built.

3.3.65 Within the strategic framework established by the government it is for industry to propose the specific types of developments that they assess to be viable. This is the nature of a market-based energy system. The Secretary of State should act in accordance with the policy set out in Section 3.2 when assessing proposals for new electricity NSIPs.

3.4 The need for new nationally significant gas infrastructure

3.4.1 Gaseous fuels have a key role in the UK energy landscape, accounting for around 38% of primary energy demand in 2019[36]. They are used in the domestic sector for heating and cooking; in the industrial sector, as a source of energy and as a feedstock and, in the power generation sector, as a reliable source of flexible generating

36 From table 1.1 of Digest of United Kingdom Energy Statistics (DUKES) 2020: main chapters and annexes A to D dataset, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/924593/DUKES_2020_dataset.xls

capacity. In this section gas, unless otherwise specified, includes natural gas, biomethane and hydrogen.

3.4.2 We need a diverse mix of gas supply infrastructure including pipelines, storage and reception facilities in order to meet our energy objectives. Our gas infrastructure must, amongst other things, be sufficient to:

- meet 'peak' demand for gas. Gas market participants may aim to have some "redundancy" in their supply arrangements, above the minimum amount to meet peaks, to manage the risk that other capacity may not be available (for example, where undergoing maintenance)
- allow for a sustained delivery of large volumes of gas, for example, demand over a particularly cold winter
- provide access to the most competitive gas supplies. Because the price of gas sources will vary over time, this leads to some redundancy in gas supply infrastructure. Market participants may therefore see distinct value in having access to gas from different sources – imports by pipeline, imports as LNG, and gas from storage (especially close-to-market)

Meeting ongoing demand for natural gas

3.4.3 Based on recent evidence, there is a downwards trend in the demand for natural gas. Total natural gas demand fell by about a fifth (around 22 per cent) in the period between 2000 and 2019, with industrial demand shrinking by almost 45% and demand for power generation and domestic demand by around 17% and 16% respectively.[37]

3.4.4 While the Energy White Paper[38] signals a decisive shift away from unabated natural gas to clean energy, this transformation cannot be instantaneous without jeopardising a secure, reliable, and affordable energy system. As illustrated in Fig 3.1, BEIS latest published reference scenario, based on 2019 assumptions, projects that the UK's demand for natural gas will continue to fall to 2025 but will stabilise after that to 2035[39]. There will continue to be demand for natural gas, and therefore a need for the gas infrastructure that supports it, during the transition to a net zero system in 2050 and potentially beyond, as we develop the means to address the carbon dioxide and other greenhouse gases associated with its use, including though the development and deployment of low carbon alternatives.

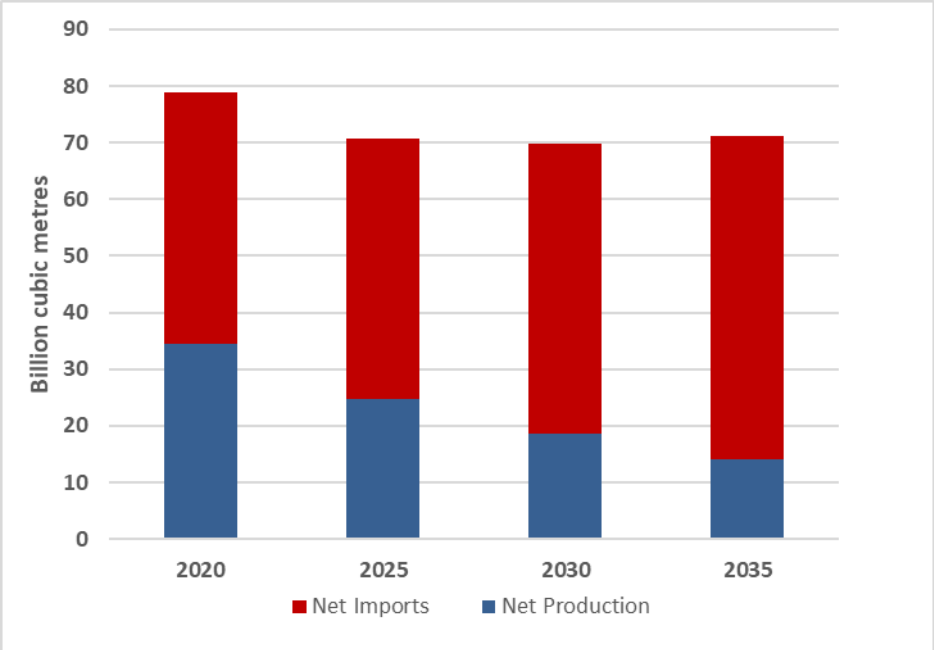
37 From Data table 4.1 of BEIS Energy Trends: December 2020, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/946775/ET_4.1_DEC_20.xls

38https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945899/201216_BEIS_EWP_Command_Paper_Accessible.pdf

39 From, BEIS Updated Energy and Emissions Projections, 2020 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931204/Annex-E-primary-energy-demand__EEP2019_.ods

3.4.5 The UK Continental Shelf (UKCS) is a key source of natural gas for the UK, accounting for almost 46% of supplies in 2019[40] but the longer-term trend is one of reducing supply. UK natural gas production in 2019 decreased by almost 3% compared with 2018 and remained two-thirds below the peak levels seen in 2000[41]. This reduction in domestic production will need to be replaced with increased imports, with net gas imports expected to account for ~80% of demand in 2035, partly dependent on energy prices and rates of economic growth (see figure 3.1 below, comprising net domestic production plus net imports).

Figure 3.1: Projected net annual UK Gas Production and Imports, 2020 to 2035[42]



3.4.6 There is evidence that the natural gas market is robust to a range of possible adverse events. However, the risk of shortfalls in supply cannot be ruled out, nor the risk that

40 From table 4.1 of Digest of United Kingdom Energy Statistics (DUKES) 2020: main chapters and annexes A to D dataset, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/924593/DUKES_2020_dataset.xls

41 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/912021/DUKES_2020_Chapter_4.pdf chart 4.1

42 Chart derived from BEIS analysis OGA Data and BEIS updated energy emissions. https://www.ogauthority.co.uk/media/6950/copy-of-oga-production-and-beis-demand-projections-september-2020.xlsx and https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/931204/Annex-E-primary-energy-demand__EEP2019_.ods. Net gas imports calculated as the difference between net gas demand and net UK domestic production. To convert Million Tonnes of Oil Equivalent into Billion Cubic Metres, we have used the BP Approximate conversion factors: Statistical Review of World Energy, Natural Gas and LNG conversions table, available at: https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2019-approximate-conversion-factors.pdf

there may need to be significant rises in wholesale natural gas prices to balance the market.

3.4.7 As UKCS production declines, and reliance on imports increases, the availability of necessary gas infrastructure will be needed to reduce the potential for supply shortfalls or price risks to consumers. This includes having the necessary import infrastructure in place, both in terms of gas reception facilities and LNG import facilities. It also includes having adequate gas storage capacity to provide close-to-market 'swing supply' to help meet peak demand.

3.4.8 Gas supply infrastructure, including pipelines, will also need to keep pace with any changes in the regional demand for gas across the UK – which may vary due to changes in location of population, commercial or industrial demand, and overall strategies adopted to achieve our net zero target.

Delivering affordable decarbonisation

3.4.9 Where low carbon alternatives can replace unabated natural gas, we will still need new gas infrastructure. Given the changing nature of the energy landscape, we cannot be certain on the precise role of natural gas, or gas infrastructure, in the future. But the approach we take must remain consistent with our energy objectives.

3.4.10 This means retaining the capability for using natural gas for low carbon dispatchable output in power stations equipped with CCS and as a feedstock for low carbon hydrogen production. Natural gas infrastructure might also be repurposed in the future for use by other gases required to deliver a net zero economy, such as low carbon hydrogen or for transportation of carbon dioxide to storage. Therefore, there is an ongoing need for retaining and developing the infrastructure for importing, storing and transporting gas.

The need for low carbon hydrogen infrastructure

3.4.11 The government is committed to developing low carbon hydrogen, which will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, with the potential to help decarbonise vital UK industry sectors and provide flexible deployment across heat, power and transport. The Impact Assessment for CB6 shows an illustrative range for low carbon hydrogen of 85-125TWh in 2035 and 250-460TWh in 2050[43].

3.4.12 Hydrogen can be produced through water electrolysis with low carbon power ('green' hydrogen) or through methane reformation with CCS ('blue' hydrogen). The government's view is that a twin track approach of developing both green and blue hydrogen production will be needed to achieve the scale of low carbon hydrogen production required for net zero.

43 https://www.legislation.gov.uk/ukdsi/2021/9780348222616/impacts

3.4.13 Blending hydrogen into the current natural gas distribution networks (potentially up to 20% by volume) can help support the near-term growth in the supply and demand of low carbon hydrogen. It can also deliver some emission reductions from heat use without requiring changes to domestic appliances. Although trials of up to 20% hydrogen (by volume) in the natural gas network are underway, confirming the specific levels of hydrogen blends that can be used in the natural gas networks requires further work. The Prime Minister's Ten Point Plan published on 18 November 2020 includes a target milestone for government to work with industry to complete all necessary testing to allow an up to 20% blend into the gas distribution network by 2023.

3.4.14 More work is also required to prove the safety and feasibility case, and to better understand the costs and benefits, of repurposing the gas grid to 100% low carbon hydrogen. BEIS is currently working with industry stakeholders to ensure that all necessary research and development, testing and trialling work required is carried out. The hydrogen strategy also provides further information on our approach.[44]

3.4.15 In the future, low carbon hydrogen may also become an internationally traded energy vector, piped or shipped from areas of low-cost production to areas of demand. While the development of this market is uncertain, the UK could become both an exporter and importer of low carbon hydrogen, potentially necessitating current gas infrastructure to be reconfigured or for new infrastructure to be put in place.

3.4.16 There is an urgent need for all types of low carbon hydrogen infrastructure to allow hydrogen to play its role in the transition to net zero. New hydrogen pipelines and underground storage for hydrogen (in both cases whether or not blended with natural gas) will require consent from the Secretary of State where they meet the definitions in sections 15-21 of the Planning Act 2008.

The role of biomethane

3.4.17 As of January 2021, biomethane is the only green gas commercially produced in the UK, and can be injected into the gas grid, following suitable upgrading processes, for use as a lower carbon substitute for natural gas. As of January 2020, the Renewable Heat Incentive (RHI) had supported the deployment of 94 biomethane plants[45] and in 2018 3.3TWh[46] of biomethane was injected into the grid. The reasons for this small uptake include the high capital required for biomethane plants, access to gas injection points and lack of feedstock availability.

3.4.18 The government's soon to be launched Green Gas Support Scheme (GGSS)[47] will also help decarbonise our gas supplies by increasing the proportion of green gas in the grid, through support for biomethane injection. We expect the GGSS will contribute

44 See https://www.gov.uk/government/publications/uk-hydrogen-strategy
45 BEIS (2020) Renewable Heat Incentive Deployment Statistics, table 1.1
46 BEIS (2019) Digest of UK Energy Statistics (DUKES) 2019
47 https://www.gov.uk/government/consultations/future-support-for-low-carbon-heat

9.7MtCO2e of carbon savings over Carbon Budgets 4 and 5, and 21.6MtCO2e of carbon savings over its lifetime.

3.4.19 Some models are being trialled to overcome these barriers, such as a number of smaller anaerobic digestion (AD) facilities in rural areas feeding their biomethane into a single injection point on the gas grid. However, it is currently not seen as a stand-alone solution for heat decarbonisation.

Alternatives to new gas infrastructure

Heat networks

3.4.20 Heat networks are systems of insulated pipes that take heat from a central source and supply it to residential, commercial and public sector buildings to provide hot water, space heating and/or cooling.

3.4.21 Heat networks are a crucial technology for decarbonising the UK's heating, particularly in dense urban areas. They are uniquely able to unlock otherwise inaccessible sources of larger scale renewable and recovered heat such as waste heat and heat from rivers and mines. By using recovered heat from industry, geothermal energy and power generation, and accessing sources of ambient heat, heat networks can reduce overall production requirements for gas. In parts of the UK, heat networks will represent a lower cost route to decarbonisation than alternatives such as repurposing the gas network for low carbon hydrogen (see Section 4.7).

3.4.22 However, although heat networks can play a key role in decarbonising heating, they cannot fully replace the need for new gas infrastructure to supply areas without heat networks or to transport gas for the other purposes set out in this section. Heat networks currently supply around 2% of the UK's heat supply.

Electrification and Energy Efficiency Measures

3.4.23 As discussed in paragraph 3.3.3, increased electrification of heat could reduce the need for gas infrastructure but such infrastructure will still be required during the transition to net zero to ensure security of our energy supplies. It is prudent to plan on a conservative basis to ensure that there is sufficient supply of energy to meet demand across a wide range of future scenarios.

Demand Side Response

3.4.24 Demand side response can temporarily reduce gas demand during times of system stress. It allows large gas consumers to reduce the amount of gas they use during times of system stress in exchange for a payment. This reduces the need for additional infrastructure. However, it cannot increase the total amount of gas available in the UK, or significantly reduce the total amount of gas consumed, and so cannot fully replace the need for new gas infrastructure to deliver our energy objectives.

Bringing forward gas infrastructure projects

3.4.25 Paragraphs 3.4.1-3.4.19 set out the ongoing need for gas infrastructure over the coming decades. It is not the role of the planning system to deliver or limit specific amounts of any form of gas infrastructure covered by this NPS. The government has other mechanisms to influence the delivery of a secure, reliable, affordable and net zero consistent gas infrastructure.

3.4.26 This does not reduce the need for individual projects to demonstrate compliance with planning and environmental requirements or mean that everything that obtains development consent will get built.

3.4.27 Within the strategic framework established by the government it is for industry to propose the specific types of developments that they assess to be viable. This is the nature of a market-based energy system. The Secretary of State should therefore act in accordance with the policy set out in Section 3.2 when assessing proposals for new gas NSIPs.

3.5 The need for new nationally significant carbon capture and storage infrastructure

3.5.1 New carbon capture and storage infrastructure will be needed to ensure the transition to a net zero economy. The Committee on Climate Change Committee states CCS is a necessity not an option.[48] As well as its role in reducing emissions associated with generating electricity from natural gas (see paragraph 3.3.38), CCS infrastructure will also be needed to capture and store carbon dioxide from hydrogen production from natural gas, industrial processes, the use of bioenergy (BECCS) and from the air (DACCS). CCS infrastructure could be new or repurposed infrastructure.

3.5.2 The UK has one of the largest potential carbon dioxide (CO_2) storage capacities in Europe, with an estimated 78 billion tonnes of CO_2 storage capacity under the seabed of the UKCS. New onshore CO_2 pipelines over 16.093 kilometres in length are within scope of this NPS.

Alternatives to new CCS infrastructure

3.5.3 There do not appear to be any realistic alternatives to new CCS infrastructure for delivering net zero by 2050. Some possibilities are set out below but, given the changing nature of the energy landscape, we cannot be certain of these outcomes and need CCS infrastructure to remain consistent with delivering our energy objectives.

48 “Net Zero: The UK's contribution to stopping global warming”, p.23. https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf

3.5.4 CCS is needed to enable domestic production of low carbon hydrogen from natural gas ('blue' hydrogen) as well as unlocking the potential use of biomass for low carbon hydrogen production with negative emissions. As discussed above producing hydrogen through water electrolysis with low carbon power ('green' hydrogen) does not rely on CCS but the government's view is that both are needed to achieve the scale of low carbon hydrogen production required for net zero, alongside further innovation to support other novel technologies.

3.5.5 CCS is fundamental to the deep decarbonisation of energy intensive industries such as chemical and cement plants and refineries. Alternative methods of decarbonising industry include improving energy efficiency, electrification of heat, and fuel switching to hydrogen or biomass as fuel or feedstock. However, these alternatives are limited as many of the emissions are process emissions and, as a result, CCS is essential for decarbonising energy intensive industry, either on its own or in combination with measures such as electrification and fuel switching.

3.5.6 BEIS analysis suggests that gas-fired electricity generation with CCS is required to deliver an affordable, reliable electricity system that is consistent with our climate change targets. If large volumes of low cost, low carbon hydrogen are available for electricity generation then it may be possible to decarbonise the electricity system without gas with CCS, but we cannot be certain of that outcome and, as noted above, the production of low carbon hydrogen may itself be reliant on CCS infrastructure.

3.5.7 It will be difficult to completely decarbonise all sectors of the economy, with aviation and agriculture viewed as particularly challenging. Where sectors are not completely decarbonised, we will need negative emissions to offset the residual emissions in those sectors. Capturing and storing emissions from bioenergy or directly from the air using CCS infrastructure provides a source of negative emissions. There are other sources of negative emissions, such as afforestation, but all of these are limited in some way and negative emissions using CCS infrastructure are viewed as essential for delivering our net zero target.

Bringing forward CCS infrastructure projects

3.5.8 Paragraphs 3.5.1-3.5.7 set out the need for CCS infrastructure over the coming decades. It is not the role of the planning system to deliver or limit specific amounts of CCS infrastructure covered by this NPS. The government has other mechanisms to influence the delivery of CCS infrastructure. This does not reduce the need for individual projects to demonstrate compliance with planning and environmental requirements or mean that everything that obtains development consent will get built.

3.5.9 Within the strategic framework established by the government it is for industry to propose the specific types of developments that they assess to be viable. This is the nature of a market-based energy system. The Secretary of State should therefore act in accordance with the policy set out at in Section 3.2 when assessing proposals for new CCS NSIPs.

3.6 The need for new nationally significant oil infrastructure

3.6.1 Oil products play an important role in the UK economy, providing around 38% of the primary energy used. We currently rely on oil for over 95% of our motorised transport needs. Transport accounted for more than 70% of final consumption of oil products in the UK in 2019, amounting to 49.5 million tonnes of oil.[49] We need to reduce our dependence on oil by improving vehicle efficiency and using new alternative fuelled vehicles. From 2030 we will end the sale of new petrol and diesel cars and vans, 10 years earlier than previously proposed. However, until 2035 we will allow the sale of hybrid cars and vans that can drive a significant distance with no carbon coming out of the tailpipe.

3.6.2 Transport is the largest share of demand for fuel but there are other uses which are important to the UK economy and life, including non-energy uses and the use of oils and liquefied petroleum gas for heating.

3.6.3 Over time technology changes, including electric vehicles and the generation of more heat from low carbon sources, together with energy efficiency policies such as seeking to encourage greater use of public transport will reduce demand for oil.

3.6.4 The technology to decarbonise light road transport is now being rolled out but the way forward for heavier road transport, shipping and aviation is not yet clear with several options, including electricity, clean hydrogen and low carbon fuels, still being developed.

3.6.5 Although analysis from the CCC suggests that demand for petroleum could reduce by 50% by 2035, there will be an ongoing demand for oil-based fuels over the transition to net zero as the changes in demand will be slower than the changes in sales of new vehicles and until low carbon alternatives for heavier transport, shipping and aviation are developed.

3.6.6 The UK needs to ensure it has safe and secure supplies of the oil products it requires. Sufficient fuel and infrastructure capacity are necessary to avoid socially unacceptable levels of interruption to physical supply and excessive costs to the economy from unexpectedly high or volatile prices. These requirements can be met by sufficient, diverse and reliable supplies of fuel, with adequate capacity to import, produce, store and distribute these supplies to customers. This in turn highlights the need for reliable infrastructure including refineries, pipelines and import terminals and the need for flexibility in the supply chain to accommodate the inevitable risk of physical outages.

3.6.7 The UK has been a net importer of petroleum products since 2013, driven by continued rationalisation of the UK's refining capacity. However, the balance of import and export varies by product and region and this will continue to evolve as demand

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and supply adjust during the transition to a net zero carbon economy over forthcoming decades.

Petroleum product distribution

3.6.8 There are about thirty sites which receive oils by sea, these are either refineries or import terminals, and oil products originate either from overseas or UK refineries by coastal shipping. Finished petroleum products are distributed from the refineries and a few major coastal import terminals to around twenty major inland distribution terminals by pipeline or rail. Onward distribution to customers from either coastal or inland sites is mostly by road tanker, but some of the larger airports and military airfields have pipeline connections.

3.6.9 There is an extensive network of privately owned pipelines in the UK, with around 4,800km of pipeline currently in use. This carries a variety of oil products from road transport fuels to heating oil and aviation fuel. The network provides an efficient and robust distribution system across the UK and directly provides jet fuel for some of the UK's main airports.

3.6.10 The drivers for new downstream oil infrastructure such as pipelines and associated facilities include:

- meeting demand by end users, particularly for aviation fuel
- compliance with International Energy Agency obligations for compulsory oil stocking, which are set to increase as North Sea resources decline
- meeting requirements for lower emission fuels blended with biofuels (including ethanol), which are set to increase
- increasing imports of refined products (due to changing demand and supply patterns)
- replacing end of life assets and adjusting their design to meet new, safety, environmental or efficiency objectives
- emerging planning, safety and environmental protection requirements
- market requirements to improve supply resilience in order to meet demand in full in a timely fashion under credible emergency scenarios

3.6.11 New pipeline infrastructure could require associated works including oil processing plant to pump or filter blend products, storage tanks for bulk storage and product settling, road handling facilities for discharge into road tankers and jetties for loading and offloading sea tankers.

3.6.12 In light of the above, the Secretary of State should expect to receive a small number of significant applications for oil pipelines and should start its assessment from the basis that there is a significant need for this infrastructure to be provided.

4 Assessment Principles

4.1 General Policies and Considerations

4.1.1 The statutory framework for deciding applications for development consent under the Planning Act is summarised in Section 1.1 of this NPS. The need for new energy infrastructure is covered in Part 3, and guidance regarding the particular physical impacts of construction and operation are set out in Part 5 of this NPS and Part 2 of each technology specific NPS. This part of EN-1, Assessment Principles, sets out the general policies for the submission and assessment of applications relating to energy infrastructure.

4.1.2 The Energy White Paper emphasises the importance of the Government's net zero commitment and efforts to fight climate change. Given the level and urgency of need for infrastructure of the types covered by the energy NPSs set out in Part 3 of this NPS, the Secretary of State will start with a presumption in favour of granting consent to applications for energy NSIPs. That presumption applies unless any more specific and relevant policies set out in the relevant NPSs clearly indicate that consent should be refused. The presumption is also subject to the provisions of the Planning Act 2008 referred to at paragraph 1.1.2 of this NPS.

4.1.3 In considering any proposed development, in particular when weighing its adverse impacts against its benefits, the Secretary of State should take into account:

- its potential benefits including its contribution to meeting the need for energy infrastructure, job creation, ecological enhancements, and any long-term or wider benefits
- its potential adverse impacts, including any long-term and cumulative adverse impacts, as well as any measures to avoid, reduce, mitigate or compensate for any adverse impacts

4.1.4 In this context, the Secretary of State should take into account environmental, social and economic benefits and adverse impacts, at national, regional and local levels. These may be identified in this NPS, the relevant technology specific NPS, in the application or elsewhere (including in local impact reports, marine plans, and other material considerations as outlined in Section 1.1). Where this NPS or the relevant technology specific NPSs require an applicant to mitigate a particular impact as far as possible, but the Secretary of State considers that there would still be residual adverse effects after the implementation of such mitigation measures, those residual effects should be weighed against the benefits of the proposed development.

4.1.5 The policy set out in this NPS and the technology specific energy NPSs is intended to provide greater clarity around existing policy and practice of the Secretary of State in considering applications for nationally significant energy infrastructure, rather than to

change the underlying policies against which applications are assessed (or therefore the "benchmark" for what is, or is not, an acceptable nationally significant energy development). Other matters that the Secretary of State may consider both important and relevant to their decision-making may include Development Plan documents or other documents in the Local Development Framework. In the event of a conflict between these or any other documents and an NPS, the NPS prevails for the purpose of Secretary of State decision making given the national significance of the infrastructure. The energy NPSs have taken account of the National Planning Policy Framework (NPPF), the Planning Practice Guidance (PPG) for England, and Planning Policy Wales and Technical Advice Notes (TANs) for Wales, where appropriate.[50]

4.1.6 Where the project conflicts with a proposal in a draft Development Plan, the Secretary of State should take account of the stage which the Development Plan document in England or Local Development Plan in Wales has reached in deciding what weight to give to the plan for the purposes of determining the planning significance of what is replaced, prevented or precluded. The closer the Development Plan document in England or local Development Plan in Wales is to being adopted by the LPA, the greater weight which can be attached to it.

4.1.7 The Secretary of State should only impose requirements[51] in relation to a development consent that are necessary, relevant to planning, relevant to the development to be consented, enforceable, precise, and reasonable in all other respects. The Secretary of State should take into account the guidance in the NPPF, the PPG: Use of Planning Conditions, and TANs, or any successor documents, where appropriate.

4.1.8 The Secretary of State may take into account any development consent obligations[52] that an applicant agrees with local authorities. These must be relevant to planning, necessary to make the proposed development acceptable in planning terms, directly related to the proposed development, fairly and reasonably related in scale and kind to the proposed development, and reasonable in all other respects.

4.1.9 Early engagement at the pre-application stage with key stakeholders, including public regulators, Statutory Nature Conservation Bodies (SNCBs), and those likely to have an interest in a proposed energy infrastructure application, is strongly encouraged. The benefits of early engagement with key stakeholders are numerous. Early engagement can aid in ensuring that all relevant information can be properly assessed by the Examining Authority at the examination stage of the project and in the subsequent report.

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50 NPPF: https://www.gov.uk/government/collections/planning-practice-guidance; PPG: Use of Planning Conditions: https://www.gov.uk/guidance/use-of-planning-conditions; TANs: https://gov.wales/technical-advice-notes

51 As defined in section 120 of the Planning Act 2008.

52 Where the words "planning obligations" are used in this NPS they refer to "development consent obligations" under section 106 of the Town & Country Planning Act 1990 as amended by section 174 of the Planning Act 2008.

4.1.10 Applicants need to consider the importance of 'good design' criteria. Such consideration of 'good design' criteria should be demonstrated when submitting applications for energy infrastructure projects to the Secretary of State. To ensure good design is embedded within the project development, a project board level design champion could be appointed and a representative design panel used to maximise the value provided by the infrastructure. Design principles[53] should be established from the outset of the project to guide the development from conception to operation.

4.1.11 Further information on the criteria for 'good design' for energy infrastructure is set out at Section 4.6 of this part of this NPS.

4.1.12 In deciding to bring forward a proposal for infrastructure development, the applicant will have made a judgement on the financial and technical viability of the proposed development, within the market framework and taking account of government interventions. Where the Secretary of State considers, on information provided in an application, that the financial viability and technical feasibility of the proposal has been properly assessed by the applicant it is unlikely to be of relevance in Secretary of State decision making (any exceptions to this principle are dealt with where they arise in this or other energy NPSs and the reasons why financial viability or technical feasibility is likely to be of relevance explained).

4.2 Environmental Principles

4.2.1 All proposals for projects that are subject to the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations) must be accompanied by an Environmental Statement (ES) describing the aspects of the environment likely to be significantly affected by the project.[54] The Regulations specifically refer to effects on population, human health,[55] biodiversity, land, soil, water, air, climate, the landscape, material assets and cultural heritage, and the interaction between them. The Regulations require an assessment of the likely significant effects of the proposed project on the environment, covering the direct effects and any indirect, secondary, cumulative, transboundary, short, medium, and long-term, permanent and temporary, positive and negative effects at all stages of the project, and also of the measures envisaged for avoiding or mitigating significant adverse effects.[56]

4.2.2 To consider the potential effects, including benefits, of a proposal for a project, the applicant should set out information on the likely significant social and economic

53 Design principles should take into account any national guidance on infrastructure design, this could include for example the Design Principles for National Infrastructure published by the National Infrastructure Commission. https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/
54 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017
55 The effects on human beings includes effects on health
56 For guidance on the assessment of cumulative effects, see, for example, PINS Advice Note 17 regarding Cumulative Effects Assessment (August 2019) https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/Advice-note-17V4.pdf

effects of the development, and show how any likely significant negative effects would be avoided, reduced, or mitigated. This information could include matters such as employment, equality, biodiversity net gain, community cohesion and well-being.

4.2.3 For the purposes of this NPS and the technology specific NPSs the ES should cover the environmental, social and economic effects arising from pre-construction, construction, operation and decommissioning of the project. In the absence of any additional information on additional assessments, the principles set out in this Section will apply to all assessments.

4.2.4 The Secretary of State should consider how the accumulation of, and interrelationship between, effects might affect the environment, economy, or community as a whole, even though they may be acceptable when considered on an individual basis with mitigation measures in place.

4.2.5 In some instances, it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail. Where this is the case, the applicant should explain in its application which elements of the proposal have yet to be finalised, and the reasons why this is the case.

4.2.6 Where some details are still to be finalised, the ES should set out to the best of the applicant's knowledge, what the likely worst-case environmental, social and economic effects of the proposed development may be and assess, on that basis, to ensure that the impacts of the project as it may be constructed have been properly assessed.[57]

4.2.7 To help the Secretary of State consider thoroughly the potential effects of a proposed project in cases where the EIA Regulations do not apply and an ES is not therefore required, the applicant should instead provide information proportionate to the scale of the project on the likely significant environmental, social, and economic effects. References to an ES in this NPS and the technology specific NPSs should be taken as including a statement which provides this information, even if the EIA Regulations do not apply and where the NPSs requires specific information to be provided in the ES. such information should still be provided in this statement.

4.2.8 In this NPS and the technology specific NPSs, the terms 'effects', 'impacts' or 'benefits' should be understood to mean likely significant effects, likely significant impacts or likely significant benefits.

57 Case law (for example Rochdale MBC Ex. Parte C Tew 1999) provides a legal principle that indicative sketches and layouts cannot provide the basis for determining applications for EIA development. The "Rochdale Envelope" is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES inadequate.

Habitats Regulations

4.2.9 The Secretary of State must, under the Habitats Regulations, consider whether the project may have a significant effect on a protected site which is part of the National Site Network, or on any site to which the same protection is applied as a matter of policy, either alone or in combination with other plans or projects. The applicant should seek the advice of the appropriate SNCB and provide the Secretary of State with such information as the Secretary of State may reasonably require, to determine whether an Appropriate Assessment (AA) is required. If an AA is required, the applicant must provide the Secretary of State with such information as may reasonably be required to enable the Secretary of State to conduct the AA. This should include information on any mitigation measures that are proposed to minimise or avoid likely effects.

4.2.10 If, during the pre-application stage, the SNCB indicate that the proposed development is likely to adversely impact the integrity of HRA sites, the applicant must include with their application such information as may reasonably be required to assess a potential derogation under the Habitats Regulations. If the SNCB gives such an indication at a later stage in the development consent process, the applicant must provide this information as soon as is reasonably possible and before the close of the examination. This information must include assessment of alternative solutions, a case for Imperative Reasons of Overriding Public Interest (IROPI) and appropriate environmental compensation. Applicants must have discussed with SNCB whether any proposed compensation is appropriate, and the compensation must be secured, or an indication given as to how it can be secured. Provision of such information will not be taken as an acceptance of adverse impacts and if an applicant disputes the likelihood of adverse impacts, it can provide this information without prejudice to the Secretary of State's final decision on the impacts of the potential development. If, in these circumstances, an applicant does not supply information required for the assessment of a potential derogation, there will be no expectation that the Secretary of State will allow the applicant the opportunity to provide such information following the examination.

Alternatives

4.2.11 As in any planning case, the relevance or otherwise to the decision making process of the existence (or alleged existence) of alternatives to the proposed development is in the first instance a matter of law, detailed guidance on which falls outside the scope of this NPS. From a policy perspective this NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option.

4.2.12 However:

- applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social

and economic effects and including, where relevant, technical and commercial feasibility

- in some circumstances, the NPSs may impose a policy requirement to consider alternatives (see below in Sections 5.4, 5.8 and 5.10)

4.2.13 Where there is a policy or legal requirement to consider alternatives, the applicant should describe the alternatives considered in compliance with these requirements. Given the level and urgency of need for new energy infrastructure, the Secretary of State should, subject to any relevant legal requirements (e.g. under the Habitats Regulations) which indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives:

- the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner
- only alternatives that can meet the objectives of the proposed development need be considered
- the Secretary of State should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security, climate change, and other environmental benefits) in the same timescale as the proposed development
- the Secretary of State should not refuse an application for development on one site simply because fewer adverse impacts would result from developing similar infrastructure on another suitable site, and it should have regard as appropriate to the possibility that all suitable sites for energy infrastructure of the type proposed may be needed for future proposals
- alternatives not among the main alternatives studied by the applicant (as reflected in the ES) should only be considered to the extent that the Secretary of State thinks they are both important and relevant to the decision
- as the Secretary of State must assess an application in accordance with the relevant NPS (subject to the exceptions set out in the Planning Act 2008), if the Secretary of State concludes that a decision to grant consent to a hypothetical alternative proposal would not be in accordance with the policies set out in the relevant NPS, the existence of that alternative is unlikely to be important and relevant to the Secretary of State's decision
- alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision
- alternative proposals which are vague or inchoate can be excluded on the grounds that they are not important and relevant to the Secretary of State's decision

- it is intended that potential alternatives to a proposed development should, wherever possible, be identified before an application is made to the Secretary of State (so as to allow appropriate consultation and the development of a suitable evidence base in relation to any alternatives which are particularly relevant). Therefore, where an alternative is first put forward by a third party after an application has been made, the Secretary of State may place the onus on the person proposing the alternative to provide the evidence for its suitability as such and the Secretary of State should not necessarily expect the applicant to have assessed it

4.3 Health

4.3.1 Energy production has the potential to impact on the health and well-being ("health") of the population. Access to energy is clearly beneficial to society and to our health as a whole. However, the production, distribution and use of energy may have negative impacts on some people's health.

4.3.2 As described in the relevant sections of this NPS and in the technology specific NPSs, where the proposed project has an effect on human beings, the ES should assess these effects for each element of the project, identifying any potential adverse health impacts, and identifying measures to avoid, reduce or compensate for these impacts as appropriate. The impacts of more than one development may affect people simultaneously, so the applicant should consider the cumulative impact on health in the ES where appropriate.

4.3.3 The direct impacts on health may include increased traffic, air or water pollution, dust, odour, hazardous waste and substances, noise, exposure to radiation, and increases in pests.

4.3.4 New energy infrastructure may also affect the composition and size of the local population, and in doing so have indirect health impacts, for example if it in some way affects access to key public services, transport or the use of open space for recreation and physical activity.

4.3.5 Generally, those aspects of energy infrastructure which are most likely to have a significantly detrimental impact on health are subject to separate regulation (for example for air pollution) which will constitute effective mitigation of them, so that it is unlikely that health concerns will either by themselves constitute a reason to refuse consent or require specific mitigation under the Planning Act 2008. However, not all potential sources of health impacts will be mitigated in this way and the Secretary of State will want to take account of health concerns when setting requirements relating to a range of impacts such as noise. Opportunities should also be taken to mitigate indirect impacts, by promoting local improvements to encourage health and wellbeing, this includes potential impacts on vulnerable groups within society i.e. those groups

within society which may be differentially impacted by a development compared to wider society as a whole.

4.4 Marine Considerations

English Marine Area

4.4.1 Marine plans apply in the 'marine area', the area from mean high water springs to the seaward limit of the Exclusive Economic Zone (EEZ). The 'marine area' also includes the waters of any estuary, river or channel, so far as the tide flows at mean high water spring tide.

4.4.2 Marine plans set out marine specific aspects of many of the assessment principles in Part 4 of this NPS. For example, criteria for 'good design' for energy infrastructure (Section 4.6) and climate change adaptation (Section 4.9). Plan policies cover a wide range of topics in Part 5 of this NPS, including landscape and visual (Section 5.10), noise and vibration (Section 5.12) and water quality (Section 5.16). Individual Marine Plans should be consulted to understand marine relevant specific considerations.

4.4.3 Section 104(2)(aa) of the Planning Act 2008 requires the Secretary of State to have regard to any appropriate marine policy documents when making a decision on an application for a development consent order where an NPS has effect.[58] This will include any Marine Plan which is in effect for the relevant area.

4.4.4 In making a decision, the Secretary of State is responsible for determining how the Marine Plan informs the decision making process. For example, the Secretary of State will determine if and how proposals meet the high-level marine objectives, plan vision, and all relevant policies. In the event of a conflict between an NPS and any marine planning documents, the NPS prevails for purposes of decision making.

4.4.5 Applicants for a development consent order will need to take account of any relevant Marine Plans. There is an expectation that applicants will complete a Marine Plan assessment as part of their project development and this information should be used to support an application for development consent. Applicants are encouraged to refer to Marine Plans at an early stage, such as in advance of pre-application stage, to inform project planning, for example to avoid less favourable locations as a result of other uses or environmental constraints.

58 Where a decision is made under s105 of the Planning Act, section 58(3) of the Marine and Coastal Access Act 2009 will similarly require the Secretary of State to have regard to the marine plan.

4.5 Environmental and Biodiversity Net Gain

4.5.1 Environmental net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. Applicants should therefore not just look to mitigate direct harms, but also consider whether there are opportunities for enhancements. Biodiversity net gain is an essential component of environmental net gain. Projects should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain.

4.5.2 Although achieving biodiversity net gain is not an obligation for projects under the Planning Act 2008, energy NSIP proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible[59]. Applicants are encouraged to use the most current version of the Defra biodiversity metric[60] to calculate their biodiversity baseline and inform their biodiversity net gain outcomes and to present this data as part of their application. Biodiversity net gain should be applied in conjunction with the mitigation hierarchy and does not change or replace existing environmental obligations.

4.5.3 In addition to delivering biodiversity net gain, developments may also deliver wider environmental gains relevant to the local area, and to national policy priorities, such as reductions in GHG emissions, reduced flood risk, improvements to air or water quality, or increased access to natural greenspace. The scope of potential gains will be dependent on the type, scale, and location of specific projects. Applications for development consent should be accompanied by a statement demonstrating how opportunities for delivering wider environmental net gains have been considered, and where appropriate, incorporated into the design (including any relevant operational aspects) of the project. Applicants should make use of available guidance and tools for measuring natural capital assets and ecosystem services, such as the Natural Capitals Committee's 'How to Do it: natural capital workbook' and Defra's guidance on Enabling a Natural Capital Approach (ENCA). Where environmental net gain considerations have featured as part of the strategic options appraisal process to select a project, the statement should reference that information to supplement the site-specific details.

59 Although achieving biodiversity net gain is not currently an obligation on applicants, a proposed amendment to the Environment Bill (see https://bills.parliament.uk/bills/2593/stages/15298/amendments/87948), would mean the Secretary of State may not grant an application for Development Consent Order unless satisfied that a biodiversity gain objective is met in relation to the development to which the application relates. The biodiversity gain objective will be set out in a biodiversity gain statement. Normally these statements will be included within NPS but the amendment allows for the statement to be published separately where a review of an NPS has begun before the proposed amendment comes into force. This would be the case with the energy NPS, should the amendment come into force.

60 The Biodiversity Metric can be found at http://publications.naturalengland.org.uk/publication/5850908674228224

4.5.4 Part 5 of this NPS provides guidance on the impacts of new energy infrastructure. Opportunities are identified in a number of sections relating to environmental, social and economic enhancements, protection and mitigation measures.

4.6 Criteria for "Good Design" for Energy Infrastructure

4.6.1 The visual appearance of a building, structure, or piece of infrastructure, and how it relates to the landscape it sits within, is sometimes considered to be the most important factor in good design. But high quality and inclusive design goes far beyond aesthetic considerations. The functionality of an object - be it a building or other type of infrastructure - including fitness for purpose and sustainability, is equally important. Applying "good design" to energy projects should produce sustainable infrastructure sensitive to place, efficient in the use of natural resources and energy used in their construction and operation, matched by an appearance that demonstrates good aesthetic as far as possible. It is acknowledged, however that the nature of much energy infrastructure development will often limit the extent to which it can contribute to the enhancement of the quality of the area.

4.6.2 Good design is also a means by which many policy objectives in the NPS can be met, for example the impact sections show how good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts such as noise. Given the benefits of "good design" in mitigating the adverse impacts of a project, applicants should consider how "good design" can be applied to a project during the early stages of the project lifecycle. Design principles[61] should be established from the outset of the project to guide the development from conception to operation.

4.6.3 In the light of the above and given the importance which the Planning Act 2008 places on good design and sustainability, the Secretary of State needs to be satisfied that energy infrastructure developments are sustainable and, having regard to regulatory and other constraints, are as attractive, durable, and adaptable (including taking account of natural hazards such as flooding) as they can be. In doing so, the Secretary of State should be satisfied that the applicant has taken into account both functionality (including fitness for purpose and sustainability) and aesthetics (including its contribution to the quality of the area in which it would be located, any potential amenity benefits, and visual impacts on the landscape or seascape) as far as possible. Whilst the applicant may not have any or very limited choice in the physical appearance of some energy infrastructure, there may be opportunities for the applicant to demonstrate good design in terms of siting relative to existing landscape character, land form and vegetation. Furthermore, the design and sensitive use of materials in any associated development such as electricity substations will assist in ensuring that such development contributes to the quality of the area. Applicants should also, so far

61 Design principles should take into account any national guidance on infrastructure design, this could include for example the Design Principles for National Infrastructure published by the National Infrastructure Commission. https://nic.org.uk/studies-reports/design-principles-for-national-infrastructure/

as is possible, seek to embed opportunities for nature inclusive design within the design process.

4.6.4 For the Secretary of State to consider the proposal for a project, applicants should be able to demonstrate in their application documents, how the design process was conducted and how the proposed design evolved. Where a number of different designs were considered, applicants should set out the reasons why the favoured choice has been selected. In considering applications, the Secretary of State should take into account the ultimate purpose of the infrastructure and bear in mind the operational, safety and security requirements which the design has to satisfy. Many of the wider impacts of a development, such as landscape and environmental impacts, will be important factors in the design process. The Secretary of State will consider such impacts under the relevant policies in this NPS. Assessment of impacts must be for the stated design life of the scheme rather than a shorter time period.

4.6.5 Applicants and the Secretary of State should consider taking independent professional advice on the design aspects of a proposal. In particular, the Design Council can be asked to provide design review for nationally significant infrastructure projects and applicants are encouraged to use this service.[62]

4.6.6 Further advice on what the Secretary of State should expect applicants to demonstrate by way of good design is provided in the technology specific NPSs where relevant.

4.7 Consideration of Combined Heat and Power (CHP)

4.7.1 Combined Heat and Power (CHP) is the generation of usable heat and electricity in a single process. A CHP station may either supply steam direct to customers or capture waste heat for low-pressure steam, hot water, or space heating purposes after it has been used to drive electricity generating turbines. The heat can also be used to drive absorption chillers, thereby providing cooling.

4.7.2 In conventional thermal generating stations, the heat that is raised to drive electricity generation is subsequently emitted to the environment as waste. Supplying steam direct to industrial customers or using lower grade heat, such as in district heating networks, can reduce the amount of fuel otherwise needed to generate the same amount of heat and power separately. CHP is technically feasible for many types of thermal generating stations, including nuclear, EfW, BECCS and hydrogen, although the majority of CHP plants in the UK are fuelled by gas.

4.7.3 Using less fuel to generate the same amount of heat and power reduces emissions, particularly CO_2. The Government has therefore committed to promoting Good Quality

62 The Chief Planner's 2011 Letter about design and planning can be found here: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/8009/110520-Letter_to_Chief_Planning_Officers-_Design_and_Planning.pdf Further information on the Design Council can be found here: https://www.designcouncil.org.uk/

CHP, which denotes CHP that has been certified as highly efficient under the CHP Quality Assurance programme. Schemes need to achieve a specified quality index and power efficiency in order to qualify for government support associated with the programme.

4.7.4 In 2019, there was 6.1GW of Good Quality CHP in the UK, providing over 7.3% of electricity and saving an estimated 10.5 $MtCO_2$ per annum. There is a recognised cost-effective potential for Good Quality CHP to continue to provide benefits due to efficiencies inherent in cogeneration.

4.7.5 To be economically viable as a CHP plant, a generating station needs to be located close to industrial or domestic customers with heat demands. The distance will vary according to the size of the generating station and the nature of the heat demand. For industrial purposes, customers are likely to be intensive heat users such as chemical plants, refineries, or paper mills. CHP can also be used to provide lower grade heat for light industrial users such as commercial greenhouses, or more commonly for hot water and space heating, including supply through district heating networks.

4.7.6 Guidance issued by the then Department for Trade and Industry (DTI) in 2006[63] will apply to any application to develop a thermal generating station under the Planning Act 2008. Applications for thermal stations must either include CHP proposals or contain evidence that the possibilities for CHP have been fully explored to inform the Secretary of State's consideration of the application. This should be through an audit trail of dialogue between the applicant and prospective customers. The Secretary of State should have regard to the 2006 guidance, or any successor to it, when considering the CHP aspects of applications for thermal generating stations.

4.7.7 In developing proposals for new thermal generating stations, applicants should consider the opportunities for CHP from the very earliest point, and it should be adopted as a criterion when considering locations for a project. Given how important liaison with potential customers for heat is, applicants should not only consult those potential customers they have identified themselves but also bodies such as Local Enterprise Partnerships (LEPs) and Local Authorities and obtain their advice on opportunities for CHP. Further advice is contained in the 2006 DTI guidance and applicants should also consider relevant information in regional and local energy and heat demand mapping.

4.7.8 Utilisation of useful heat that displaces conventional heat generation from fossil fuel sources is to be encouraged where, as will often be the case, it is more efficient than the alternative electricity/heat generation mix. To encourage proper consideration of CHP, substantial additional positive weight should therefore be given to applications

63 Guidance on background information to accompany notifications under Section 14(1) of the Energy Act 1976 and applications under Section 36 of the Electricity Act 1989.

incorporating CHP. If the proposal is for thermal generation without CHP, the applicant should:

- explain why CHP is not economically or practically feasible for example if there is a more energy efficient means of satisfying a nearby domestic heat demand
- provide details of any potential future heat requirements in the area that the station could meet
- detail the provisions in the proposed scheme for ensuring any potential heat demand in the future can be exploited
- Given the importance which government attaches to CHP, if an application does not demonstrate that CHP has been considered the Secretary of State should seek further information from the applicant. The Secretary of State should not give development consent unless satisfied that the applicant has provided appropriate evidence that CHP is included or that the opportunities for CHP have been fully explored. For non-CHP stations, where there is reason to believe that opportunities to supply heat through CHP may arise in the future, the Secretary of State may also require that developers ensure that their stations are 'CHP ready' and are designed in order to allow heat supply at a later date

4.7.9 CHP may require additional space than for a non-CHP generating station. It is possible that this might conflict with space required for a generating station to be CCR, as set out in Section 4.8. The material provided by applicants should therefore explain how the development can both be ready to provide CHP in the future, and also be CCR, or set out any constraints (for example space restrictions) which would prevent this.

4.7.10 If the Secretary of State is not satisfied with the evidence that has been provided, the Secretary of State may wish to investigate this with one or more of the bodies such as LEPs and Local Authorities.

4.7.11 Furthermore, if the Secretary of State, when considering an application for a thermal generating station, identifies a potential heat customer that is not explored in the application (for instance, on the advice of the Local Authorities), the Secretary of State should request that the applicant pursues this. Should the applicant not be able to reach an agreement with a potential customer, it should provide evidence demonstrating why it was not possible.

4.7.12 The Secretary of State may be aware of potential developments (for example from the applicant or a third party) which could utilise heat from the plant in the future, for example planned housing, and which is due to be built within a timeframe that would make the supply of heat cost-effective. If so, the Secretary of State may wish to impose requirements to ensure that the generating station is CHP-ready unless the Secretary of State is satisfied that the applicant has demonstrated that the need to comply with the requirement to be CCR will preclude any provision for CHP.

4.8 Carbon Capture and Storage (CCS)

CCS

4.8.1 CCS is a technology that enables carbon dioxide that would otherwise be released to the atmosphere to be captured and permanently stored. It can be applied to any large point source of carbon dioxide, such as thermal generating power stations or other industrial processes that are high emitters. Carbon capture rates achieved will depend on the application and a minimum capture rate may be required. Carbon capture technologies offer the opportunity to decarbonise the electricity system whilst maintaining security of supply, providing reliable low carbon generation capacity.

4.8.2 The government has made its ambitions for CCS clear[64] - committing to providing funding to support the establishment of CCS in at least four industrial clusters by 2030 and supporting, using consumer subsidies, at least one privately financed gas CCS power station by 2030. The barriers to CCS deployment to date have been commercial rather than technical, and the business models, which may evolve over time, aim to support the deployment of the technology. Part 3 of this NPS sets out the need for CCS and the role power CCS could play in our electricity system in more detail.

4.8.3 The types of environmental impacts of a gas-fired power CCS station should be similar to an unabated gas-fired power station, and so the assessment principles for the generating station covered in EN-2 should be similarly applied. Gas-fired power CCS stations may still emit residual CO_2 and so will be required to comply with any Emissions Performance Standards (EPS) that might be applicable, but this is not part of the development consent process. The carbon capture plant required for a new build power CCS plant can be included as associated development in the application for development consent for the relevant thermal generating station, and will then be considered as part of that application. A supply of water will be needed for CCS processes and the volumes required will depend on the carbon capture technology used. Power CCS facilities will have an impact on the surrounding landscape and visual amenity. As set out in Section 2.6 of EN-2, the main structures of a thermal generating stations could be large, and so may have landscape and visual impacts. Carbon capture facilities could also be significant in size - they may require additional space to the generating facility which will need to be included within the design and EIA. For example, the main direct contact cooler, CO_2 absorber column and regenerator towers in post-combustion plants can be tall, but the overall size will be dependent on the technology and design. As set out in Section 2.7 of EN-2, there will be noise and vibration impacts associated with the generating station. The carbon capture plant will also have noise and vibration impacts. Planning applications for generating stations with CCS should provide evidence that shows technically feasible plans for the CO_2 capture plant, an ES that addresses impacts arising from the project and documentation to ensure compliance with all other existing policy, including that

64 https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution

any of the plant's capacity which is not to be fitted with carbon capture at the outset meets the requirements for Carbon Capture Readiness (CCR). An Environmental Permit (EP) will also be required from the Environment Agency (EA) or Natural Resources Wales (NRW) which incorporates conditions for operation of the carbon capture and storage installation.

4.8.4 There are several different capture techniques which might have slightly different environmental impacts and considerations. These should be set out in the planning application. For example, some capture technologies may require hazardous substances consent for solvents required during the capture process. The Secretary of State should have regard to advice from the EA or NRW as to the technical feasibility of the proposed carbon capture technology. The Secretary of State may also seek further independent advice, but is not required to do so.

4.8.5 Examples of three types of capture technology are:

- Pre-combustion capture: this method involves reacting fuel with oxygen or air, and in some cases steam, to produce a gas consisting mainly of carbon monoxide and hydrogen. The carbon monoxide is reacted with more steam in a catalytic shift converter to produce more hydrogen and CO_2. The CO_2 is then separated, and the hydrogen is used as fuel in a combined cycle gas turbine generating station.
- Post-combustion capture: this uses solvents or other methods to scrub CO_2 out of flue gases. The CO_2 is then released as a concentrated gas stream by a regeneration process.
- Oxy-fuel combustion: in this process, fuel is burnt in an oxygen/CO_2 mixture rather than air to produce a flue gas that is predominantly CO_2. For gas-fired plants the technology could be used with a combined cycle system. Other oxy-fuel combustion power CCS plants are being developed using novel non-combined cycle systems.

4.8.6 The chain of CCS has three links: capture of carbon, transport, and storage. Due to the approach of deploying CCS in clusters in the UK with shared transport and storage infrastructure, it is likely that development consent applications for power CCS projects may not include an application for consent for the full CCS chain (including the onward transportation and storage of CO_2). However, development consent applications for power CCS projects should include details of how the captured CO_2 is intended to be transported and stored, how cumulative impacts will be assessed and whether any necessary consents, permits and licences have been obtained.

4.8.7 Applicants gaining consent for CCS infrastructure will need a range of consents from different bodies. One method for transporting captured carbon dioxide is through pipelines. These will be located both onshore and offshore. Onshore pipelines over 16.093 kilometres in length classify as NSIPs and require a development consent order. The operation of the CCS chain will require permits from the EA or NRW. There are currently no cross-country carbon dioxide pipelines in the UK and considerable investment in pipelines will be required for the wider deployment of CCS. This initial

investment could form the basis of more extensive carbon dioxide pipeline networks, which are likely to require greater capacity pipelines. In considering applications, the Secretary of State should therefore, take into account that the government will expect applicants to take into account foreseeable future demand when considering the size and route of their investments and applicants may therefore propose pipelines with a greater capacity than demand at the time of consenting might suggest. Existing legislation (The Pipeline Safety Regulations 1996) already provides powers to require modification of pipelines where this would reduce the need for additional pipelines to be constructed in the future. Another method for transporting carbon dioxide is by ship. Ports would enable the transfer of carbon dioxide from onshore infrastructure onto ships. Ports and associated infrastructure that process at least 5Mt of carbon dioxide per year would qualify as NSIP Projects and require a development consent order from the Department for Transport. Such applications would be considered under the National Policy Statement for Ports, but the need for CCS infrastructure set out in this NPS is likely to be a relevant consideration.

4.8.8 CO_2 can be permanently stored in deep geological formations, such as depleted oil and gas fields and saline aquifers. In the UK, the majority of locations thought to be best suited to storage of CO_2 are located offshore. The UK has an estimated offshore CO_2 storage capacity of 78Gt/CO_2[65] enough to store the equivalent of current total UK annual emissions for over 200 years. The development of an offshore CO_2 storage industry will play a key role in helping to ensure the transition to a net zero economy. Establishing an offshore storage industry could also make the UK a global leader in storage services as countries eager to meet emissions targets pursue carbon capture. As the global CCS market increases, the UK can capture £4.3 billion of GVA per annum from exports by 2050[66]. We do not currently envisage an onshore CO_2 storage industry developing against this backdrop. Efficiently maximising our offshore CO_2 storage capacity offers the best opportunity to realise our ambitions for CO_2 storage as set out in the Ten Point Plan. Offshore CO_2 transport and storage infrastructure will require an applicant to secure a Carbon Dioxide Appraisal and Storage Licence and a Storage Permit; a Carbon Storage Lease and a Seabed Lease; offshore pipelines require a Pipeline Works Authorisation and a Demonstration of Safety. Offshore CO_2 transport and storage proposals will need to be supported by an EIA. A suite of environmental approvals will also be required for the construction, development and the operational phase.

65 Energy Technologies Institute: Taking stock of UK CO2 storage (2017): https://www.eti.co.uk/insights/taking-stock-of-UK-CO2-storage
66 Energy Innovation Needs Assessment Sub-theme report: Carbon capture, utilisation and storage; https://www.gov.uk/government/publications/energy-innovation-needs-assessments

Carbon Capture Readiness[67]

4.8.9 To ensure that no foreseeable barriers exist to retrofitting CCS equipment on combustion generating stations, all applications for new combustion plant which are of generating capacity at or over 300MW and of a type covered by The Carbon Capture Readiness (Electricity Generating Stations) Regulations 2013 should demonstrate that the plant is "Carbon Capture Ready" (CCR) before consent may be given. The Secretary of State must not grant consent unless this is the case. In order to assure the Secretary of State that a proposed development is CCR, applicants will need to demonstrate that their proposal complies with guidance issued by the Secretary of State in November 2009[68] or any successor to it. The guidance requires:

- that sufficient space is available on or near the site to accommodate carbon capture equipment in the future
- the technical feasibility of retrofitting their chosen carbon capture technology
- that a suitable area of deep geological storage offshore exists for the storage of captured CO2 from the proposed combustion station
- the technical feasibility of transporting the captured CO2 to the proposed storage area
- the economic feasibility within the combustion station's lifetime of the full CCS chain, covering retrofitting, transport and storage

4.8.10 Government envisages that the technical feasibility study for retrofitting CCS equipment will take the form of a written report and accompanying plant designs which:

- make clear which capture technology is currently considered most appropriate for retrofit in the future to the power station
- provide sufficient detail to enable the EA or NRW to advise the Secretary of State on whether the applicant has sufficiently demonstrated there are no currently known technical barriers to subsequent retrofit of the declared capture technology

4.8.11 The assessment of technological feasibility could be against either:

- an appropriate reference document
- by the provision of sufficient technical detail by the applicant in their submitted plans and discussions with the advisory body

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67 The Energy White Paper, published in December 2020, committed to consult on proposals to update the Carbon Capture Readiness requirements to reflect technological advances, such as conversion to low carbon hydrogen, and apply them more broadly, by removing the 300MW threshold and including all combustion technologies within scope. If that consultation leads to changes in the relevant legal or policy framework then those new requirements will apply and this NPS will be updated to reflect any revised requirements ahead of designation. In the meantime, CCR policy remains as set out in this section.
68 Carbon Capture Readiness. A guidance note for Section 36 Applications: https://www.gov.uk/government/publications/carbon-capture-readiness-ccr-a-guide-on-consent-applications

4.8.12 Applicants should conduct a single economic assessment which encompasses retrofitting of capture equipment, CO_2 transport and the storage of CO_2. Applicants should provide evidence of reasonable scenarios, taking into account the cost of the capture technology and transport option chosen for the technical CCR assessments and the estimated costs of CO_2 storage, which make operational CCS economically feasible for the proposed development.

4.8.13 The preparation of an economic assessment will involve a wide range of assumptions on each of a number of factors, and government recognises the inherent uncertainties about each of these factors. There can be no guarantee that an assessment which is carried out now will predict with complete accuracy either in what circumstances it will be feasible to fit CCS to a proposed power station or when those circumstances will arise, but it can indicate the circumstances which would need to be the case to allow operational CCS to be economically feasible during the lifetime of the proposed new station.

4.8.14 A model assessment structure is suggested in CCR guidance[69], although this is not the only way which the assessment could be addressed. It is the responsibility of applicants to justify the capture, transport and storage options chosen for their proposed development.

4.8.15 The Secretary of State should consult the EA or NRW on the technical and economic feasibility assessments. The Secretary of State should also have regard to advice from the EA or NRW as to the suitability of the space set aside on or near the site for CCS equipment. If the Secretary of State, having considered these assessments and other available information including comments by EA or NRW, concludes that it will not be technically and economically feasible to retrofit CCS to a proposed plant during its expected lifetime, then the proposed development cannot be judged to be CCR and therefore cannot receive consent.

4.8.16 If granted consent, operators of the power station will be required to:

- retain control over sufficient additional space on or near the site on which to install the carbon capture equipment and the ability to use it for that purpose
- submit update reports on the technical aspects of its CCR status to the Secretary of State for BEIS. These reports will be required within 3 months of the commercial operation date of the power station (so avoiding any burden on the operator with an unimplemented consent) and every two years thereafter. Should CCS equipment be retrofitted to the full capacity of the plant, the obligation to provide such reports will lapse

69 Carbon Capture Readiness. A guidance note for Section 36 Applications: https://www.gov.uk/government/publications/carbon-capture-readiness-ccr-a-guide-on-consent-applications

4.9 Climate Change Adaptation

4.9.1 Part 2 of this NPS covers the government's energy and climate change strategy, including policies for mitigating climate change and its impacts. This part of the NPS sets out how applicants and the Secretary of State should take the effects of climate change into account when developing and consenting infrastructure. While climate change mitigation is essential to minimise the most dangerous impacts of climate change, previous global GHG emissions have already committed us to some degree of continued climate change for at least the next 30 years. If new energy infrastructure is not sufficiently resilient against the possible impacts of climate change, it will not be able to satisfy the energy needs as outlined in Part 3 of this NPS.

4.9.2 Climate change is likely to mean that the UK will experience hotter, drier summers and warmer, wetter winters. There is a likelihood of increased flooding, drought, heatwaves, and intense rainfall events, as well as rising sea levels and coastal change. Adaptation is therefore necessary to deal with the potential impacts of these changes that are already happening. Renewable and low carbon development is an adaptive measure to address climate change.

4.9.3 To support planning decisions, the government produces a set of UK Climate Projections[70] and has developed a statutory National Adaptation Programme[71]. In addition, the government's Adaptation Reporting Power[72] will ensure that reporting authorities (a defined list of public bodies and statutory undertakers, including energy utilities) assess the risks to their organisation presented by climate change. The Secretary of State may take into account energy utilities' reports to the Secretary of State when considering adaptation measures proposed by an applicant for new energy infrastructure.

4.9.4 In certain circumstances, measures implemented to ensure a scheme can adapt to climate change may give rise to additional impacts, for example as a result of protecting against flood risk, there may be consequential impacts on coastal change (see Section 5.6).

4.9.5 In preparing measures to support climate change adaptation applicants should consider whether nature-based solutions could provide a basis for such adaptation. In addition to avoiding further GHG emissions when compared with some more traditional adaptation approaches, nature based solutions can also result in biodiversity benefits as well as increasing absorption of carbon dioxide from the atmosphere (see also Section 5.11 on the role of green infrastructure).

70 The UKCP18 key results can be found here: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/key-results
71 s.58 of the Climate Change Act 2008.
72 s.62 of the Climate Change Act 2008; https://www.gov.uk/government/publications/climate-change-second-national-adaptation-programme-2018-to-2023

4.9.6 New energy infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the impacts of climate change when planning the location, design, build, operation and, where appropriate, decommissioning of new energy infrastructure. The ES should set out how the proposal will take account of the projected impacts of climate change, in accordance with the EIA Regulations. This information will be needed by the Secretary of State.

4.9.7 The Secretary of State should be satisfied that applicants for new energy infrastructure have taken into account the potential impacts of climate change using the latest UK Climate Projections and associated research and expert guidance (such as the EA's Climate Change Allowances for Flood Risk Assessments) available at the time the ES was prepared to ensure they have identified appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure. Should a new set of UK Climate Projections or associated research become available after the preparation of the ES, the Secretary of State should consider whether they need to request further information from the applicant.

4.9.8 Applicants should assess the impacts on and from their proposed energy project across a range of climate change scenarios, in line with appropriate expert advice and guidance available at the time. Applicants should be able to demonstrate that proposals have a high level of climate resilience built-in from the outset. They should also be able to demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. These results should be considered alongside relevant research which is based on the climate change projections.

4.9.9 The Secretary of State should be satisfied that there are not features of the design of new energy infrastructure critical to its operation which may be seriously affected by more radical changes to the climate beyond that projected in the latest set of UK climate projections, taking account of the latest credible scientific evidence on, for example, sea level rise (for example by referring to additional maximum credible scenarios – i.e. from the Intergovernmental Panel on Climate Change or EA) and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.

4.9.10 Where energy infrastructure has safety critical elements (for example parts of new gas-fired power stations or some electricity sub-stations), the applicant should apply the high emissions scenario to those elements. Although the likelihood of this scenario is thought to be low, it is appropriate to take a more risk-averse approach with elements of infrastructure which are critical to the safety of its operation.

4.9.11 If any adaptation measures give rise to consequential impacts (for example on flooding, water resources or coastal change) the Secretary of State should consider the impact of the latter in relation to the application as a whole and the impacts guidance set out in Part 5 of this NPS.

4.9.12 Any adaptation measures should be based on the latest set of UK Climate Projections, the Government's latest UK Climate Change Risk Assessment, when available[73] and in consultation with the EA's Climate Change Allowances for Flood Risk Assessments.[74]

4.9.13 Adaptation measures can be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to ensure that the adaptation measure could be implemented should the need arise, rather than at the outset of the development (for example increasing height of existing, or requiring new, sea walls).

4.9.14 The generic impacts advice in this NPS and the technology specific advice on impacts in the other NPSs provide additional information on climate change adaptation. In particular, this section should be read alongside the sections in Part 5 on coastal change (Section 5.6) and flood risk (Section 5.8).

4.10 Grid Connection

4.10.1 The connection of a proposed electricity generation plant to the electricity network is an important consideration for applicants wanting to construct or extend generation plant. In the market system and in the past, it has been for the applicant to ensure that there will be necessary infrastructure and capacity within an existing or planned transmission or distribution network to accommodate the electricity generated. To support the achievement of the transition to net zero, government is accelerating the co-ordination of the development of the grid network to facilitate the UK's net zero energy generation development and transmission. Applicants should consider co-ordinating their proposals for the onshore-offshore connection, as outlined at Section 3.3.

4.10.2 The applicant will liaise with National Grid who own and manage the transmission network in England and Wales or the relevant regional DNO or TSO to secure a grid connection. It may be the case that the applicant has not received or accepted a formal offer of a grid connection from the relevant network operator at the time of the application, although it is likely to have applied for one and discussed it with them. This is a commercial risk the applicant may wish to take for a variety of reasons, although the Secretary of State will want to be satisfied that there is no obvious reason why a grid connection would not be possible.

73 s.56 of the Climate Change Act 2008.
74 https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

4.10.3 The Planning Act 2008 aims to create a holistic planning regime so that the cumulative effect of different elements of the same project can be considered together. The government therefore envisages that wherever possible, applications for new generating stations and related infrastructure should be contained in a single application to the Secretary of State or in separate applications submitted in tandem which have been prepared in an integrated way. This is particularly encouraged to ensure development of more co-ordinated transmission overall. However, for some new co-ordinated offshore transmission projects it is recognised that these will be brought forward for consenting separate to (though planned with) the applications for the wind farms[75] as outlined in EN-5.

4.10.4 Co-ordinated applications typically bring economic efficiencies and reduced environmental impact. On some occasions it may not be possible, nor the best course in terms of delivery of the project in a timely way, as different aspects may have different lead-in times and be undertaken by different legal entities subject to different commercial and regulatory frameworks (for example grid companies operate within OFGEM controls), so the level of information available on the different elements may vary. In some cases, applicants may therefore decide to put in an application that seeks consent only for one element but contains some information on the second. Where this is the case, the applicant should explain the reasons for the separate application.

4.10.5 If this option is pursued, the applicant accepts the implicit risks involved in doing so and must ensure they provide sufficient information to comply with the EIA Regulations including the indirect, secondary, and cumulative effects, which will encompass information on grid connections. The Secretary of State must be satisfied that there are no obvious reasons why the necessary approvals for the other element are likely to be refused. The fact that the Secretary of State has decided to grant consent for one project should not in any way fetter the Secretary of State's subsequent decisions on any related projects.

4.10.6 Further guidance on the considerations for the Secretary of State is contained in EN-5.

4.11 Pollution Control and Other Environmental Regulatory Regimes

4.11.1 Issues relating to discharges or emissions from a proposed project and which lead to other direct or indirect impacts on terrestrial, freshwater, marine, onshore and offshore environments, or which include noise and vibration may be subject to separate

75 The transition to more co-ordinated transmission is led by two temporal workstreams under the Offshore Transmission Network Review (OTNR). Co-ordinated transmission projects are being brought forward as pathfinders as part of the 'early opportunities' workstream. For other offshore wind projects, their connection to a transmission network will form part of the holistic network design under the 'pathway to 2030' workstream.

regulation under the pollution control framework or other consenting and licensing regimes.

4.11.2 The planning and pollution control systems are separate but complementary. The planning system controls the development and use of land in the public interest. It plays a key role in protecting and improving the natural environment, public health and safety, and amenity, for example by attaching conditions to allow developments which would otherwise not be environmentally acceptable to proceed and preventing harmful development which cannot be made acceptable even through conditions. Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environment from different sources to the lowest practicable level. It also ensures that ambient air, water, and land quality meet standards that guard against impacts to the environment or human health.

4.11.3 Pollution from industrial sources in England and Wales is controlled through the Environmental Permitting (England and Wales) Regulations 2016 (EPR). The EPR requires industrial facilities to have an EP and meet limits on allowable emissions to operate.

4.11.4 Larger industrial facilities undertaking specific types of activity are also required to use Best Available Techniques (BAT) to reduce emissions to air, water, and land. Agreement on what sector specific BAT standards are, will now be determined through a new UK-specific BAT process.

4.11.5 In considering an application for development consent, the Secretary of State should focus on whether the development itself is an acceptable use of the land or sea, and on the impacts of that use, rather than the control of processes, emissions or discharges themselves[76]. The Secretary of State should work on the assumption that the relevant pollution control regime and other environmental regulatory regimes, including those on land drainage, water abstraction and biodiversity, will be properly applied and enforced by the relevant regulator. The Secretary of State should act to complement but not seek to duplicate them.

4.11.6 Applicants should consult the MMO on energy NSIP projects which would affect, or would be likely to affect, any relevant marine areas as defined in the Planning Act 2008 (as amended by section 23 of the Marine and Coastal Access Act 2009). Applicants are encouraged to consider the relevant marine plans in advance of consulting the MMO for England or the relevant policy teams at the Welsh government. The Secretary of State's consent may include a deemed marine licence and the MMO will advise on what conditions should apply to the deemed marine licence. The Secretary of State and MMO should cooperate closely to ensure that energy NSIPs are licensed in accordance with environmental legislation.

76 See paragraph 183 of section 15 of the NPPF

4.11.7 Many projects covered by this NPS will be subject to the EP regime, which also incorporates operational waste management requirements for certain activities. When an applicant applies for an EP, the relevant regulator (usually EA or NRW but sometimes the local authority) requires that the application demonstrates that processes are in place to meet all relevant EP requirements. In considering the impacts of the project, the Secretary of State may wish to consult the regulator on any management plans that would be included in an EP application.

4.11.8 Applicants should make early contact with relevant regulators, including EA or NRW and the MMO, to discuss their requirements for EPs and other consents. Early contact with relevant regulators will ensure that applications take account of all relevant environmental considerations and that the relevant regulators are able to provide timely advice and assurance to the Secretary of State. Wherever possible, applicants should submit applications for EPs and other necessary consents at the same time as applying to the Secretary of State for development consent.

4.11.9 The Secretary of State should be satisfied that development consent can be granted taking full account of environmental impacts. Working in close cooperation with EA or NRW and/or the pollution control authority, and other relevant bodies, such as the MMO, the SNCB, Drainage Boards, and water and sewerage undertakers, the Secretary of State should be satisfied, before consenting any potentially polluting developments, that:

- the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework
- the effects of existing sources of pollution in and around the site are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits

4.11.10 The Secretary of State should not refuse consent on the basis of pollution impacts unless there is good reason to believe that any relevant necessary operational pollution control permits or licences or other consents will not subsequently be granted.

4.12 Safety

4.12.1 The Health and Safety Executive (HSE) is responsible for enforcing a range of occupational health and safety legislation some of which is relevant to the construction, operation and decommissioning of energy infrastructure. Applicants should consult with the HSE on matters relating to safety.

4.12.2 Some technologies, for example the use of salt caverns for underground gas storage, will be regulated by specific health and safety legislation. The application of these regulations is set out in the technology specific NPSs where relevant.

4.12.3 Some energy infrastructure will be subject to the Control of Major Accident Hazards (COMAH) Regulations 2015. These Regulations aim to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any that do occur. COMAH regulations apply throughout the life cycle of the facility, i.e. from the design and build stage through to decommissioning. They are enforced by the Competent Authority comprising HSE and the EA acting jointly in England and by the HSE and NRW acting jointly in Wales, and the HSE and Scottish Environment Protection Agency (SEPA) acting jointly in Scotland. The same principles apply here as for those set out in the previous section on pollution control and other environmental permitting regimes.

4.12.4 Applicants seeking to develop infrastructure subject to the COMAH regulations should make early contact with the Competent Authority. If a safety report is required it is important to discuss with the Competent Authority the type of information that should be provided at the design and development stage, and what form this should take. This will enable the Competent Authority to review as much information as possible before construction begins, in order to assess whether the inherent features of the design are sufficient to prevent, control and mitigate major accidents. The Secretary of State should be satisfied that an assessment has been done where required and that the Competent Authority has assessed that it meets the safety objectives described above.

4.13 Hazardous Substances

4.13.1 All establishments wishing to hold stocks of certain hazardous substances above a threshold need Hazardous Substances consent. Applicants must consult the Hazardous Substances Authority and the HSE at pre-application stage[77] if the project is likely to need hazardous substances consent. Where hazardous substances consent is applied for, the Secretary of State will consider whether to make an order directing that hazardous substances consent shall be deemed to be granted alongside making an order granting development consent.[78] The Secretary of State should consult HSE about this.

4.13.2 HSE will assess the risks based on the development consent application. Where HSE does not advise against the Secretary of State granting the consent, it will also recommend whether the consent should be granted subject to any requirements.

4.13.3 HSE sets a consultation distance around every site with hazardous substances consent and notifies the relevant local planning authorities. The applicant should therefore consult the local planning authority at preapplication stage to identify whether

77 Further information is available at the HSE's website: HSE: Land use planning - Hazardous substances consent

78 Hazardous substances consent can also be applied for subsequent to a DCO application. However, the guidance in 4.13.1 still applies i.e. the applicant should consult with HSE at the pre-application stage and include details in their DCO

its proposed site is within the consultation distance of any site with hazardous substances consent and, if so, should consult the HSE for its advice on locating the particular development on that site.

4.14 Common Law Nuisance and Statutory Nuisance

4.14.1 Section 158 of the Planning Act 2008 confers statutory authority for carrying out development consented to by, or doing anything else authorised by, a development consent order. Such authority is conferred only for the purpose of providing a defence in any civil or criminal proceedings for nuisance. This would include a defence for proceedings for nuisance under Part III of the Environmental Protection Act 1990 (EPA) (statutory nuisance) but only to the extent that the nuisance is the inevitable consequence of what has been authorised. The defence does not extinguish the local authority's duties under Part III of the EPA 1990 to inspect its area and take reasonable steps to investigate complaints of statutory nuisance and to serve an abatement notice where satisfied of its existence, likely occurrence or recurrence. The defence is not intended to extend to proceedings where the matter is "prejudicial to health" and not a nuisance.

4.14.2 At the application stage of an energy NSIP, possible sources of nuisance under section 79(1) of the 1990 Act and how they may be mitigated or limited should be considered by the Secretary of State so that appropriate requirements can be included in any subsequent order granting development consent (see Section 5.7 on Dust, odour, artificial light etc. and Section 5.12 on Noise and vibration).

4.14.3 The Secretary of State should note that the defence of statutory authority is subject to any contrary provision made by the Secretary of State in any particular case in a development consent order (section 158(3)). Therefore, subject to Section 5.7, the Secretary of State can disapply the defence of statutory authority, in whole or in part, in any particular case, but in so doing should have regard to whether any particular nuisance is an inevitable consequence of the development.

4.15 Security Considerations

4.15.1 National security considerations apply across all national infrastructure sectors. BEIS works closely with Government security agencies including the Centre for the Protection of National Infrastructure (CPNI) and the National Cyber Security Centre (NCSC) to provide advice to the most critical infrastructure assets on terrorism and other national security threats, as well as on risk mitigation. In the UK's civil nuclear industry, security is also independently regulated by the Office for Nuclear Regulation (ONR).

4.15.2 Government policy is to ensure that, where possible, proportionate protective security measures are designed into new infrastructure projects at an early stage in the project

development. Where applications for development consent for infrastructure covered by this NPS relate to potentially 'critical' infrastructure, there may be national security considerations.

4.15.3 BEIS will be notified at pre-application stage about every likely future application for energy NSIPs, so that any national security implications can be identified. Where national security implications have been identified, the applicant should consult with relevant security experts from CPNI, ONR (for civil nuclear) and/or BEIS to ensure security measures have been adequately considered in the design process and that adequate consideration has been given to the management of security risks. If CPNI, ONR (for civil nuclear) and/or BEIS are satisfied that security issues have been adequately addressed in the project when the application is submitted to the Secretary of State, it will provide confirmation of this to the Secretary of State. The Secretary of State should not need to give any further consideration to the details of the security measures in its examination.

4.15.4 The applicant should only include sufficient information in the application as is necessary to enable the Secretary of State to examine the development consent issues and make a properly informed decision on the application.

4.15.5 In exceptional cases, where examination of an application would involve public disclosure of information about defence or national security which would not be in the national interest, the Secretary of State may direct that examination of that evidence take place in closed session.

5 Generic Impacts

5.1 Introduction

5.1.1 Some impacts (such as landscape and visual impacts) arise from the development of any of the types of energy infrastructure covered by the energy NPSs. Other impacts may not be relevant to all types of energy infrastructure but nevertheless can arise in similar ways from the development of the types of energy infrastructure covered in at least two of the energy NPSs. Both these classes of impacts are considered in this Part. These impacts are referred to as “generic impacts”. In some cases, the technology specific NPSs provide detail on the way these impacts arise or are to be considered in the context of applications which is specific to the technology in question. Impacts which are limited to one particular technology are only covered in the relevant technology specific NPS.

5.1.2 The list of impacts (generic and technology specific) and the relevant policy in this Part and in the impact section of the technology specific NPSs is not exhaustive. The NPSs address those impacts and means of mitigation that are anticipated to arise most frequently; they are not intended to provide a list of all possible effects or ways to mitigate such effects. The Secretary of State should therefore consider other impacts and means of mitigation where it determines that the impact is relevant and important to its decision. The technology specific NPSs may state that certain impacts should be given a particular weight. Where they do not do so, the Secretary of State should follow any policy set out on the level of weight to be given to such impact set out in this NPS. Applicants should identify the impacts of their proposals in the ES in terms of those covered in this NPS and any others that may be relevant to their application.

5.1.3 Some of the impact sections in this NPS and the technology specific NPSs refer to development consent requirements or obligations, or conditions of a deemed marine licence, as means of securing appropriate mitigation. The fact that the possible use of requirements, obligations or conditions are not mentioned in relation to other impacts does not mean that they may not be relevant.

5.1.4 Some of the impact sections in this NPS and the technology specific NPSs also refer to bodies whom the applicant or the Secretary of State should consult. The references to specific bodies are not intended to be exhaustive. The fact that in other impact sections no mention is made of such consultation does not mean that the applicant or the Secretary of State should not, where appropriate, engage in it.[79] Applicants must also ensure they consult the relevant bodies about their proposed applications in

79 The Secretary of State may choose to consult in certain circumstances following the close of the examination but in most cases will be under no obligation to do so.

accordance with section 42 to 44 of the Planning Act 2008 and the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009.

5.2 Air Quality and Emissions

Introduction

5.2.1 Infrastructure development can have adverse effects on air quality. The construction, operation and decommissioning phases can involve emissions to air which could lead to adverse impacts on health, on protected species and habitats, or on the wider countryside and species. Impacts on protected species and habitats are covered in Section 5.4. Air emissions include particulate matter (for example dust) up to a diameter of ten microns (PM10) as well as gases such as sulphur dioxide, carbon monoxide and nitrogen oxides (NOx). Levels for pollutants in ambient air are set out in the Air Quality Standards Regulations 2010 and reiterated in the Air Quality Strategy.[80] The Secretary of State for Environment, Food and Rural Affairs is required to make available up to date information on air quality to any relevant interested party.[81]

5.2.2 A particular effect of air emissions from some energy infrastructure may be eutrophication, which is the excessive enrichment of nutrients in the environment. Eutrophication from air pollution results mainly from emissions of NOx and ammonia. The main emissions from energy infrastructure are from generating stations. Eutrophication can affect plant growth and functioning, altering the competitive balance of species and thereby damaging biodiversity. In aquatic ecosystems it can cause changes to algal composition and lead to algal blooms, which remove oxygen from the water, adversely affecting plants and fish. The effects on ecosystems can be short term or irreversible, and can have a large impact on ecosystem services such as pollination, aesthetic services and water supply.

5.2.3 Emissions from combustion plants are generally released through exhaust stacks. Design of exhaust stacks, particularly height, is the primary driver for the delivery of optimal dispersion of emissions and is often determined by statutory requirements. The optimal stack height is dependent upon the local terrain and meteorological conditions, in combination with the emission characteristics of the plant. The EA or NRW will require the exhaust stack height of a thermal combustion generating plant, including fossil fuel generating stations and waste or biomass plant, to be optimised in relation to impact on air quality. The Secretary of State need not, therefore, be concerned with the exhaust stack height optimisation process in relation to air emissions, though the impact of stack heights on landscape and visual amenity will be a consideration (see Section 5.10).

80 https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1
81 Air Quality Standards Regulations 2010, No.2010/1001.

5.2.4 Impacts of thermal combustion generating stations with respect to air emissions are set out in the technology specific NPSs.

Applicant's assessment

5.2.5 Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the ES.

5.2.6 The ES should describe:

- any significant air emissions, their mitigation and any residual effects distinguishing between the project stages and taking account of any significant emissions from any road traffic generated by the project
- the predicted absolute emission levels of the proposed project, after mitigation methods have been applied
- existing air quality levels and the relative change in air quality from existing levels
- any potential eutrophication impacts

Secretary of State decision making

5.2.7 Many activities involving air emissions are subject to pollution control. The considerations set out in Section 4.11 on the interface between planning and pollution control therefore apply.

5.2.8 The Secretary of State should generally give air quality considerations substantial weight where a project would lead to a deterioration in air quality in an area or leads to a new area where air quality breaches any national air quality limits. However, air quality considerations will also be important where substantial changes in air quality levels are expected, even if this does not lead to any breaches of national air quality limits.

5.2.9 In all cases, the Secretary of State must take account of any relevant statutory air quality limits. Where a project is likely to lead to a breach of such limits the applicant should work with the relevant authorities to secure appropriate mitigation measures to allow the proposal to proceed. In particular, where a project is located within, or in close proximity to, a Local Air Quality Management Area or Clean Air Zone, applicants should engage with the relevant local authority to ensure the project is compatible with the local air quality plan. In the event that a project will lead to non-compliance with a statutory limit the Secretary of State should refuse consent.

Mitigation

5.2.10 The Secretary of State should consider whether mitigation measures are needed both for operational and construction emissions over and above any which may form part of the project application. A construction management plan may help codify mitigation at this stage.

5.2.11 In doing so the Secretary of State should have regard to the Air Quality Strategy[82] or any successor to it and should consider relevant advice within Local Air Quality Management guidance.[83]

5.2.12 The mitigations identified in Section 5.14 on traffic and transport impacts will help mitigate the effects of air emissions from transport.

5.3 Greenhouse Gas Emissions

Introduction

5.3.1 Significant levels of energy infrastructure development are vital to ensure the decarbonisation of the UK economy. The construction, operation and decommissioning of that energy infrastructure will in itself, lead to GHG emissions.

5.3.2 In considering this section, applicants should also have regard to Part 2 of this NPS, which explains the current policy on climate change and how this NPS interacts with that policy, and Section 4.9 of this NPS, which deals with climate change adaptation.

5.3.3 As discussed in Part 2, energy infrastructure plays a vital role in decarbonisation. While all steps should be taken to reduce and mitigate climate change impacts, it is accepted that there will be residual emissions from energy infrastructure, particularly during the economy wide transition to net zero, and potentially beyond.

Applicant's assessment

5.3.4 All proposals for energy infrastructure projects should include a carbon assessment as part of their ES (See Section 4.2). This should include:

- A whole life carbon assessment showing construction, operational and decommissioning carbon impacts
- An explanation of the steps that have been taken to drive down the climate change impacts at each of those stages
- Measurement of embodied carbon impact from the construction stage
- How reduction in energy demand and consumption during operation has been prioritised in comparison with other measures
- How operational emissions have been reduced as much as possible through the application of best available technology for that type of technology
- Calculation of operational energy consumption and associated carbon emissions

82 https://www.gov.uk/government/publications/the-air-quality-strategy-for-england-scotland-wales-and-northern-ireland-volume-1
83 https://laqm.defra.gov.uk/supporting-guidance.html

- Whether and how any residual carbon emissions will be (voluntarily) offset or removed using a recognised framework
- Where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if sectoral targets are developed

Secretary of State decision making

5.3.5 The Secretary of State must be satisfied that the applicant has as far as possible assessed the GHG emissions of all stages of the development.

5.3.6 The Secretary of State should be content that the applicant has taken all reasonable steps to reduce the GHG emissions of the construction and decommissioning stage of the development. The Secretary of State should also give positive weight to projects that embed nature-based or technological processes to mitigate or offset the emissions of construction and decommissioning within the proposed development. However, in light of the vital role energy infrastructure plays in the process of economy wide decarbonisation, the Secretary of State accepts that there are likely to be some residual emissions from construction and decommissioning of energy infrastructure.

5.3.7 Operational GHG emissions are a significant adverse impact from some types of energy infrastructure which cannot be totally avoided (even with full deployment of CCS technology). Given the characteristics of these and other technologies, as noted in Part 3 of this NPS, and the range of non-planning policies aimed at decarbonising electricity generation such as UK ETS (see Sections 2.4 and 2.5 above), government has determined that operational GHG emissions are not reasons to prohibit the consenting of energy projects including those which use these technologies or to impose more restrictions on them in the planning policy framework than are set out in the energy NPSs (e.g. the CCR requirements). Any carbon assessment will include an assessment of operational GHG emissions, but the policies set out in Part 2, including the UK ETS, apply to these emissions. Operational emissions will be addressed in a managed, economy-wide manner, to ensure consistency with carbon budgets, net zero and our international climate commitments. The Secretary of State does not, therefore need to assess individual applications for planning consent against operational carbon emissions and their contribution to carbon budgets, net zero and our international climate commitments.

Mitigation

5.3.8 A carbon assessment should be used to drive down GHG emissions at every stage of the proposed development and ensure that emissions are minimised as far as possible for the type of technology, taking into account the overall objectives of ensuring our supply of energy always remains secure, reliable and affordable, as we transition to net zero.

5.3.9 Applicants should look for opportunities within the proposed development to embed nature-based or technological solutions to mitigate or offset the emissions of construction and decommissioning.

5.3.10 To be taken into account in Secretary of State decision making, steps taken to minimise and offset emissions should be set out in a GHG Reduction Strategy, secured under the development consent order.

5.4 Biodiversity and Geological Conservation

Introduction

5.4.1 Biodiversity is the variety of life in all its forms and encompasses all species of plants and animals, the genetic diversity they contain and the complex ecosystems of which they are a part. Geological conservation relates to the sites that are designated for their geology and/or their geomorphological importance.

5.4.2 The wide range of legislative provisions at the international and national level that can impact on planning decisions affecting biodiversity and geological conservation issues are set out in a Government Circular.[84] The MHCLG Natural Environment PPG document sets out good practice in England in relation to planning for biodiversity and geological conservation.[85]

Applicant's assessment

5.4.3 Where the development is subject to EIA the applicant should ensure that the ES clearly sets out any effects on internationally, nationally, and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Secretary of State consider thoroughly the potential effects of a proposed project.

5.4.4 The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. As set out in Section 4.6, the design process should embed opportunities for nature inclusive design. The applicant is encouraged to consider how their proposal can contribute towards Biodiversity Net Gain in line with the ambition set out in the 25 Year Environment Plan. Energy infrastructure projects have the potential to deliver significant benefits and enhancements beyond Biodiversity Net Gain, which result in

84 Government Circular: Biodiversity and Geological Conservation – Statutory Obligations and their Impact within the Planning System (ODPM 06/2005, Defra 01/2005) available via TSO website www.tso.co.uk/bookshop. It should be noted that this document does not cover more recent legislative requirements, such as the Marine Strategy Regulations 2010.
85 The MHCLG Natural Environment Guidance can be found at https://www.gov.uk/guidance/natural-environment

wider environmental gains. The scope of potential gains will be dependent on the type, scale, and location of each project.

Secretary of State decision making

5.4.5 The government's 25 Year Environment Plan marked a step change in ambition for wildlife and the natural environment. The Secretary of State should have regard to the aims and goals of the government's 25 Year Environment Plan and any relevant measures and targets In doing so, the Secretary of State should also take account of the context of the challenge of climate change: failure to address this challenge will result in significant adverse impacts to biodiversity. The policy set out in the following sections recognises the need to protect and enhance biodiversity and geological conservation interests. The benefits of nationally significant low carbon energy infrastructure development may include benefits for biodiversity and geological conservation interests and these benefits may outweigh harm to these interests. The Secretary of State may take account of any such net benefit in cases where it can be demonstrated.

5.4.6 As a general principle, and subject to the specific policies below, development should at the very least aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.2 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought. If significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then the Secretary of State will give significant weight to any residual harm.

5.4.7 In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national, and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider environment.

HRA Sites

5.4.8 Important sites for biodiversity are those identified through international conventions and the Habitats Regulations. The Habitats Regulations set out sites for which an HRA will assess the implications of a plan or project, including Special Areas of Conservation and Special Protection Areas. As a matter of policy, the following should be given the same protection as sites covered by the Habitat's Regulations: (a) potential Special Protection Areas and possible Special Areas of Conservation; (b) listed or proposed Ramsar sites; and (c) sites identified, or required, as compensatory measures for adverse effects on other HRA sites.

Sites of Special Scientific Interest (SSSIs)

5.4.9 Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection. Most National Nature Reserves are notified as SSSIs.

5.4.10 Development on land within or outside a SSSI, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits (including need) of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of SSSIs. The Secretary of State should use requirements and/or planning obligations to mitigate the harmful[86] aspects of the development and, where possible, to ensure the conservation and enhancement of the site's biodiversity or geological interest.

Marine Conservation Zones

5.4.11 Marine Conservation Zones (MCZs) (Marine Protected Areas in Scotland), introduced under the Marine and Coastal Access Act 2009, are areas that have been designated for the purpose of conserving marine flora or fauna, marine habitats or types of marine habitat or features of geological or geomorphological interest. The protected feature or features and the conservation objectives for the MCZ are stated in the designation order for the MCZ. The Secretary of State is bound by the duties in relation to MCZs imposed by sections 125 and 126 of the Marine and Coastal Access Act 2009.

Regional and Local Sites

5.4.12 Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Wildlife Sites, are areas of substantive nature conservation value and make an important contribution to ecological networks and nature's recovery. They can also provide wider benefits including public access (where agreed), climate mitigation and helping to tackle air pollution. National planning policy expects plans to identify and map Local Wildlife sites, and to include policies that not only secure their protection from harm or loss but also help to enhance them and their connection to wider ecological networks. The Secretary of State should give due consideration to such regional or local designations. However, given the need for new nationally significant infrastructure, these designations should not be used in themselves to refuse development consent. Development will still be expected to comply with the biodiversity and geological conservation requirements set out in this NPS.

86 In line with the principle in paragraph 4.2.8, the term 'harm' should be understood to mean 'significant harm'.

Ancient Woodland and Veteran Trees

5.4.13 Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The Secretary of State should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location clearly outweigh the loss of the woodland habitat. Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided[87]. Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why. Applicants should provide a suitable compensation strategy in instances where proposals would result in the loss or deterioration of ancient woodland and ancient or veteran trees.

Biodiversity within Developments

5.4.14 Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, the Secretary of State should maximise such opportunities in and around developments, using requirements or planning obligations where appropriate. This can help towards delivering biodiversity net gain. Wider ecosystem services and benefits of natural capital should also be considered when designing enhancement measures.

Protection and Enhancement of Habitats and Other Species

5.4.15 Many individual wildlife species receive statutory protection under a range of legislative provisions.[88]

5.4.16 Other species and habitats have been identified as being of principal importance for the conservation of biodiversity in England and Wales and thereby requiring conservation action.[89] The Secretary of State should ensure that these species and habitats are protected from the adverse effects of development by using requirements, planning obligations, or licence conditions. The Secretary of State should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context the Secretary of State should give substantial weight to any such harm to the

87 This does not prevent the loss of such trees where the Secretary of State is satisfied that their loss is unavoidable.
88 Certain plant and animal species, including all wild birds, are protected under the Wildlife and Countryside Act 1981. Certain plant and animal species are also protected under the Conservation of Habitats and Species Regulations 2010. Some other animals are protected under their own legislation, for example Protection of Badgers Act 1992.
89 Lists of habitats and species of principal importance for the conservation of biological diversity in England published in response to Section 41 of the Natural Environment and Rural Communities Act 2006 are available from the Biodiversity Action Reporting System website at: http://ukbap-reporting.org.uk/our-biodiversity-reporting-system

detriment of biodiversity features of national or regional importance which it considers may result from a proposed development.

5.4.17 Proposals should also consider any opportunities to maximise the restoration, creation, and enhancement of wider biodiversity. Consideration should be given to improvements to, and impacts on, habitats and species in, around and beyond developments, for wider ecosystem services and natural capital benefits, beyond those under protection and identified as being of principal importance. This may include considerations and opportunities identified through Local Nature Recovery Strategies, and national goals and targets set through the government's strategy for nature for example.

Mitigation

5.4.18 The applicant should include appropriate mitigation measures as an integral part of the proposed development. In particular, the applicant should demonstrate that:

- during construction, they will seek to ensure that activities will be confined to the minimum areas required for the works
- the timing of construction has been planned to avoid or limit disturbance to birds during the breeding season[90]
- during construction and operation best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements
- habitats will, where practicable, be restored after construction works have finished
- mitigation measures should take into account existing habitats and should generally seek opportunities to enhance them, rather than replace them. Where practicable, mitigation measures should seek to create new habitats of value within the site landscaping proposals

5.4.19 Applicants should consider producing and implementing a Biodiversity Management Strategy as part of their development proposals. This could include provision for biodiversity awareness training to employees and contractors so as to avoid unnecessary adverse impacts on biodiversity during the construction and operation stages.

5.4.20 In the design of any direct cooling system the locations of the intake and outfall should be sited to avoid or minimise adverse impacts on the receiving waters, including their ecology. There should also be specific measures to minimise impact to fish and aquatic biota by entrainment and impingement or by excessive heat or biocidal chemicals from discharges to receiving waters.

90 See guidance on the protection of wild birds here: https://www.gov.uk/guidance/wild-birds-protection-surveys-and-licences

5.4.21 To further minimise any adverse impacts on geodiversity, where appropriate applicants are encouraged to produce and implement a Geodiversity Management Strategy to preserve and enhance access to geological interest features, as part of relevant development proposals.

5.4.22 The Secretary of State should consider what appropriate requirements should be attached to any consent and/or in any planning obligations entered into, in order to ensure that any mitigation or biodiversity net gain measures, if offered, are delivered and maintained. Any habitat creation or enhancement delivered for biodiversity net gain should generally be maintained for a minimum period of 30 years.

5.4.23 The Secretary of State will need to take account of what mitigation measures may have been agreed between the applicant and the SNCB or the MMO, and whether the SNBC or the MMO has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences.

5.5 Civil and Military Aviation and Defence Interests

Introduction

5.5.1 Civil and military aerodromes, aviation technical sites, and other types of defence interests (both onshore and offshore) can be affected by new energy development.

Aviation

5.5.2 UK airspace is important for both civilian and military aviation interests. It is essential that the safety of UK aerodromes, aircraft and airspace is not adversely affected by new energy infrastructure. Similarly, aerodromes can have important economic and social benefits, particularly at the regional and local level. Commercial civil aviation is largely confined to designated corridors of controlled airspace and set approaches to airports. However, civilian leisure and military aircraft may often fly outside of ‘controlled air space’. The approaches and flight patterns to aerodromes are not necessarily routine and can be irregular owing to a variety of factors including the performance characteristics of the aircraft concerned and the prevailing meteorological conditions.

5.5.3 Certain civil aerodromes, and aviation technical sites, selected on the basis of their importance to the national air transport system, are officially safeguarded in order to ensure that their safety and operation are not compromised by new development. A similar official safeguarding system applies to certain military aerodromes and defence assets, selected on the basis of their strategic importance. Areas of airspace around aerodromes used by aircraft taking off or on approach and landing are described as “obstacle limitation surfaces” (OLS). OLS for civil aerodromes are defined according to

criteria set out in relevant Civil Aviation Authority (CAA) guidance[91] and for military aerodromes according to MoD criteria. Aerodromes that are officially safeguarded will have officially produced plans that show the OLS.

5.5.4 The certified Safeguarding maps depicting the OLS and other criteria (for example to minimise "birdstrike" hazards) are deposited with the relevant local planning authorities. DfT/ODPM Circular 01/2003[92] provides advice to planning authorities on the official safeguarding of aerodromes and includes a list of the aerodromes which are officially safeguarded. The Circular and CAA guidance also recommends that the operators of aerodromes which are not officially safeguarded should take steps to protect their aerodrome from the effects of possible adverse development by establishing an agreed consultation procedure between themselves and the local planning authority or authorities.

5.5.5 There are also "Public Safety Zones" (PSZs) at the end of runways of the busiest airports in the UK, within which development is restricted to minimise risks to people on the ground in the event of an aircraft accident on take-off or landing. Maps showing the PSZs are deposited with the relevant local planning authorities. DfT Circular 01/2010 provides advice to local planning authorities on Public Safety Zones.[93]

5.5.6 The military Low Flying system covers the whole of the UK and enables low flying activities as low as 75m (mean separation distance). A considerable amount of military flying for training purposes is conducted at as low as 30m in designated Tactical Training Areas (TTAs) in mid Wales, Cumbria, the Scottish Border region and in the Electronic Warfare Range in the Scottish Border area. In addition, military helicopters may operate down to ground level. New energy infrastructure may cause obstructions in Ministry of Defence (MoD) low flying areas.

5.5.7 Safe and efficient operations within UK airspace is dependent upon communications, navigation and surveillance (CNS) infrastructure, including radar (often referred to as 'technical sites'). Energy infrastructure development may interfere with the operation of CNS systems such as radar. It can also act as a reflector or diffractor of radio signals upon which Air Traffic Control Services rely (an effect which is particularly likely to arise when large structures, such as wind turbines, are located in close proximity to Communications and Navigation Aids and technical sites). Wind turbines may also cause false returns when built in line of sight to Primary or Secondary Surveillance radar installations.

Other defence interests

91 CAA CAP 168: Licensing of Aerodromes: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=6114
92 DfT/ODPM Circular 01/2003: Safeguarding, Aerodromes, Technical Sites and Military Explosives Storage Areas.
93 DfT Circular 01/2010: Control of Development in Airport Public Safety Zones: https://www.gov.uk/government/publications/control-of-development-in-airport-public-safety-zones

5.5.8 The MoD operates military training areas, military danger zones (offshore Danger and Exercise areas), military explosives storage areas and TTAs. There are extensive Danger and Exercise Areas across the UKCS for military firing and highly surveyed routes to support government shipping that are essential for national defence.

5.5.9 Other operational defence assets may be affected by new development, for example the Seismological Monitoring Station at Eskdalemuir and maritime acoustic facilities used to test and calibrate noise emissions from naval vessels, such as at Portland Harbour. The MoD also operates Air Defence radars and Meteorological radars which have wide coverage over the UK (onshore and offshore). It is important that new energy infrastructure does not significantly impede or compromise the safe and effective use of any defence assets.

Applicant's assessment

5.5.10 Where the proposed development may have an effect on civil or military aviation and/or other defence assets an assessment of potential effects should be set out in the ES (see Section 4.2).

5.5.11 The applicant should consult the MoD, Civil Aviation Authority (CAA), NATS and any aerodrome – licensed or otherwise – likely to be affected by the proposed development in preparing an assessment of the proposal on aviation or other defence interests.

5.5.12 Any assessment of aviation or other defence interests should include potential impacts of the project upon the operation of CNS infrastructure, flight patterns (both civil and military), other defence assets and aerodrome operational procedures. It should also assess the cumulative effects of the project with other relevant projects in relation to aviation and defence.

5.5.13 If any relevant changes are made to proposals during the pre-application and determination period, it is the responsibility of the applicant to ensure that the relevant aviation and defence consultees are informed as soon as reasonably possible.

Secretary of State decision making

5.5.14 The Secretary of State should be satisfied that the effects on civil and military aerodromes, aviation technical sites and other defence assets have been addressed by the applicant and that any necessary assessment of the proposal on aviation or defence interests has been carried out. In particular, the Secretary of State should be satisfied that the proposal has been designed to minimise adverse impacts on the operation and safety of aerodromes and that reasonable mitigation is carried out. It may also be appropriate to expect operators of the aerodrome to consider making reasonable changes to operational procedures. When assessing the necessity, acceptability, and reasonableness of operational changes to aerodromes, the Secretary of State should be satisfied that they have the necessary information regarding the operational procedures along with any demonstrable risks or harm of

such changes, taking into account the cases put forward by all parties. When making such a judgement in the case of military aerodromes, the Secretary of State should have regard to interests of defence and national security.

5.5.15 If there are conflicts between the government's energy and transport policies and military interests in relation to the application, the Secretary of State should expect the relevant parties to have made appropriate efforts to work together to identify realistic and pragmatic solutions to the conflicts. In so doing, the parties should seek to protect the aims and interests of the other parties as far as possible.

5.5.16 There are statutory requirements concerning lighting to tall structures.[94] Where lighting is requested on structures that goes beyond statutory requirements by any of the relevant aviation and defence consultees, the Secretary of State should be satisfied of the necessity of such lighting taking into account the case put forward by the consultees. The effect of such lighting on the landscape and ecology may be a relevant consideration.

5.5.17 Where, after reasonable mitigation, operational changes, obligations and requirements have been proposed, the Secretary of State considers that:

- a development would prevent a licensed aerodrome from maintaining its licence
- the benefits of the proposed development are outweighed by the harm to aerodromes serving business, training or emergency service needs, taking into account the relevant importance and need for such aviation infrastructure
- the development would significantly impede or compromise the safe and effective use of defence assets or significantly limit military training
- the development would have an impact on the safe and efficient provision of en-route air traffic control services for civil aviation, in particular through an adverse effect on the infrastructure required to support communications, navigation or surveillance systems

consent should not be granted.

Mitigation

5.5.18 Where a proposed energy infrastructure development would significantly impede or compromise the safe and effective use of civil or military aviation or defence assets and or significantly limit military training, the Secretary of State may consider the use of 'Grampian conditions'[95], or other forms of requirement which relate to the use of future technological solutions, to mitigate impacts. Where technological solutions have not yet been developed or proven, the Secretary of State will need to consider the

94 Articles 222 and 223. Air Navigation Order 2016.
95 As set out on https://www.gov.uk/guidance/use-of-planning-conditions, a Grampian condition refers to a condition worded in a negative form, i.e. prohibiting development authorised by the planning permission or other aspects linked to the planning permission (e.g. occupation of premises) until a specific action has been taken (such as the provision of supporting infrastructure)..

likelihood of a solution becoming available within the time limit for implementation of the development consent. In this context, where new technologies to mitigate the adverse effects of wind farms on radar are concerned, the Secretary of State should have regard to any government guidance which emerges from the joint government/industry Aviation Plan.

5.5.19 Mitigation for infringement of OLS may include[96]:

- amendments to layout or scale of infrastructure to reduce the height, provided that it does not result in an unreasonable reduction of capacity or unreasonable constraints on the operation of the proposed energy infrastructure
- changes to operational procedures of the aerodromes in accordance with relevant guidance, provided that safety assurances can be provided by the operator that are acceptable to the CAA where the changes are proposed to a civilian aerodrome (and provided that it does not result in an unreasonable reduction of capacity or unreasonable constraints on the operation of the aerodrome)
- installation of obstacle lighting and/or by notification in Aeronautical Information Service publications

5.5.20 For CNS infrastructure, the UK military Low Flying system (including TTAs) and designated air traffic routes, mitigation may also include:

- lighting
- operational airspace changes
- upgrading of existing CNS infrastructure, the cost of which the applicant may reasonably be required to contribute in part or in full

5.5.21 Mitigation for effects on radar, communications and navigational systems may include reducing the scale of a project, although in some cases it is likely to be unreasonable for the Secretary of State to require mitigation by way of a reduction in the scale of development, for example, where reducing the tip height of wind turbines in an offshore wind farm would result in a material reduction in electricity generating capacity or operation would be severely constrained. However, there may be exceptional circumstances where a small reduction in such function will result in proportionately greater mitigation. In these cases, the Secretary of State may consider that the benefits of the mitigation outweighs the marginal loss of function.

96 Where mitigation is required using a condition or planning obligation, the tests set out at paragraphs 4.1.7 – 4.1.8 in EN-1 should be applied.

5.6 Coastal Change

Introduction

5.6.1 The government's aim is to ensure that our coastal communities continue to prosper and adapt to coastal change. This means planning should:

- ensure that policies and decisions in coastal areas are based on an understanding of coastal change over time
- prevent new development from being put at risk from coastal change by:
- (i) avoiding inappropriate development in areas that are vulnerable to coastal change or any development that adds to the impacts of physical changes to the coast
- (ii) directing development away from areas vulnerable to coastal change
- ensure that the risk to development which is, exceptionally, necessary in coastal change areas because it requires a coastal location and provides substantial economic and social benefits to communities, is managed over its planned lifetime
- ensure that plans are in place to secure the long-term sustainability of coastal areas

5.6.2 For the purpose of this section, coastal change means physical change to the shoreline, i.e. erosion, coastal landslip, permanent inundation and coastal accretion. Where onshore infrastructure projects are proposed on the coast, coastal change is a key consideration as well as a vital element of climate change adaptation (see Section 4.9). Some kinds of coastal change happen very gradually, others over shorter timescales. Some are the result of purely natural processes; others, including potentially significant modifications of the coastline or coastal environment resulting from climate change, are wholly or partly man-made. This section is concerned both with the impacts which energy infrastructure can have as a driver of coastal change and with how to ensure that developments are resilient to ongoing and potential future coastal change.

5.6.3 The construction of an onshore energy project on the coast may involve, for example, dredging, dredge spoil deposition, cooling water, culvert construction, marine landing facility construction and flood and coastal protection measures which could result in direct effects on the coastline, seabed and marine ecology and biodiversity.

5.6.4 Additionally, indirect changes to the coastline and seabed might arise as a result of a hydrodynamic response to some of these direct changes. This could lead to localised or more widespread coastal erosion or accretion and changes to offshore features such as submerged banks and ridges and marine biodiversity.

5.6.5 This section only applies to onshore energy infrastructure projects situated on the coast. The impacts of offshore renewable energy projects on marine life and coastal geomorphology are considered in EN-3. Section 5.4 on biodiversity and geological

conservation, Section 5.8 on flood risk and Section 4.9 on adaptation to climate change, including the increased risk of coastal erosion, are also relevant, as is advice on access to coastal recreation sites and features in Section 5.11 on land use. Advice on the historic environment in Section 5.9 may also be relevant.

Applicant's assessment

5.6.6 Where relevant, applicants should undertake coastal geomorphological and sediment transfer modelling to predict and understand impacts and help identify relevant mitigating or compensatory measures.

5.6.7 The ES (see Section 4.2) should include an assessment of the effects on the coast. In particular, applicants should assess:

- the impact of the proposed project on coastal processes and geomorphology, including by taking account of potential impacts from climate change. If the development will have an impact on coastal processes the applicant must demonstrate how the impacts will be managed to minimise adverse impacts on other parts of the coast
- the implications of the proposed project on strategies for managing the coast as set out in Shoreline Management Plans (SMPs) (which provide a large-scale assessment of the physical risks associated with coastal processes and present a long term policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner), any relevant Marine Plans, River Basin Management Plans and capital programmes for maintaining flood and coastal defences
- the effects of the proposed project on marine ecology, biodiversity and protected sites
- how coastal change could affect flood risk management infrastructure, drainage and flood risk
- the effects of the proposed project on maintaining coastal recreation sites and features
- the vulnerability of the proposed development to coastal change, taking account of climate change, during the project's operational life and any decommissioning period

5.6.8 For any projects involving dredging or disposal into the sea, the applicant should consult the MMO at an early stage. Where the project has the potential to have a major impact in this respect, this is covered in the technology specific NPSs. For example, EN-4 looks further at the environmental impacts of dredging in connection with Liquified Natural Gas (LNG) tanker deliveries to LNG import facilities.

5.6.9 The applicant should be particularly careful to identify any effects of physical changes on the integrity and special features of Marine Protected Areas (MPAs). These could include MCZs, candidate marine Special Areas of Conservation (SACs), coastal SACs

and candidate coastal SACs, coastal Special Protection Areas (SPAs) and potential coastal SPAs, Ramsar sites, Sites of Community Importance (SCIs) and potential SCIs and SSSIs.

Secretary of State decision making

5.6.10 The Secretary of State should be satisfied that the proposed development will be resilient to coastal erosion and deposition, taking account of climate change, during the project's operational life and any decommissioning period. Proposals that aim to facilitate the relocation of existing energy infrastructure from unsustainable locations which are at risk from coastal change, should be supported where it would result in climate resilient infrastructure.

5.6.11 The Secretary of State should not normally consent new development in areas of dynamic shorelines where the proposal could inhibit sediment flow or have an adverse impact on coastal processes at other locations. Impacts on coastal processes must be managed to minimise adverse impacts on other parts of the coast. Where such proposals are brought forward, consent should only be granted where the Secretary of State is satisfied that the benefits (including need) of the development outweigh the adverse impacts.

5.6.12 The Secretary of State should ensure that applicants have restoration plans for areas of foreshore disturbed by direct works and will undertake pre- and post-construction coastal monitoring arrangements with defined triggers for intervention and restoration.

5.6.13 The Secretary of State should examine the broader context of coastal protection around the proposed site, and the influence in both directions, i.e. coast on site, and site on coast.

5.6.14 The Secretary of State should consult the MMO on projects which could impact on coastal change, since the MMO may also be involved in considering other projects which may have related coastal impacts.

5.6.15 In addition to this NPS, the Secretary of State must have regard to the appropriate marine policy documents, as provided for in the Marine and Coastal Access Act 2009. The Secretary of State may also have regard to any relevant SMPs.

5.6.16 Substantial weight should be attached to the risks of flooding and coastal erosion. The applicant must demonstrate that full account has been taken of the policy on assessment and mitigation in paragraphs 4.2.1 to 4.2.8 of this NPS, taking account of the potential effects of climate change on these risks as discussed above.

Mitigation

5.6.17 Applicants should propose appropriate mitigation measures to address adverse physical changes to the coast, in consultation with the MMO, the EA or NRW, LPAs, other statutory consultees, Coastal Partnerships and other coastal groups, as it

considers appropriate. Where this is not the case, the Secretary of State should consider what appropriate mitigation requirements might be attached to any grant of development consent.

5.7 Dust, Odour, Artificial Light, Smoke, Steam, and Insect Infestation

Introduction

5.7.1 During the construction, operation and decommissioning of energy infrastructure there is potential for the release of a range of emissions such as odour, dust, steam, smoke, artificial light and infestation of insects. All have the potential to have a detrimental impact on amenity or cause a common law nuisance or statutory nuisance under Part III, Environmental Protection Act 1990. Note that pollution impacts from some of these emissions (for example dust, smoke) are covered in the Section 5.2 on air emissions.

5.7.2 Because of the potential effects of these emissions and infestation, and in view of the availability of the defence of statutory authority against nuisance claims described in Section 4.14, it is important that the potential for these impacts is considered by the Secretary of State.

5.7.3 For energy NSIPs of the type covered by this NPS, some impact on amenity for local communities is likely to be unavoidable. The aim should be to keep impacts to a minimum, and at a level that is acceptable.

Applicant's assessment

5.7.4 The applicant should assess the potential for insect infestation and emissions of odour, dust, steam, smoke, and artificial light to have a detrimental impact on amenity, as part of the ES.

5.7.5 In particular, the assessment provided by the applicant should describe:

- the type, quantity and timing of emissions
- aspects of the development which may give rise to emissions
- premises or locations that may be affected by the emissions
- effects of the emission on identified premises or locations
- measures to be employed in preventing or mitigating the emissions

5.7.6 The applicant is advised to consult the relevant local planning authority and, where appropriate, the EA about the scope and methodology of the assessment.

Secretary of State decision making

5.7.7 The Secretary of State should satisfy itself that:

- an assessment of the potential for artificial light, dust, odour, smoke, steam and insect infestation to have a detrimental impact on amenity has been carried out

- that all reasonable steps have been taken, and will be taken, to minimise any such detrimental impacts

5.7.8 If the Secretary of State does grant development consent for a project, the Secretary of State should consider whether there is a justification for all of the authorised project (including any associated development) being covered by a defence of statutory authority against nuisance claims. If the Secretary of State cannot conclude that this is justified, the Secretary of State should disapply in whole or in part the defence through a provision in the development consent order.

5.7.9 Where the Secretary of State believes it appropriate, the Secretary of State may consider attaching requirements to the development consent, in order to secure certain mitigation measures.

5.7.10 In particular, the Secretary of State should consider whether to require the applicant to abide by a scheme of management and mitigation concerning insect infestation and emissions of odour, dust, steam, smoke, and artificial light from the development. The Secretary of State should consider the need for such a scheme to reduce any loss to amenity which might arise during the construction, operation and decommissioning of the development. A construction management plan may help codify mitigation at that stage.

Mitigation

5.7.11 Mitigation measures may include one or more of the following:

- engineering: prevention of a specific emission at the point of generation; control, containment and abatement of emissions if generated
- lay-out: adequate distance between source and sensitive receptors; reduced transport or handling of material
- administrative: limiting operating times; restricting activities allowed on the site; implementing management plans

5.8 Flood Risk

Introduction

5.8.1 Flooding is a natural process that plays an important role in shaping the natural environment. However, flooding threatens life and causes substantial disruption and damage to property. The effects of weather events on the natural environment, life and property can be increased in severity both as a consequence of decisions about the

location, design and nature of settlement and land use, and as a potential consequence of future climate change. Having resilient energy infrastructure not only reduces the risk of flood damages to the infrastructure, it also reduces the disruptive impacts of flooding on those homes and businesses that rely on that infrastructure. Although flooding cannot be wholly prevented, its adverse impacts can be avoided or reduced through good planning and management.

5.8.2 The government's Flood and Coastal Erosion Risk Management Policy Statement sets out our ambition to create a nation more resilient to future flood and coastal erosion risk. It outlines policies and actions which will accelerate progress to better protect and better prepare the country against flooding and coastal erosion.

5.8.3 All buildings in flood risk areas can improve their preparedness to reduce costs and disruption to key public services when a flood happens. Where infrastructure is not better protected as part of a wider community scale flood defence scheme, those who own and run infrastructure sites – whether in public or private hands – are expected to take action to keep water out, minimise the damage if water gets in through flood-resilient materials, and reduce the disruption caused. This includes effective contingency planning to mitigate the impacts of flooding on the delivery of important services.

5.8.4 Climate change is already having an impact and is expected to have an increasing impact on the UK throughout this century. The UK Climate Projections 2018 show an increased chance of milder, wetter winters and hotter, drier summers in the UK, with more intensive rainfall causing flooding. Sea levels will continue to rise beyond the end of the century, increasing risks to vulnerable coastal communities. Within the lifetime of energy projects, these factors will lead to increased flood risks in areas susceptible to flooding, and to an increased risk of the occurrence of floods in some areas which are not currently thought of as being at risk. A robust approach to flood risk management is a vital element of climate change adaptation; the applicant and the Secretary of State should take account of the policy on climate change adaptation in Section 4.9.

5.8.5 The aims of planning policy on development and flood risk are to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to steer new development to areas with the lowest risk of flooding. Where new energy infrastructure is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and, where possible, by reducing flood risk overall. It should also be designed and constructed to remain operational in times of flood. Proposals that aim to facilitate the relocation of existing energy infrastructure from unsustainable locations which are or will be at unacceptable risk of flooding, should be supported where it would result in climate-resilient infrastructure.

Applicant's assessment

5.8.6 A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England or Zones B and C in Wales. In Flood Zone 1 in England or Zone A in Wales, an assessment should accompany all proposals involving:

- sites of 1 hectare or more
- land which has been identified by the EA or NRW as having critical drainage problems
- land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future
- land that may be subject to other sources of flooding (for example surface water)
- where the EA or NRW, Lead Local Flood Authority, Internal Drainage Board or other body have indicated that there may be drainage problems. This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account.

5.8.7 The minimum requirements for Flood Risk Assessments (FRA) are that they should:

- be proportionate to the risk and appropriate to the scale, nature and location of the project
- consider the risk of flooding arising from the project in addition to the risk of flooding to the project
- take the impacts of climate change into account, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made[97];
- be undertaken by competent people, as early as possible in the process of preparing the proposal
- consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure and exceedance
- consider the vulnerability of those using the site, including arrangements for safe access and escape
- consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration

97 Refer to Flood risk assessments: climate change allowances - https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

- identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management
- consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes
- include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding
- consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems. Information should include:
    i. Describe the existing surface water drainage arrangements for the site
    ii. Set out (approximately) the existing rates and volumes of surface water run-off generated by the site. Detail the proposals for restricting discharge rates
    iii. Set out proposals for managing and discharging surface water from the site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate
    iv. Demonstrate how the hierarchy of drainage options (refer to PPG Sustainable Drainage Systems section) has been followed. Explain and justify why the types of Sustainable Drainage Systems and method of discharge have been selected and why they are considered appropriate. Where cost is a reason for not including Sustainable Drainage Systems, provide information to enable comparison with the lifetime costs of a conventional public sewer connection
    v. Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the site
    vi. Describe the multifunctional benefits the sustainable drainage system will provide
    vii. Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system
    viii. Explain how run-off from the completed development will be prevented from causing an impact elsewhere
    ix. Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development

- detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere
- be supported by appropriate data and information, including historical information on previous events.

5.8.8 Further guidance can be found in the Planning Practice Guidance Flood Risk and Coastal Change section which accompanies the NPPF, TAN15 for Wales or successor documents.

5.8.9 Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions with the EA or NRW, and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers, navigation authorities, highways authorities and reservoir owners and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. The Secretary of State should advise applicants to undertake these steps where they appear necessary, but have not yet been addressed.

5.8.10 If the EA or NRW has concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the EA or NRW and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the EA's or NRW's concerns.

Secretary of State decision making

5.8.11 In determining an application for development consent, the Secretary of State should be satisfied that where relevant:

- the application is supported by an appropriate FRA
- the Sequential Test has been applied and satisfied as part of site selection
- a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk
- the proposal is in line with any relevant national and local flood risk management strategy[98]
- sustainable drainage systems (SuDs) (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate
- in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in 5.8.18)

98 As provided for in section 9(1) of the Flood and Water Management Act 2010.

- the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development
- land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance

5.8.12 For energy projects which have drainage implications, approval for the project's drainage system, including during the construction period, will form part of the development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010. In addition, the development consent order, or any associated planning obligations, will need to make provision for appropriate operation and maintenance of any SuDS throughout the project's lifetime. Where this is secured through the adoption of any SuDS features, any necessary access rights to property will need to be granted. Where relevant, the Secretary of State should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. Responsible bodies could include, for example the landowner, the relevant lead local flood authority or water and sewerage company (through the Ofwat-approved Sewerage Sector Guidance[99]), or another body, such as an Internal Drainage Board.

5.8.13 If the EA or NRW continues to have concerns and objects to the grant of development consent on the grounds of flood risk, the Secretary of State can grant consent, but would need to be satisfied before deciding whether or not to do so that all reasonable steps have been taken by the applicant and the EA or NRW to try to resolve the concerns.

5.8.14 Energy projects should not normally be consented within Flood Zone 3b the Functional Floodplain (where water has to flow or be stored in times of flood), or Zone C2 in Wales, or on land expected to fall within these zones within its predicted lifetime. However, where essential energy infrastructure has to be located in such areas, for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage, and will not impede water flows.

The Sequential Test

5.8.15 Preference should be given to locating projects in areas of lowest flood risk. The Secretary of State should not consent development in flood risk areas (Flood Zone 2 in England or Zone B in Wales), accounting for all sources of flooding and the predicted impacts of climate change unless they are satisfied that the sequential test

99 Sewerage Sector Guidance: https://www.water.org.uk/sewerage-sector-guidance-approved-documents/

requirements have been met. The Secretary of State should not consent development in Flood Zone 3 or Zone C unless they are satisfied that the Sequential and Exception Test requirements have been met. The technology specific NPSs set out some exceptions to the application of the sequential test. However, when seeking development consent on a site allocated in a development plan through the application of the Sequential Test, informed by a strategic flood risk assessment, applicants need not apply the Sequential Test, provided the proposed development is consistent with the use for which the site was allocated and there is no new flood risk information that would have affected the outcome of the test. Consideration of alternative sites should take account of the policy on alternatives set out in Section 4.2 above. All projects should apply the sequential approach to locating development within the site.

The Exception Test

5.8.16 If, following application of the sequential test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied, as required by table 3 of the Planning Practice Guidance. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available.

5.8.17 The Exception Test is only appropriate for use where the sequential test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the sequential test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Examples could include alternative site(s) that are subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), SSSIs and World Heritage Sites (WHS) which would not usually be considered appropriate.

5.8.18 Both elements of the test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that:

- the project provides wider sustainability benefits to the community[100] that outweigh flood risk
- the project reduces flood risk overall, where possible

5.8.19 Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the Secretary of State

100 These would include the benefits (including need), for the infrastructure set out in Part 3.

should make clear how, in reaching their decision, they have weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the EA or NRW and other relevant bodies.

Mitigation

5.8.20 To satisfactorily manage flood risk, arrangements are required to manage surface water and the impact of the natural water cycle on people and property.

5.8.21 In this NPS, the term SuDS refers to the whole range of sustainable approaches to surface water drainage management including, where appropriate:

- source control measures including rainwater recycling and drainage
- infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed
- basins ponds and tanks to hold excess water after rain and allow controlled discharge that avoids flooding
- flood routes to carry and direct excess water through developments to minimise the impact of severe rainfall flooding

5.8.22 Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts.

5.8.23 The surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect.

5.8.24 It may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary through the use of a planning obligation.

5.8.25 The sequential approach should be applied to the layout and design of the project. Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses.

Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS.

5.8.26 The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. The applicant should take advice from the local authority emergency planning team, emergency services and, where appropriate, from the local resilience forum when producing an evacuation plan for a manned energy project as part of the FRA. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the FRA.

5.9 Historic Environment

Introduction

5.9.1 The construction, operation and decommissioning of energy infrastructure has the potential to result in adverse impacts on the historic environment above, at and below the surface of the ground.

5.9.2 The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, landscaped and planted or managed flora.

5.9.3 Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called ‘heritage assets’. Heritage assets may be buildings, monuments, sites, places, areas or landscapes, or any combination of these. The sum of the heritage interests that a heritage asset holds is referred to as its significance.[101] Significance derives not only from a heritage asset’s physical presence, but also from its setting.[102]

5.9.4 Some heritage assets have a level of significance that justifies official designation. Categories of designated heritage assets are: World Heritage Sites; Scheduled Monuments; Protected Wreck Sites; Protected Military Remains; Listed Buildings;

101 Terms used in this section, including the term “Designated Heritage Asset” are defined in Annex 2 of the National Planning Policy Framework.
102 The setting of a heritage asset is the surroundings in which it is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, and may affect the ability to appreciate that significance or may be neutral.

Registered Parks and Gardens; Registered Battlefields; Conservation Areas; and Registered Historic Landscapes (Wales only).[103]

5.9.5 There are heritage assets that are not currently designated, but which have been demonstrated to be of equivalent significance to designated heritage assets of the highest significance. These are:

- those that the Secretary of State has recognised as being capable of being designated as a Scheduled Monument or Protected Wreck Site but has decided not to designate
- those that the Secretary of State has recognised as being of equivalent significance to Scheduled Monuments or Protected Wreck Sites but are incapable of being designated by virtue of being outside the scope of the related legislation

5.9.6 There are also heritage assets with archaeological interest that have yet to be formally assessed by the Secretary of State but which have potential to demonstrate equivalent significance to Scheduled Monuments or Protected Wreck Sites.

5.9.7 Non-designated heritage assets that have been recognised by the Secretary of State as being of equivalent significance to Scheduled Monuments or Protected Wreck Sites, or that have yet to be formally assessed but have archaeological interest[104] and have potential to demonstrate equivalent significance to Scheduled Monuments or Protected Wreck Sites, should be considered subject to the same policy considerations as those that apply to designated heritage assets.

5.9.8 The Secretary of State should also consider the impacts on other non-designated heritage assets (as identified either through the development plan making process by local authorities, including 'local listing', or through the application, examination and decision making process). This is on the basis of clear evidence that such heritage assets have a significance that merits consideration in that process, even though those assets are of lesser significance than designated heritage assets.

5.9.9 Impacts on heritage assets specific to types of infrastructure are included in the technology specific NPSs.

Applicant's assessment

5.9.10 The applicant should undertake an assessment of any likely significant heritage impacts of the proposed development as part of the EIA and describe these in the ES

103 The issuing of licences to undertake works on Protected Wreck Sites in English waters is the responsibility of the Secretary of State for Digital, Culture, Media and Sport and does not form part of development consents issued by the Secretary of State for BEIS. In Wales it is the responsibility of Welsh Ministers. The issuing of licences for Protected Military Remains is the responsibility of the Secretary of State for Defence.
104 There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point.

(see Section 4.2). This should include consideration of heritage assets above, at, and below the surface of the ground.

5.9.11 As part of the ES the applicant should provide a description of the significance of the heritage assets affected by the proposed development, including any contribution made by their setting. The level of detail should be proportionate to the importance of the heritage assets and no more than is sufficient to understand the potential impact of the proposal on their significance. As a minimum the applicant should have consulted the relevant Historic Environment Record[105] (or, where the development is in English or Welsh waters, Historic England or Cadw) and assessed the heritage assets themselves using expertise where necessary according to the proposed development's impact.

5.9.12 Where a site on which development is proposed includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation. Where proposed development will affect the setting of a heritage asset, accurate representative visualisations may be necessary to explain the impact.[106]

5.9.13 The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents. Studies will be required on those heritage assets affected by noise, vibration, light and indirect impacts, the extent and detail of these studies will be proportionate to the significance of the heritage asset affected.

5.9.14 The applicant is encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment, and to consider how their scheme takes account of the significance of heritage assets affected. This can include, where possible:

- enhancing, through a range of measures such a sensitive design, the significance of heritage assets or setting affected
- considering measures that address those heritage assets which are at risk or which may become at risk, as a result of the scheme

105 Historic Environment Records (HERs) are information services maintained by local authorities and National Park Authorities with a view to providing access to comprehensive and dynamic resources relating to the historic environment of an area for public benefit and use. Details of Historic Environment Records in England are available from the Heritage Gateway website. For Wales, HERs can be obtained through the Historic Wales Portal at https://historic-wales-rcahmw.hub.arcgis.com/ English Heritage and Cadw hold additional information about heritage assets in English or Welsh waters. Historic England or Cadw should also be consulted, where relevant.
106 Relevant guidance is given in the Historic England publication, The Setting of Heritage Assets https://historicengland.org.uk/images-books/publications/gpa3-setting-of-heritage-assets/

- considering how visual or noise impacts can affect heritage assets, and whether there may be opportunities to enhance access to, or interpretation, understanding and appreciation of, the heritage assets affected by the scheme

5.9.15 Careful consideration in preparing the scheme will be required on whether the impacts on the historic environment will be direct or indirect, temporary or permanent.

5.9.16 Applicants should look for opportunities for new development within Conservation Areas and World Heritage Sites, and within the setting of heritage assets, to enhance or better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to the asset (or which better reveal its significance) should be treated favourably.

Secretary of State decision making

5.9.17 In determining applications, the Secretary of State should seek to identify and assess the particular significance of any heritage asset that may be affected by the proposed development, including by development affecting the setting of a heritage asset (including assets whose setting may be affected by the proposed development), taking account of:

- relevant information provided with the application and, where applicable, relevant information submitted during the examination of the application
- any designation records, including those on the National Heritage List for England
- historic landscape character records
- the relevant Historic Environment Record(s), and similar sources of information
- representations made by interested parties during the examination process
- expert advice, where appropriate, and when the need to understand the significance of the heritage asset demands it

5.9.18 The Secretary of State must also comply with the requirements on listed buildings, conservation areas and scheduled monuments, set out in Regulation 3 of the Infrastructure Planning (Decisions) Regulations 2010.

5.9.19 In considering the impact of a proposed development on any heritage assets, the Secretary of State should take into account the particular nature of the significance of the heritage assets and the value that they hold for this and future generations. This understanding should be used to avoid or minimise conflict between their conservation and any aspect of the proposal.

5.9.20 The Secretary of State should take into account the desirability of sustaining and, where appropriate, enhancing the significance of heritage assets, the contribution of their settings and the positive contribution that their conservation can make to sustainable communities, including to their quality of life, their economic vitality, and to

the public's enjoyment of these assets[107]. The Secretary of State should also take into account the desirability of the new development making a positive contribution to the character and local distinctiveness of the historic environment. The consideration of design should include scale, height, massing, alignment, materials, use and landscaping (for example, screen planting).

5.9.21 When considering the impact of a proposed development on the significance of a designated heritage asset, the Secretary of State should give great weight to the asset's conservation. The more important the asset, the greater the weight should be. This is irrespective of whether any potential harm amounts to substantial harm, total loss, or less than substantial harm to its significance.

5.9.22 Any harm or loss of significance of a designated heritage asset (from its alteration or destruction, or from development within its setting) should require clear and convincing justification. Substantial harm to or loss of significance of a grade II listed building park or garden should be exceptional. Substantial harm to or loss of significance of assets of the highest significance, including Scheduled Monuments; Protected Wreck Sites; Registered Battlefields; grade I and II* Listed Buildings; grade I and II* Registered Parks and Gardens; and World Heritage Sites, should be wholly exceptional.

5.9.23 The Secretary of State should give considerable importance and weight to the desirability of preserving all designated heritage assets. Any harmful impact on the significance of a designated heritage asset should be given significant weight when weighed against the public benefit of development, recognising that the greater the harm to the significance of the heritage asset the greater the justification will be needed for any loss.

5.9.24 Where the proposed development will lead to substantial harm to (or total loss of significance of) a designated heritage asset the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm to or loss of significance is necessary to achieve substantial public benefits that outweigh that harm or loss, or all of the following apply:

- the nature of the heritage asset prevents all reasonable uses of the site
- no viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation
- conservation by grant-funding or some form of not for profit, charitable or public ownership is demonstrably not possible
- the harm or loss is outweighed by the benefit of bringing the site back into use

107 This can be by virtue of: heritage assets having an influence on the character of the environment and an area's sense of place; heritage assets having a potential to be a catalyst for regeneration in an area, particularly through leisure, tourism and economic development; heritage assets being a stimulus to inspire new development of imaginative and high quality design; and the mixed and flexible patterns of land use in historic areas that are likely to be, and remain, sustainable.

5.9.25 Where the proposed development will lead to less than substantial harm to the significance of the designated heritage asset, this harm should be weighed against the public benefits of the proposal, including, where appropriate securing its optimum viable use.

5.9.26 The effect of an application on the significance of a non-designated heritage asset should be taken into account in determining the application. In weighing applications that directly or indirectly affect non-designated heritage assets, a balanced judgement will be required having regard to the scale of any harm or loss and the significance of the heritage asset.

5.9.27 Not all elements of a Conservation Area or World Heritage Site will necessarily contribute to its significance. Loss of a building (or other element) which makes a positive contribution to the significance of the Conservation Area or World Heritage Site should be treated either as substantial harm or less than substantial harm under paragraph 5.9.24 or less than substantial harm under paragraph 5.9.25, as appropriate, taking into account the relative significance of the element affected and its contribution to the significance of the Conservation Area or World Heritage Site as a whole.

5.9.28 Where there is evidence of deliberate neglect of, or damage to, a heritage asset, the Secretary of State should not take its deteriorated state into account in any decision.[108]

5.9.29 When considering applications for development affecting the setting of a designated heritage asset, the Secretary of State should give considerable importance and weight to the desirability of preserving the setting such assets and treat favourably applications that preserve those elements of the setting that make a positive contribution to, or better reveal the significance of, the asset. When considering applications that do not do this, the Secretary of State should give significant weight to any negative effects, when weighing them against the wider benefits of the application. The greater the negative impact on the significance of the designated heritage asset, the greater the benefits that will be needed to justify approval.[109]

Recording

5.9.30 A documentary record of our past is not as valuable as retaining the heritage asset and therefore the ability to record evidence of the asset is not an adequate mitigation of any harm and should not be a factor in deciding whether consent should be given.

5.9.31 Where the loss of the whole or a material part of a heritage asset's significance is justified, the Secretary of State should require the applicant to record and advance

108 Historic Environment Good Practice Advice in Planning 2 provides further advice on managing significance in decision-taking in the historic environment, available online at: https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/
109 See the Infrastructure Planning (Decisions) Regulations 2010

understanding of the significance of the heritage asset before it is lost wholly or in part. The extent of the requirement should be proportionate to the nature and level of the asset's significance. Applicants should be required to publish this evidence and deposit copies of the reports with the relevant Historic Environment Record. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it.

Requirements

5.9.32 The Secretary of State may add requirements to the development consent order to ensure that this is undertaken in a timely manner in accordance with a written scheme of investigation that meets the requirements of this Section and has been agreed in writing with the relevant Local Authority (or, where the development is in English waters, the MMO and Historic England, or where it is in Welsh waters, the MMO and Cadw) and that the completion of the exercise is properly secured[110].

5.9.33 Where the loss of significance of any heritage asset has been justified by the applicant on the merits of the new development and the significance of the asset in question, the Secretary of State should consider:

- imposing a requirement in the development consent order
- requiring the applicant to enter into an obligation

5.9.34 That will prevent the loss occurring until the relevant part of the development has commenced, or it is reasonably certain that the relevant part of the development is to proceed.

5.9.35 Where there is a high probability that a development site may include as yet undiscovered heritage assets with archaeological interest, the Secretary of State should consider imposing requirements to ensure that appropriate procedures are in place for the identification and treatment of such assets discovered during construction.

5.10 Landscape and Visual

Introduction

5.10.1 The landscape and visual effects of energy projects will vary on a case by case basis according to the type of development, its location and the landscape setting of the proposed development. In this context, references to landscape should be taken as covering seascape and townscape where appropriate.

110 Guidance on the contents of a written scheme of investigation is set out in Historic Environment Good Practice Advice in Planning: 2 – Managing Significance in Decision-Taking in the Historic Environment https://historicengland.org.uk/images-books/publications/gpa2-managing-significance-in-decision-taking/ or any successor documents.

5.10.2 Among the features of energy infrastructure which are common to a number of different technologies, cooling towers and exhaust stacks and their plumes have the most obvious impact on landscape and visual amenity for thermal combustion generating stations.[111] Some natural draught cooling towers may be up 200 metres, although this would be exceptional. Visual impacts may be not just the physical structures but also visible steam plumes from cooling towers.

5.10.3 Other types of cooling system, for example direct throughput where water is abstracted, used for cooling then returned to source, or air-cooled condensers, will have less visible impacts as the structures are considerably lower than natural draught cooling towers and exhibit no visible steam plumes. Further, modern hybrid cooling systems – for example mechanical draught – do not generally exhibit visible steam plumes except in exceptional adverse weather conditions. These systems are normally considered as the "Best Available Techniques" (BAT). However there may be losses of electricity output owing to the need for energy to operate hybrid cooling or air-cooled condenser systems.

5.10.4 When considering visual impacts of thermal combustion generating stations, the Secretary of State should presume that the adverse impacts would be less if a hybrid or direct cooling system is used and that applicants will use BAT. The Secretary of State should therefore expect the applicant to justify BAT for the use of a cooling system that involves visible steam plumes or has a high visible structure, such as a natural draught cooling tower. The Secretary of State should be satisfied that the application of modern hybrid cooling technology or other technologies is not reasonably practicable before giving consent to a development with natural draught cooling towers.

Applicant's assessment

5.10.5 The applicant should carry out a landscape and visual assessment and report it in the ES (see Section 4.2). A number of guides have been produced to assist in addressing landscape issues.[112] The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England and local development plans in Wales. For seascapes, applicants should consult the Seascape Character

111 Cooling towers and exhaust stacks can form part of projects covered by EN-2, EN-3 and EN-6. Other features of energy infrastructure which can be similarly prominent are associated with particular technologies and so are considered in the technology-specific NPSs (see e.g. Section 2.11 of EN-5).

112The Landscape Institute and Institute of Environmental Management and Assessment: Guidelines for Landscape and Visual Impact Assessment (2013, 3rd edition); Landscape and Seascape Character Assessments – https://www.gov.uk/guidance/landscape-and-seascape-character-assessments; Countryside Council for Wales/Cadw (2007) Guide to Good Practice on Using the Register of Landscapes of Historic Interest in Wales in the Planning and Development Process; or any successor documents.

Assessment and the Marine Plan Seascape Character Assessments, and any successors to them.[113]

5.10.6 The applicant's assessment should include the effects during construction of the project and the effects of the completed development and its operation on landscape components and landscape character.

5.10.7 The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include light pollution effects, including on local amenity, and nature conservation.

5.10.8 The assessment should also demonstrate how noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views, will be minimised.

Secretary of State decision making

Landscape impact

5.10.9 Landscape effects of the project depend on the existing character of the local landscape, its current quality, how highly it is valued and its capacity to accommodate change. All of these factors need to be considered in judging the impact of a project on landscape. Virtually all nationally significant energy infrastructure projects will have effects on the landscape. Projects need to be designed carefully, taking account of the potential impact on the landscape. Having regard to siting, operational and other relevant constraints the aim should be to minimise harm to the landscape, providing reasonable mitigation where possible and appropriate.

5.10.10 Applicants should consider how landscapes can be enhanced using landscape management plans, as this will help to enhance environmental assets where they contribute to landscape and townscape quality.

Development proposed within nationally designated landscapes

5.10.11 National Parks, the Broads and AONBs have been confirmed by the government as having the highest status of protection in relation to landscape and scenic beauty. Each of these designated areas has specific statutory purposes which help ensure their continued protection and which the Secretary of State should have regard to in their decisions.[114] The conservation of the natural beauty of the landscape and

113 The Seascape Character Assessments Guidance: https://www.gov.uk/government/publications/seascape-character-assessments-identify-and-describe-seascape-types; Marine plan seascape character assessments: https://www.gov.uk/government/publications/seascape-assessments-for-north-east-north-west-south-east-south-west-marine-plan-areas-mmo1134 and https://www.gov.uk/government/publications/seascape-assessment-for-the-south-marine-plan-areas-mmo-1037 and https://www.gov.uk/government/publications/east-marine-plan-areas-seascape-character-assessment

114 For an explanation of the duties which will apply to the Secretary of State, see 'Duties on relevant authorities to have regard to the purposes of National Parks, AONBs and the Norfolk and Suffolk Broads' at https://landscapesforlife.org.uk/application/files/2015/8928/8605/Duty_of_Regard_Guide_Defra_2005.pdf

countryside should be given substantial weight by the Secretary of State in deciding on applications for development consent in these areas.

5.10.12 Nevertheless, the Secretary of State may grant development consent in these areas in exceptional circumstances. The development should be demonstrated to be in the public interest[115] and consideration of such applications should include an assessment of:

- the need for the development, including in terms of national considerations[116], and the impact of consenting or not consenting it upon the local economy
- the cost of, and scope for, developing elsewhere outside the designated area or meeting the need for it in some other way, taking account of the policy on alternatives set out in Section 4.2
- any detrimental effect on the environment, the landscape and recreational opportunities, and the extent to which that could be moderated

5.10.13 The Secretary of State should ensure that any projects consented in these designated areas should be carried out to high environmental standards, including through the application of appropriate requirements where necessary.

Developments outside nationally designated areas which might affect them

5.10.14 The duty to have regard to the purposes of nationally designated areas also applies when considering applications for projects outside the boundaries of these areas which may have impacts within them. The aim should be to avoid compromising the purposes of designation and such projects should be designed sensitively given the various siting, operational, and other relevant constraints. This should include projects in England which may have impacts on National Scenic Areas in Scotland.

5.10.15 The fact that a proposed project will be visible from within a designated area should not in itself be a reason for refusing consent.

Developments in other areas

5.10.16 Outside nationally designated areas, there are local landscapes that may be highly valued locally and protected by local designation. Where a local development document in England or a local development plan in Wales has policies based on landscape or waterscape character assessment, these should be paid particular attention. However, local landscape designations should not be used in themselves to refuse consent, as this may unduly restrict acceptable development.

5.10.17 The scale of such projects means that they will often be visible within many miles of the site of the proposed infrastructure. The Secretary of State should judge whether

115 Section 15 of the NPPF applies a public interest test for major development in these designated areas.
116 National considerations should be understood to include the national need for the infrastructure as set out in Part 3 of this NPS and the contribution of the infrastructure to the national economy.

any adverse impact on the landscape would be so damaging that it is not offset by the benefits (including need) of the project.

5.10.18 In reaching a judgment, the Secretary of State should consider whether any adverse impact is temporary, such as during construction, and/or whether any adverse impact on the landscape will be capable of being reversed in a timescale that the Secretary of State considers reasonable.

5.10.19 The Secretary of State should consider whether the project has been designed carefully, taking account of environmental effects on the landscape and siting, operational and other relevant constraints, to minimise harm to the landscape, including by reasonable mitigation.

Visual impact

5.10.20 All proposed energy infrastructure is likely to have visual effects for many receptors around proposed sites. The Secretary of State will have to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors, such as visitors to the local area, outweigh the benefits of the project. Coastal areas are particularly vulnerable to visual intrusion because of the potential high visibility of development on the foreshore, on the skyline and affecting views along stretches of undeveloped coast.

5.10.21 It may be helpful for applicants to draw attention, in the supporting evidence to their applications, to any examples of existing permitted infrastructure they are aware of with a similar magnitude of impact on sensitive receptors. This may assist the Secretary of State in judging the weight they should give to the assessed visual impacts of the proposed development.

5.10.22 The Secretary of State should ensure applicants have taken into account the landscape and visual impacts of visible plumes from chimney stacks and/or the cooling assembly. It may be necessary to attach requirements to the consent requiring the incorporation of particular design details that are in keeping with the statutory and technical requirements.

Mitigation

5.10.23 Reducing the scale of a project can help to mitigate the visual and landscape effects of a proposed project. However, reducing the scale or otherwise amending the design of a proposed energy infrastructure project may result in a significant operational constraint and reduction in function - for example, the electricity generation output. There may, however, be exceptional circumstances, where mitigation could have a very significant benefit and warrant a small reduction in function. In these circumstances, the Secretary of State may decide that the benefits of the mitigation to reduce the landscape and/or visual effects outweigh the marginal loss of function.

5.10.24 Within a defined site, adverse landscape and visual effects may be minimised through appropriate siting of infrastructure within that site, design including colours and materials, and landscaping schemes, depending on the size and type of the proposed project. Materials and designs of buildings should always be given careful consideration.

5.10.25 Depending on the topography of the surrounding terrain and areas of population it may be appropriate to undertake landscaping off site. For example, filling in gaps in existing tree and hedge lines would mitigate the impact when viewed from a more distant vista.

5.11 Land Use, Including Open Space, Green Infrastructure, and Green Belt

Introduction

5.11.1 An energy infrastructure project will have direct effects on the existing use of the proposed site and may have indirect effects on the use, or planned use, of land in the vicinity for other types of development. Given the likely locations of energy infrastructure projects there may be particular effects on open space[117] including green infrastructure[118].

5.11.2 The government's policy is to ensure there is adequate provision of high quality open space (including green infrastructure) and sports and recreation facilities to meet the needs of local communities. Open spaces, sports and recreational facilities all help to underpin people's quality of life and have a vital role to play in promoting healthy living. Well designed and managed green infrastructure in particular, provides multiple benefits at a range of scales. It can contribute to health, wellbeing, biodiversity recovery, absorb surface water, cleanse pollutants and absorb noise and reduce high temperatures. It will also play an increasingly important role in mitigating or adapting to the impacts of climate change. The provision and enhancement of green infrastructure can improve air quality, particularly in urban areas. Applicants are therefore encouraged to consider how new green infrastructure can be provided, or how existing green infrastructure can be enhanced, as part of their application.

5.11.3 Although the re-use of previously developed land for new development can make a major contribution to sustainable development by reducing the amount of countryside

117 Open space is defined in the Town and Country Planning Act 1990 as land laid out as a public garden, or used for the purposes of public recreation, or land which is a disused burial ground. However, in applying the policies in this section, open space should be taken to mean all open space of public value, including not just land, but also areas of water such as rivers, canals, lakes and reservoirs which offer important opportunities for sport and recreation and can also act as a visual amenity.
118 Green infrastructure is a network of multi-functional green spaces, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities.

and undeveloped greenfield land that needs to be used, it may not be possible for many forms of energy infrastructure.

5.11.4 Green Belts, defined in a local authority's development plan[119], are situated around certain cities and large built-up areas. The fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the most important attribute of Green Belts is their openness. Green Belt land can play a positive role in providing access to sport and recreation facilities or access to the open countryside. For further information on the purposes of Green Belt policy see chapter 13 of the NPPF, or any successor to it.

Applicant's assessment

5.11.5 The ES (see Section 4.2) should identify existing and proposed[120] land uses near the project, any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan.

5.11.6 Applicants will need to consult the local community on their proposals to build on open space, sports or recreational buildings and land. Taking account of the consultations, applicants should consider providing new or additional open space including green infrastructure, sport or recreation facilities, to substitute for any losses as a result of their proposal. Applicants should use any up-to-date local authority assessment or, if there is none, provide an independent assessment to show whether the existing open space, sports and recreational buildings and land is surplus to requirements.

5.11.7 During any pre-application discussions with the applicant the LPA should identify any concerns it has about the impacts of the application on land use, having regard to the development plan and relevant applications and including, where relevant, whether it agrees with any independent assessment that the land is surplus to requirements.

5.11.8 Applicants should seek to minimise impacts on the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification) and preferably use land in areas of poorer quality (grades 3b, 4 and 5) except where this would be inconsistent with other sustainability considerations. Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination, and where contamination is present, applicants should consider opportunities for remediation where possible. Applicants are encouraged to develop and implement a Soil Management Plan which could help minimise potential land contamination.

119 Or else so designated under The Green Belt (London and Home Counties) Act 1938.
120 For example, where a planning application has been submitted.

5.11.9 Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place.

5.11.10 The general policies controlling development in the countryside apply with equal force in Green Belts but there is, in addition, a general presumption against inappropriate development within them. Such development should not be approved except in very special circumstances. Applicants should therefore determine whether their proposal, or any part of it, is within an established Green Belt and if it is, whether their proposal may be inappropriate development within the meaning of Green Belt policy (see paragraph 5.11.16 below).

5.11.11 However, infilling or redevelopment of major developed sites in the Green Belt, if identified as such by the local planning authority, may be suitable for energy infrastructure. It may help to secure jobs and prosperity without further prejudicing the Green Belt or offer the opportunity for environmental improvement. Applicants should refer to relevant criteria[121] on such developments in Green Belts.

5.11.12 An applicant may be able to demonstrate that a particular type of energy infrastructure, such as an underground pipeline, which, in Green Belt policy terms, may be considered as an “engineering operation” rather than a building is not in the circumstances of the application inappropriate development. It may also be possible for an applicant to show that the physical characteristics of a proposed overhead line development are such that it has no adverse effects which conflict with the fundamental purposes of Green Belt designation.

Secretary of State decision making

5.11.13 The Secretary of State should not grant consent for development on existing open space, sports and recreational buildings and land unless an assessment has been undertaken either by the local authority or independently, which has shown the open space or the buildings and land to be surplus to requirements or the Secretary of State determines that the benefits of the project (including need), outweigh the potential loss of such facilities, taking into account any positive proposals made by the applicant to provide new, improved or compensatory land or facilities. The loss of playing fields should only be allowed where applicants can demonstrate that they will be replaced with facilities of equivalent or better quantity or quality in a suitable location.

5.11.14 The Secretary of State should ensure that applicants do not site their scheme on the best and most versatile agricultural land without justification. Little weight should be given to the loss of poorer quality agricultural land (in grades 3b, 4 and 5), except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy.

121 See Section 13 of the NPPF, or any successor to it.

5.11.15 In considering the impact on maintaining coastal recreation sites and features, the Secretary of State should expect applicants to have taken advantage of opportunities to maintain and enhance access to the coast. In doing so the Secretary of State should consider the implications for development of the creation of a continuous signed and managed route around the coast, as provided for in the Marine and Coastal Access Act 2009.

5.11.16 When located in the Green Belt, energy infrastructure projects are likely to comprise 'inappropriate development'.[122] Inappropriate development is by definition harmful to the Green Belt and the general planning policy presumption against it applies with equal force in relation to major energy infrastructure projects. The Secretary of State will need to assess whether there are very special circumstances to justify inappropriate development. Very special circumstances will not exist unless the harm by reason of inappropriateness, and any other harm, is clearly outweighed by other considerations. In view of the presumption against inappropriate development, the Secretary of State will attach substantial weight to the harm to the Green Belt when considering any application for such development while taking account, in relation to renewable and linear infrastructure, of the extent to which its physical characteristics are such that it has limited or no impact on the fundamental purposes of Green Belt designation.

5.11.17 In Wales, 'green wedges' may be designated locally[123]. These enjoy the same protection as Green Belt in Wales and the Secretary of State should adopt a similar approach. Green wedges give the same protection as Green Belt in Wales. Green wedges do not convey the same level of permanence of a Green Belt and should be reviewed by the local authority as part of the development plan review process. As with Green Belt, there is a presumption against inappropriate development and the Secretary of State should assess whether there are very special circumstances to justify any proposed inappropriate development.

Mitigation

5.11.18 Although in the case of much energy infrastructure there may be little that can be done to mitigate the direct effects of an energy project on the existing use of the proposed site (assuming that some at least of that use can still be retained post project construction) applicants should nevertheless seek to minimise these effects and the effects on existing or planned uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction.

5.11.19 Where green infrastructure is affected, the Secretary of State should consider imposing requirements to ensure the functionality and connectivity of the green

122 Referred to in paragraph 147 of section 13 of the NPPF.
123 See Managing Settlement Form - Green Belts and Green Wedges, in Planning Policy Wales (Edition 11, February 2021), or any successor to it https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

infrastructure network is maintained in the vicinity of the development and that any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space including appropriate access to National Trails and other public rights of way and new coastal access routes.

5.11.20 The Secretary of State should also consider whether any adverse effects on green infrastructure and other forms of open space is adequately mitigated or compensated by means of any planning obligations, for example exchange land and provide for appropriate management and maintenance agreements. Any exchange land should be at least as good in terms of size, usefulness, attractiveness and quality, and accessibility. Alternatively, where sections 131 and 132 of the Planning Act 2008 apply, replacement land provided under those sections will need to conform to the requirements of those sections.

5.11.21 Where a proposed development has an impact upon a Mineral Safeguarding Area (MSA), the Secretary of State should ensure that appropriate mitigation measures have been put in place to safeguard mineral resources.

5.11.22 Where a project has a sterilising effect on land use (for example in some cases under transmission lines) there may be scope for this to be mitigated through, for example, using or incorporating the land for nature conservation or wildlife corridors or for parking and storage in employment areas.

5.11.23 Public Rights of way, National Trails and other rights of access to land are important recreational facilities for example for walkers, cyclists and horse riders. The Secretary of State should expect applicants to take appropriate mitigation measures to address adverse effects on coastal access, National Trails, other rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve or create new access. In considering revisions to an existing right of way, consideration should be given to the use, character, attractiveness and convenience of the right of way. The Secretary of State should consider whether the mitigation measures put forward by an applicant are acceptable and whether requirements or other provisions in respect of these measures should be included in any grant of development consent.

5.12 Noise and Vibration

Introduction

5.12.1 Excessive noise can have wide-ranging impacts on the quality of human life, health (for example owing to annoyance or sleep disturbance) and use and enjoyment of areas of value such as quiet places and areas with high landscape quality. The

Government's policy on noise is set out in the Noise Policy Statement for England.[124] It promotes good health and good quality of life through effective noise management. Similar considerations apply to vibration, which can also cause damage to buildings. In this section, in line with current legislation, references to "noise" below apply equally to assessment of impacts of vibration.

5.12.2 Noise resulting from a proposed development can also have adverse impacts on wildlife and biodiversity. Noise effects of the proposed development on ecological receptors should be assessed by the Secretary of State in accordance with the Biodiversity and Geological Conservation section of this NPS. This should consider underwater noise and vibration especially for marine developments.

5.12.3 Factors that will determine the likely noise impact include:

- the inherent operational noise from the proposed development, and its characteristics
- the proximity of the proposed development to noise sensitive premises (including residential properties, schools and hospitals) and noise sensitive areas (including certain parks and open spaces)
- the proximity of the proposed development to quiet places and other areas that are particularly valued for their soundscape or landscape quality
- the proximity of the proposed development to designated sites where noise may have an adverse impact on protected species or other wildlife

Applicant's assessment

5.12.4 Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:

- a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive, low frequency or temporal characteristics of the noise
- identification of noise sensitive receptors and noise sensitive areas that may be affected
- the characteristics of the existing noise environment
- a prediction of how the noise environment will change with the proposed development
    - in the shorter term, such as during the construction period
    - in the longer term, during the operating life of the infrastructure

124 https://www.gov.uk/government/publications/noise-policy-statement-for-england

    - at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year

- an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and well-being where appropriate, and noise-sensitive areas
- if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise
- measures to be employed in mitigating the effects of noise - applicants should consider using best available techniques to reduce noise impacts

5.12.5 The nature and extent of the noise assessment should be proportionate to the likely noise impact.

5.12.6 The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.

5.12.7 Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards[125] and other guidance. Further information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards[126] and other guidance which also give examples of mitigation strategies.

5.12.8 Some noise impacts will be controlled through environmental permits and parallel tracking is encouraged where noise impacts determined by an environmental permit interface with planning issues (i.e. physical design and location of development). The applicant should consult EA and/or the SNCB, as necessary, and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.

Secretary of State decision making

5.12.9 The project should demonstrate good design through selection of the quietest or most acceptable cost-effective plant available; containment of noise within buildings wherever possible, taking into account any other adverse impacts that such containment might cause e.g. on landscape and visual impacts; optimisation of plant layout to minimise noise emissions; and, where possible, the use of landscaping,

125 For example BS 4142, BS 6472 and BS 8233.
126 For example BS 5228.

bunds or noise barriers to reduce noise transmission. A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the NPPF, and the government's associated planning guidance on noise.

5.12.10 The Secretary of State should not grant development consent unless it is satisfied that the proposals will meet the following aims:

- avoid significant adverse impacts on health and quality of life from noise
- mitigate and minimise other adverse impacts on health and quality of life from noise
- where possible, contribute to improvements to health and quality of life through the effective management and control of noise

5.12.11 When preparing the development consent order, the Secretary of State should consider including measurable requirements or specifying the mitigation measures to be put in place to ensure that noise levels do not exceed any limits specified in the development consent. These requirements or mitigation measures may apply to the construction, operation, and decommissioning of the energy infrastructure development.

Mitigation

5.12.12 The Secretary of State should consider whether mitigation measures are needed both for operational and construction noise over and above any which may form part of the project application. In doing so the Secretary of State may wish to impose requirements. Any such requirements should take account of the guidance set out in the NPPF or any successor to it.

5.12.13 Mitigation measures may include one or more of the following**:**

- engineering: reduction of noise at point of generation and containment of noise generated
- lay-out: adequate distance between source and noise-sensitive receptors; incorporating good design to minimise noise transmission through screening by natural barriers, or other buildings
- administrative: restricting activities allowed on the site; specifying acceptable noise limits; and taking into account seasonality of wildlife in nearby designated sites

5.12.14 In certain situations, and only when all other forms of noise mitigation have been exhausted, it may be appropriate for the Secretary of State to consider requiring noise mitigation through improved sound insulation to dwellings.

5.13 Socio-Economic Impacts

Introduction

5.13.1 The construction, operation and decommissioning of energy infrastructure may have socio-economic impacts at local and regional levels. Parts 2 and 3 of this NPS set out some of the national level socio-economic impacts.

Applicant's assessment

5.13.2 Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the ES (see Section 4.2).

5.13.3 This assessment should consider all relevant socio-economic impacts, which may include:

- the creation of jobs and training opportunities**.** Applicants may wish to provide information on the sustainability of the jobs created, including where they will help to develop the skills needed for the UK's transition to Net Zero
- the contribution to the development of low-carbon industries at the local and regional level as well as nationally
- the provision of additional local services and improvements to local infrastructure, including the provision of educational and visitor facilities
- any indirect beneficial impacts for the region hosting the infrastructure, in particular in relation to use of local support services and supply chains
- effects on tourism
- the impact of a changing influx of workers during the different construction, operation and decommissioning phases of the energy infrastructure. This could change the local population dynamics and could alter the demand for services and facilities in the settlements nearest to the construction work (including community facilities and physical infrastructure such as energy, water, transport and waste). There could also be effects on social cohesion depending on how populations and service provision change as a result of the development
- cumulative effects - if development consent were to be granted to for a number of projects within a region and these were developed in a similar timeframe, there could be some short-term negative effects, for example a potential shortage of construction workers to meet the needs of other industries and major projects within the region

5.13.4 Applicants should describe the existing socio-economic conditions in the areas surrounding the proposed development and should also refer to how the development's socio-economic impacts correlate with local planning policies.

5.13.5 Socio-economic impacts may be linked to other impacts, for example the visual impact of a development is considered in Section 5.10 but may also have an impact on tourism and local businesses. Applicants are encouraged, where possible, to ensure local suppliers are considered in any supply chain.

5.13.6 Applicants should also consider developing accommodation strategies where appropriate, especially during construction and decommissioning phases, that would include for the need to provide temporary accommodation for construction workers if required.

Secretary of State decision making

5.13.7 The Secretary of State should have regard to the potential socio-economic impacts of new energy infrastructure identified by the applicant and from any other sources that the Secretary of State considers to be both relevant and important to its decision.

5.13.8 The Secretary of State may conclude that limited weight is to be given to assertions of socio-economic impacts that are not supported by evidence (particularly in view of the need for energy infrastructure as set out in this NPS).

5.13.9 The Secretary of State should consider any relevant positive provisions the applicant has made or is proposing to make to mitigate impacts (for example through planning obligations) and any legacy benefits that may arise as well as any options for phasing development in relation to the socio-economic impacts. The Secretary of State may wish to include a requirement that specifies the approval by the local authority of an employment and skills plan detailing arrangements to promote local employment and skills development opportunities, including apprenticeships, education, engagement with local schools and colleges and training programmes to be enacted.

Mitigation

5.13.10 The Secretary of State should consider whether mitigation measures are necessary to mitigate any adverse socio-economic impacts of the development. For example, high quality design can improve the visual and environmental experience for visitors and the local community alike.

5.14 Traffic and Transport

Introduction

5.14.1 The transport of materials, goods and personnel to and from a development during all project phases can have a variety of impacts on the surrounding transport

infrastructure and potentially on connecting transport networks, for example through increased congestion. Impacts may include economic, social and environmental effects. Environmental impacts may result particularly from increases in noise and emissions from road transport. Disturbance caused by traffic and abnormal loads generated during the construction phase will depend on the scale and type of the proposal.

5.14.2 The consideration and mitigation of transport impacts is an essential part of Government's wider policy objectives for sustainable development as set out in Section 2.6 of this NPS.

Applicant's assessment

5.14.3 If a project is likely to have significant transport implications, the applicant's ES (see Section 4.2) should include a transport assessment, using the NATA/WebTAG[127] methodology stipulated in Department for Transport DfT) guidance[128], or any successor to such methodology. Applicants should consult the Highways England and Highways Authorities as appropriate on the assessment and mitigation.

5.14.4 Where appropriate, the applicant should prepare a travel plan including demand management measures to mitigate transport impacts. The applicant should also provide details of proposed measures to improve access by public transport, walking and cycling, to reduce the need for parking associated with the proposal and to mitigate transport impacts. The assessment should also consider any possible disruption to services and infrastructure (such as road, rail and airports).

5.14.5 If additional transport infrastructure is proposed, applicants should discuss with network providers the possibility of co-funding by Government for any third-party benefits. Guidance has been issued[129] which explains the circumstances where this may be possible, although the Government cannot guarantee in advance that funding will be available for any given uncommitted scheme at any specified time.

Secretary of State decision making

5.14.6 A new energy NSIP may give rise to substantial impacts on the surrounding transport infrastructure and the Secretary of State should therefore ensure that the applicant has sought to mitigate these impacts, including during the construction phase of the development. Where the proposed mitigation measures are insufficient to reduce the impact on the transport infrastructure to acceptable levels, the Secretary of State should consider requirements to mitigate adverse impacts on transport networks

127 WelTag in Wales: https://gov.wales/welsh-transport-appraisal-guidance-weltag
128 Guidance on transport assessments is at http://www.dft.gov.uk/pgr/regional/transportassessments/guidanceonta and (for Wales) at: https://gov.wales/welsh-transport-appraisal-guidance-weltag
129 https://www.gov.uk/government/publications/transport-investment-strategy, For Wales, refer to the guidance note regarding Transport Grants or any successor to it: https://gov.wales/sites/default/files/publications/2020-01/local-transport-grants-guidance-2020-to-2021.pdf

arising from the development, as set out below. Applicants may also be willing to enter into planning obligations for funding infrastructure and otherwise mitigating adverse impacts.

5.14.7 Provided that the applicant is willing to enter into planning obligations or requirements can be imposed to mitigate transport impacts identified in the NATA/WebTAG transport assessment, with attribution of costs calculated in accordance with the DfT's guidance, then development consent should not be withheld, and appropriately limited weight should be applied to residual effects on the surrounding transport infrastructure.

5.14.8 The Secretary of State should only consider preventing or refusing development on highways grounds if there would be an unacceptable impact on highway safety, or residual cumulative impacts on the road network would be severe.

Mitigation

5.14.9 Where mitigation is needed, possible demand management measures must be considered and if feasible and operationally reasonable, required, before considering requirements for the provision of new inland transport infrastructure to deal with remaining transport impacts.

5.14.10 The Secretary of State should have regard to the cost-effectiveness of demand management measures compared to new transport infrastructure, as well as the aim to secure more sustainable patterns of transport development when considering mitigation measures.

5.14.11 Water-borne or rail transport is preferred over road transport at all stages of the project, where cost-effective. Applicants should consider the DfT policy guidance "Water Preferred Policy Guidelines for the movement of abnormal indivisible loads" when preparing their Application.[130]

5.14.12 The Secretary of State may attach requirements to a consent where there is likely to be substantial HGV traffic that:

- control numbers of HGV movements to and from the site in a specified period during its construction and possibly on the routing of such movements
- make sufficient provision for HGV parking, either on the site or at dedicated facilities elsewhere, to avoid 'overspill' parking on public roads, prolonged queuing on approach roads and uncontrolled on-street HGV parking in normal operating conditions
- ensure satisfactory arrangements for reasonably foreseeable abnormal disruption, in consultation with network providers and the responsible police force

130 https://www.gov.uk/government/publications/movement-of-abnormal-loads-by-water

5.14.13 If an applicant suggests that the costs of meeting any obligations or requirements would make the proposal economically unviable this should not in itself justify the relaxation by the Secretary of State of any obligations or requirements needed to secure the mitigation.

5.15 Resource and Waste Management

Introduction

5.15.1 Government policy on hazardous and non-hazardous waste is intended to protect human health and the environment by producing less waste and by using it as a resource wherever possible. Where this is not possible, waste management regulation ensures that waste is disposed of in a way that is least damaging to the environment and to human health.

5.15.2 Sustainable waste management is implemented through the "waste hierarchy", which sets out the priorities that must be applied when managing waste[131]:

a) prevention
b) preparing for reuse
c) recycling
d) other recovery, including energy recovery
e) disposal

5.15.3 Disposal of waste should only be considered where other waste management options are not available or where it is the best overall environmental outcome.

5.15.4 All large infrastructure projects are likely to generate hazardous and non-hazardous waste. The EA's EP regime incorporates operational waste management requirements for certain activities. When an applicant applies to the EA for an EP, the EA will require the application to demonstrate that processes are in place to meet all relevant EP requirements.

5.15.5 Specific considerations with regard to radioactive waste are set out in Section 2.11 and Annex B of EN-6. The present section will apply to non-radioactive waste for nuclear infrastructure as for other energy infrastructure.

Applicant's assessment

5.15.6 The applicant should set out the arrangements that are proposed for managing any waste produced and prepare a Site Waste Management Plan. The arrangements described and Management Plan should include information on the proposed waste recovery and disposal system for all waste generated by the development, and an assessment of the impact of the waste arising from development on the capacity of

131 The Waste Hierarchy is set out in The Waste (England and Wales) Regulations 2011.

waste management facilities to deal with other waste arising in the area for at least five years of operation. The applicant is encouraged to refer to the Waste Prevention Programme for England, and should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental outcome. If the applicant's assessment includes dredged material, the assessment should also include other uses of such material before disposal to sea, for example through re-use in the construction process.

5.15.7 Where possible, applicants are encouraged to source materials from recycled or reused sources and use low carbon materials, sustainable sources and local suppliers. Construction best practices should be used to ensure that material is reused or recycled onsite where possible.

5.15.8 Applicants are also encouraged to use construction best practices in relation to storing materials in an adequate and protected place on site to prevent waste, for example, from damage or vandalism. The use of Building Information Management tools (or similar) to record the materials used in construction can help to reduce waste in future decommissioning of facilities, by identifying materials that can be recycled or reused.

Secretary of State decision making

5.15.9 The Secretary of State should consider the extent to which the applicant has proposed an effective system for managing hazardous and non-hazardous waste arising from the construction, operation and decommissioning of the proposed development. The Secretary of State should be satisfied that:

- any such waste will be properly managed, both on-site and off-site
- the waste from the proposed facility can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area
- adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal, except where that is the best overall environmental outcome

5.15.10 Where necessary, the Secretary of State should use requirements or obligations to ensure that appropriate measures for waste management are applied. The Secretary of State may wish to include a condition on revision of waste management plans at reasonable intervals when giving consent.

5.15.11 Where the project will be subject to the EP regime, waste management arrangements during operations will be covered by the permit and the considerations set out in Section 4.11 will apply.

5.16 Water Quality and Resources

Introduction

5.16.1 Infrastructure development can have adverse effects on the water environment, including groundwater, inland surface water, transitional waters[132] and coastal waters. During the construction, operation and decommissioning phases, it can lead to increased demand for water, involve discharges to water and cause adverse ecological effects resulting from physical modifications to the water environment. There may also be an increased risk of spills and leaks of pollutants to the water environment. These effects could lead to adverse impacts on health or on protected species and habitats (see Section 4.2) and could, in particular, result in surface waters, groundwaters or protected areas[133] failing to meet environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and the Marine Strategy Regulations 2010[134].

Applicant's assessment

5.16.2 Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent (see Section 4.2).

5.16.3 Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation.

5.16.4 Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in Water Resource Management Plans - this could include, for example, the use of protective barriers.

5.16.5 The ES should in particular describe:

132 As defined in the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, transitional waters are bodies of surface water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.
133 Protected areas are areas which have been designated as requiring special protection under specific legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water.
134 https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/522426/LIT_10445.pdf; see PINS advice: https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2017/06/advice_note_18.pdf

- the existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges
- existing water resources[135] affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed changes to abstraction rates (including any impact on or use of mains supplies and reference to Catchment Abstraction Management Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance
- existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics
- any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions

Secretary of State decision making

5.16.6 Activities that discharge to the water environment are subject to pollution control. The considerations set out in Section 4.11 on the interface between planning and pollution control therefore apply. These considerations will also apply in an analogous way to the abstraction licensing regime regulating activities that take water from the water environment, and to the control regimes relating to works to, and structures in, on, or under a controlled water.[136]

5.16.7 The Secretary of State will generally need to give impacts on the water environment more weight where a project would have an adverse effect on the achievement of the environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

5.16.8 The Secretary of State should be satisfied that a proposal has regard to the River Basin Management Plans and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (including regulation 19). The specific objectives for particular river basins are set out in River Basin Management Plans. In terms of Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 compliance, the overall aim of development should be to prevent deterioration in status of water bodies to support the achievement of the objectives in the River Basin Management Plans and not to jeopardise the future achievement of good status for any affected water bodies. If the development is considered likely to cause deterioration of water body status or to

135 See the Water Resources planning guideline: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline
136 Controlled waters include all watercourses, lakes, lochs, coastal waters, and water contained in underground strata.

prevent the achievement of good groundwater status or of good ecological status potential compliance with regulation 19 of the Water Environment (Water Framework Directive) (England and Wales) 2017 must be demonstrated.

5.16.9 The Secretary of State should also consider the interactions of the proposed project with other plans such as Water Resources Management Plans and Shoreline/Estuary Management Plans.

5.16.10 The Secretary of State should consider whether appropriate requirements should be attached to any development consent and/or planning obligations entered into to mitigate adverse effects on the water environment.

Mitigation

5.16.11 The Secretary of State should consider whether mitigation measures are needed over and above any which may form part of the project application (see Sections 4.2 and 5.1). A construction management plan may help codify mitigation at that stage.

5.16.12 The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked.

5.16.13 The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If an applicant needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA or NRW.

6 Glossary

This glossary sets out the most frequently used terms in this NPS. There is a glossary in each of the energy NPSs. The glossary set out in each of the technology specific NPS may also be useful when reading this NPS.

AA	Appropriate Assessment
ACTs	Advanced Conversion Technologies
AD	Anaerobic Digestion
AoS	Appraisal of Sustainability
Associated development	Associated development as defined in Section 115 of the Planning Act 2008
BAT	Best Available Technique
BECCS	Bioenergy with Carbon Capture and Storage
BEIS	Department for Business, Energy and Industrial Strategy
Biomass	Material of recent biological origin derived from plant or animal matter
CAA	Civil Aviation Authority
CCA	Climate Change Act 2008
CCC	Climate Change Committee
CCGT	Combined Cycle Gas Turbine
CCS	Carbon Capture and Storage
CCR	Carbon Capture Readiness
CCUS	Carbon, Capture, Utilisation and Storage
CfD	Contracts for Difference
CHP	Combined Heat and Power
CM	Capacity Market
CNS	Communications, navigation and surveillance infrastructure
Co-firing	Use of two fuel types (e.g. coal and biomass) in a thermal generating station
CO_2	Carbon dioxide
COMAH	Control of Major Accident Hazards

CPS	Carbon Price Support
DACCS	Direct Air Carbon Capture and Storage
DECC	Department of Energy and Climate Change, replaced by BEIS in 2016
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
“Dispatchable” power	Sources of electricity that can be supplied (turned on or off) by operators at the request of power grid operators, in contrast to intermittent power sources that cannot be similarly controlled.
DNO	Distribution Network Operator
EA	Environment Agency
EEZ	Exclusive Economic Zone
EfW	Energy from Waste – combustion of waste material to provide electricity and/or heat
EIA	Environmental Impact Assessment
EP	Environmental Permit
EPR	Environmental Permitting Regulations
EPS	Emissions Performance Standards
ES	Environmental Statement
ESO	Electricity Systems Operator
FRA	Flood Risk Assessment
GB	Great Britain
Generic Impacts	Potential impacts of any energy infrastructure projects, the general policy for consideration of which is set out in Part 5 of EN-1
GGSS	Green Gas Support Scheme
GHG	Greenhouse Gas
Gt	Gigatonne = one billion tonnes
GVA	Gross Value Added
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017

HRA	Habitats Regulations Assessment
HRA site	One of the sites set out in paragraph 5.4.8 for which an HRA will assess the implications of a plan or project
HSE	Health and Safety Executive
LNG	Liquefied Natural Gas
LPAs	Local Planning Authorities
MCZs	Marine Conservation Zone: areas that protect a range of nationally important, rare or threatened habitats and species. MCZs are established under section 116(1) of the Marine and Coastal Access Act 2009
MHCLG	Ministry for Housing, Communities and Local Government
MMO	Marine Maritime Organisation established under the Marine and Coastal Access Act 2009
MoD	Ministry of Defence
MPS	Marine Policy Statement
MW	Megawatt = one million watts
Nameplate capacity	The rated output of the unit/station at the generator, and therefore includes station own use (parasitic power), and any other consumption/loss prior to despatch to the grid, local network, industrial site or similar transmission system
NDC	Nationally determined contribution
NETSO	National Electricity Transmission System Operator
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NRW	Natural Resources Wales
NSIP	Nationally significant infrastructure project
OCGT	Open Cycle Gas Turbine
OHL	Overhead electricity line carried on poles or pylons
OLS	Obstacle limitation surfaces
pfa	Pulverised fuel ash; fine ash from the use of finely crushed coal in fossil fuel generating stations

PPG	Planning Practice Guidance issued by MHCLG
PSZs	Public Safety Zones
REZ	The Renewable Energy Zone
RHI	Renewable Heat Incentive
SEA	Strategic Environmental Assessment (under the Environmental Assessment of Plans and Programmes Regulations 2004)
SMPs	Shoreline Management Plans
SNCBs	Statutory Nature Conservation Bodies
Substation	An assembly of equipment in an electric power system through which electric energy is passed for transmission, transformation, distribution, or switching
TAN	Technical Advice Notes regarding planning in Wales
Technical feasibility	Whether it is possible to build and operate a proposed development according to its design parameters
Thermal Generating Station	Electricity generating station that uses a heat source (combustion of fuel or nuclear) to create steam that drives a generating turbine or which uses gas directly to drive a generating turbine
TSO	Transmission System Operator
TTAs	Tactical Training Areas
UKCS	United Kingdom Continental Shelf
UK ETS	UK Emissions Trading Scheme

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APPENDIX 2

DRAFT NATIONAL POLICY STATEMENT FOR

RENEWABLE ENERGY INFRASTRUCTURE (EN-3)

Department for
Business, Energy
& Industrial Strategy

Draft National Policy Statement for Renewable Energy Infrastructure (EN-3)

September 2021

Any enquiries regarding this publication should be sent to us at:
enquiries@beis.gov.uk

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1 Introduction

1.1 Background

1.1.1 Electricity generation from renewable sources of energy is an essential element of the transition to net zero. Our analysis suggests that demand for electricity is likely to increase significantly over the coming years and could more than double by 2050. This could require a fourfold increase in low carbon electricity generation, with most of this likely to come from renewables.[1]

1.1.2 This National Policy Statement (NPS), taken together with the Overarching National Policy Statement for Energy (EN-1), provides the primary policy for decisions by the Secretary of State on applications they receive for nationally significant renewable energy infrastructure defined at Section 1.6 of this NPS. The way in which NPSs guide Secretary of State decision-making, and the matters which the Secretary of State is required by the Planning Act 2008 to take into account in considering applications, are set out in Sections 1.1 and 4.1 of EN-1.

1.1.3 Applicants should, therefore, ensure that their applications and any accompanying supporting documents and information are consistent with the instructions and guidance in this NPS, EN-1 and any other NPSs that are relevant to the application in question.

1.1.4 This NPS may be helpful to local planning authorities (LPAs) in preparing their local impact reports.

1.2 Role of this NPS in the wider planning system

1.2.1 In England and Wales this NPS may be a material consideration in decision making on applications that fall under the Town and Country Planning Act 1990 (as amended). Whether, and to what extent, this NPS is a material consideration will be judged on a case by case basis and will depend upon the extent to which the matters are already covered by applicable planning policy.

1.2.2 The Secretary of State may also receive applications for variations to existing consents for electricity generation infrastructure under section 36C of the Electricity Act 1989 for which this NPS may be a relevant consideration.

1.2.3 Paragraphs 1.2.3 and 4.4 of EN-1 provide details of how this NPS may be relevant to the decisions of the Marine Management Organisation (MMO) and

[1] https://www.gov.uk/government/publications/modelling-2050-electricity-system-analysis

how the Marine Policy Statement (MPS) may be relevant to the Secretary of State in decision making.

1.2.4 The MMO, as provided for in the Marine and Coastal Access Act 2009, will determine applications under section 36 and section 36A of the Electricity Act 1989 relating to any generating station in waters adjacent to England and Wales or in the UK Renewable Energy Zone (REZ) (except the Scottish part) that does not exceed the capacity threshold set out in the Planning Act 2008. The MMO will determine applications in accordance with the MPS and any applicable Marine Plans, unless relevant considerations indicate otherwise.

1.3 Relationship with EN-1

1.3.1 This NPS is part of a suite of energy NPSs. It should be read in conjunction with EN-1, which covers:

- the high level objectives, policy and regulatory framework for new nationally significant infrastructure projects that are covered by the suite of energy NPSs and any associated development (referred to as energy NSIPs)
- the need and urgency for new energy infrastructure to be consented and built to ensure our supply of energy always remains secure, reliable, affordable, and consistent with net zero emissions in 2050 for a wide range of future scenarios
- the need to meet our carbon budgets and Nationally Determined Contributions (NDCs), and support the government's policies on sustainable development, in-particular by mitigating and adapting to climate change
- the need for specific technologies, including the infrastructure covered by this NPS
- the key principles to be followed in the examination and determination of applications
- the role of the Appraisal of Sustainability (AoS) in relation to the suite of energy NPSs
- policy on good design, climate change adaptation and other matters relevant to more than one technology specific NPS
- the assessment and handling of generic impacts that are not specific to particular technologies.

1.3.2 This NPS does not seek to repeat the material set out in EN-1, which applies to all applications covered by this NPS unless stated otherwise. The reasons for policy that is specific to the energy infrastructure covered by this NPS are given, but where EN-1 sets out the reasons for general policy these are not repeated.

1.4 Geographical coverage

1.4.1 This NPS, together with EN-1, is the primary decision-making policy document for the Secretary of State on nationally significant onshore renewable energy infrastructure projects in England and Wales and nationally significant offshore renewable energy projects in waters in or adjacent to England or Wales up to the seaward limits of the territorial sea or in the UK Renewable Energy Zone (REZ) (defined in section 84 (4) of the Energy Act 2004), except any part of a REZ in relation to which Scottish Ministers have functions.

1.4.2 The Secretary of State will only examine electricity generating stations in Wales or in territorial waters adjacent to Wales if their capacity is greater than 350 megawatts (MW).

1.4.3 In Scotland, the Secretary of State will not examine applications for nationally significant generating stations or electricity network infrastructure. However, energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland.

1.4.4 In Northern Ireland, planning consents for all nationally significant infrastructure projects are devolved to the Northern Ireland Executive, so the Secretary of State will not examine applications for energy infrastructure in Northern Ireland and the NPS will not apply there.

1.5 Period of validity and review

1.5.1 This NPS will remain in force in its entirety unless withdrawn or suspended in whole or in part by the Secretary of State. It will be subject to review by the Secretary of State to ensure that it remains appropriate. Information on the review process is set out in paragraphs 10 to 12 of the Annex to Communities and Local Government (CLG's) letter of 9 November 2009[2] and the Ministry for Housing, Communities and Local Government (MHCLG) guidance on Review of NPSs.[3]

1.5.2 For transitional provisions following review, see paragraph 1.6 of EN-1.

[2] https://www.gov.uk/guidance/planning-guidance-letters-to-chief-planning-officers
[3] https://www.gov.uk/guidance/planning-act-2008-guidance-on-the-process-for-carrying-out-a-review-of-existing-national-policy-statements

1.6 Infrastructure covered by this NPS

1.6.1 This NPS covers the following types of nationally significant renewable energy infrastructure:

- energy from biomass and/or waste (EfW) (>50 MW in England and >350MW in Wales)
- pumped hydro storage (>50 MW in England and >350MW in Wales)
- solar photovoltaic (PV) (>50 MW in England and >350MW in Wales)
- offshore wind (>100MW in England and >350MW in Wales)
- tidal stream (>100MW in England and >350MW in Wales)

1.6.2 In England, this NPS will also apply to renewable generation proposals of the types listed above, whose capacity is below the relevant threshold, which are directed into the NSIP regime under section 35 of the Planning Act 2008

1.6.3 This NPS does not cover onshore wind[4]. This NPS does not cover other types of renewable energy generation that are not at present technically viable over 50MW onshore, or over 100MW offshore. When it appears that other renewables technologies will be economically and technically viable over 50MW, the government will consider either revisions to this NPS or separate NPSs to cover such technologies.

1.7 Appraisal of Sustainability and Habitats Regulation Assessment[5]

1.7.1 All the energy NPSs have been subject to an Appraisal of Sustainability (AoS), as required by the Planning Act 2008. The AoSs also incorporate the analysis of likely significant environmental effects required by the Strategic Environmental Assessment (SEA) Regulations (The Environmental Assessment of Plans and Programmes) 2004.

1.7.2 The purposes and methods of the AoSs are explained in the draft of the AoS for EN-1 (AoS-1) which is published alongside this document. Their primary function is to inform consultation on the draft NPSs by providing an analysis of the environmental, social and economic impacts of implementing the energy NPSs. The key findings from AoS-1 are included in EN-1

[4] Onshore wind farm planning applications are determined in accordance with the Town and Country Planning Act
[5] Appraisal of Sustainability for the Revised Draft Electricity Networks available at http://www.energynpsconsultation.decc.gov.uk

1.7.3 In addition to those generic effects identified through the AoS and reported in AoS-1, a number of specific effects relating to EN-3 were identified, due to the type of technology promoted under this NPS.

1.7.4 Key points from the AoS for EN-3 (AoS-3) are:

- Renewable energy infrastructure development has similar effects to other types of energy infrastructure. Solar, biomass or energy from waste facilities will occupy land and as such potentially result in a whole range of terrestrial impacts. Offshore wind will, conversely, have impacts on marine and coastal environments.
- For the majority AoS objectives, the strategic effects of EN-3 are considered to match those identified in AoS-1.
- However, associated with additional detail provided about the Technologies in EN-3, non-generic effects were considered for eight AoS objectives (Carbon Emissions, Biodiversity, Water Environment, Landscape / Seascape, Air Quality, Health, Economy and Resources). The non-generic effects have been found to be generally negative across short, medium and long terms, though there are some elements of positivity in respect of the need to promote sustainable use of resources and natural assets.
- Consistency with the national target of reducing carbon emissions to Net Zero by 2050 is considered significantly negative over the short, medium and long terms for Energy from Waste, reflecting residual emissions from waste combustion plants, where carbon capture technologies are not used.
- Significant effects from renewable technologies can potentially affect biodiversity, landscape/ seascape, noise, commercial fishing, and commercial navigation routes. However, the effects are uncertain at this level of appraisal, as the actual effects are dependent on the sensitivity of the environment and the location and design of infrastructure.
- There are, however, a few positive specific effects associated with the technologies. Positive effects may occur on the fishing industry from offshore wind farms; on biodiversity from solar farms, where land is no longer managed intensively; on biodiversity from pumped hydro storage schemes, as a result of habitat creation and fish re-stocking; and on resources where residues from biomass or energy from plants can be recovered and re-used rather than being sent to landfill.
- Uncertainty is associated with this assessment, as at this level of appraisal, actual effects are dependent on the sensitivity of the environment and the location and design of infrastructure.

1.7.5 As required by the SEA Regulations, an assessment of reasonable alternatives has also been carried out in respect of EN-3. The alternative assessed against EN-3 was: only consent biomass or waste combustion plant with Combined Capture and Storage (CCS).

1.7.6 The key difference between this alternative and EN-3 would seem to be beneficial for the achievement of net zero, due to reduction of emissions from energy from waste and negative emissions through BECCS. This assessment is highly uncertain and would depend on what happens to the waste if not used within the power sector (as energy recovery from residual waste has a lower greenhouse gas impact than landfill) and the extent to which biomass may be more cost effective in decarbonising other sectors (such as heat and transport) over the long-term.

1.7.7 However, the use of carbon capture and storage with biomass and energy from waste could present a more sustainable alternative than the policies set out in EN-1 and EN-3, if implemented in a way which minimises unintended consequences. As set out in the Energy White Paper, published in December 2020, the government is committed to consult on proposals to update the Carbon Capture Readiness requirements to reflect technological advances, such as conversion to low carbon hydrogen and apply them more broadly, by removing the 300MW threshold and including all combustion technologies within scope. If that consultation leads to changes in the relevant legal or policy framework then those new requirements will apply and this NPS will be updated to reflect any revised requirements ahead of designation

Habitats Regulation Assessments

1.7.8 Habitats Regulation Assessments (HRA) have also been carried out and published for the non-locationally specific NPSs EN-1 to EN-5. As EN-1 to EN-5 do not specify locations for energy infrastructure, the HRA is a high-level strategic overview. Although the lack of spatial information within the EN-1 to EN-5 made it impossible to reach certainty on the effect of the plan on the integrity of any HRA Site, the potential for proposed energy infrastructure projects of the kind contemplated by EN-1 to EN-5 to have adverse effects on the integrity of such sites cannot be ruled out, based on following the precautionary principle. The HRA explains why the government considers that EN-1 to EN-5 are, nevertheless, justified by imperative reasons of overriding public interest, while noting that its conclusions are only applicable at the NPS level and are without prejudice to any project-level HRA, which may result in the refusal of consent for a particular application.

2 Assessment and Technology Specific Information

2.1 Introduction

2.1.1 Part 4 of EN-1 sets out the general principles that should be applied in the assessment of development consent applications across the range of energy technologies. Part 5 of EN-1 sets out policy on the assessment of impacts which are common across a range of these technologies (generic impacts). This NPS is concerned with impacts and other matters which are specific to biomass and EfW, offshore wind energy, pumped hydro storage, solar PV and tidal stream energy or where, although the impact or issue is generic and covered in EN-1, there are further specific considerations arising from the technologies covered here.

2.1.2 The policies set out in this NPS are additional to those on generic impacts set out in EN-1 and do not replace them. The Secretary of State should consider this NPS and EN-1 together. In particular, EN-1 sets out the Government's conclusion that there is a significant need for new major energy infrastructure (see Section 3 of EN-1). EN-1 Section 3.3 includes assessments of the need for new major renewable electricity infrastructure. In the light of this, the Secretary of State should act on the basis that the need for infrastructure covered by this NPS has been demonstrated.

2.1.3 Factors influencing site selection by developers for renewable energy generating stations are set out below. These are not a statement of government policy, but are included to provide the Secretary of State and others with background information on the criteria that applicants consider when choosing a site. The specific criteria considered by applicants and the weight they give to them will vary from project to project. The choices which energy companies make in selecting sites reflect their assessment of the risk that the Secretary of State, following the general points set out in Section 4.1 of EN-1, will not grant consent in any given case. It is for energy companies to decide what applications to bring forward and the government does not seek to direct applicants to particular sites for renewable energy infrastructure other than in the specific circumstances described in this document in relation to offshore wind.

2.2 Relationship with English and Welsh renewables policies

2.2.1 Policy set out in existing planning guidance in England, and for any proposed project located in Wales in relevant planning policy and advice issued by the

Welsh Assembly Government, will provide important information to applicants of nationally significant energy infrastructure projects (energy NSIPs). The Secretary of State should have regard to these policies and expect applicants to have taken them into account when working up their proposals. Applicants should explain in their applications to the Secretary of State how their proposals fit with the guidance and support its targets or, alternatively, why they depart from them. Whether an application conforms to the guidance or the targets will not, in itself, be a reason for approving or rejecting the application.

2.3 Climate change adaptation

2.3.1 Part 2 of EN-1 covers the government's energy and climate change strategy, including policies for mitigating climate change. Section 4.9 of EN-1 sets out generic considerations that applicants and the Secretary of State should take into account to help ensure that renewable energy infrastructure is safe and resilient to climate change, and that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.

2.3.2 Biomass generating stations are likely to be proposed for coastal or estuarine sites where climate change is likely to increase risks from flooding or rising sea levels, for example. In such cases applicants should, in particular, set out how the proposal would be resilient to:

- the effects of rising sea levels and increased risk from storm surge
- increased risk of flooding
- impact of higher temperatures
- increased risk of drought affecting river flows

2.3.3 EfW generating stations may also require significant water resources, but are less likely to be proposed for coastal sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:

- increased risk of flooding
- increased risk of drought affecting river flows

2.3.4 Solar PV sites may also be proposed in low lying exposed sites. For these proposals, applicants should consider, in particular, how plant will be resilient to:

- increased risk of flooding
- impact of higher temperatures

2.3.5 Offshore wind farms will not be affected by flooding, but applicants should particularly set out how the proposal would be resilient to storms.

2.3.6 Section 4.9 of EN-1 advises that the resilience of the project to climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, the impact of increased risk of drought as a result of higher temperatures should be covered in the water quality and resources section of the ES.

2.4 Consideration of “good design” for energy infrastructure

2.4.1 The Planning Act 2008 requires the Secretary of State to have regard, in designating an NPS, to the desirability of good design. Section 4.6 of EN-1 sets out the criteria for good design that should be applied to all energy infrastructure.

2.4.2 Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology.

Biomass and Waste Combustion

2.5 Biomass and waste combustion: introduction

2.5.1 The combustion of biomass (fuels of recent biological origin as described in paragraph 2.6.1 below) for electricity generation plays an important role in meeting the UK's energy needs and supports the decarbonisation of the sector. It also has a potentially significant role in supporting delivery towards the UK's net zero target when combined with carbon capture and storage.

2.5.2 In accordance with the waste hierarchy[6], the recovery of energy from the combustion of waste, plays an important role in meeting the UK's energy needs. Furthermore, the recovery of energy from the combustion of waste forms an important element of waste management strategies in both England and Wales.

2.5.3 The combustion generating stations covered by this NPS are those which generate electricity:

- using waste (possibly including non-renewable sources of waste) and/or biomass as a fuel
- generate more than 50MW of electricity in England or 350MW in Wales.

2.5.4 Biomass/EfW generating stations can be configured to produce Combined Heat and Power (CHP). Details of CHP criteria are set out in Section 4.7 of EN-1. Biomass generating stations should also be Carbon Capture Ready (CCR) and/or have Carbon Capture and Storage (CCS) technology applied.

2.5.5 Details of the government's policy on CCR and CCS is set out in Section 4.8 of EN-1. There is further information on CCR/CCS for biomass in this NPS.

2.6 Biomass and waste combustion impacts: fuels

2.6.1 Biomass is material of recent biological origin derived from plant or animal matter. The biomass used for heat and power usually falls into one or more of three categories:

- biomass derived from forest residues as co-products of conventional forestry management. This includes forest products generated during thinning, felling and coppicing of sustainably managed forests, parklands and trees from other green spaces. It also includes sawmill residues (often processed to produce wood

[6] Waste hierarchy as set out in Regulation 12 of the Waste (England and Wales) Regulations 2011, and also see Section 5.15 of EN-1.

pellets), other wood processing residues and parts of trees unsuitable for the timber industry

- biomass from agricultural crops and residues. This includes crops grown primarily for use in energy generation ('energy crops'), 'woody' energy crops such as short rotation coppice (SRC), or miscanthus grass which can be grown on land unsuitable for food crops. Biomass can also be sourced from agricultural residues such as straw, husks and kernels
- biomass from biodegradable waste and other similar materials including sewage sludge, animal manure, waste wood from construction, the biodegradable fraction of mixed municipal waste, and food waste that would otherwise be disposed of in landfill

2.6.2 The social, environmental and economic case for widespread deployment of biomass-fuelled plant depends on the sustainability of fuel used in it. The Renewables Obligation (RO)[7], administered by the Office of Gas and Electricity Markets (Ofgem) and the Contracts for Difference (CfD) scheme are the main support mechanisms for renewable electricity in the UK. Further detail on the CfD scheme is set out in paragraph 2.4.2 in EN-1. In order to receive incentives under these two schemes, and for their output to count towards the UK's renewable energy targets, plants fuelled by biomass must use fuel which meets certain sustainability criteria. These criteria are set out in the relevant Renewables Obligation Order, in the case of the RO, and in the contract for the CfD scheme, and reporting against them is mandatory.

2.6.3 The sustainability criteria include a minimum greenhouse gas (GHG) emissions saving and general restrictions on the use of materials from land that is important on carbon or biodiversity grounds, such as primary forest, highly biodiverse grasslands or peatlands and, for woody biomass, a requirement that the forests are managed sustainably. Assessment of the GHG emissions will take account of emissions associated with cultivation, processing and transport of biomass for electricity generation and direct land use change. The criteria apply to both domestic and imported material.

2.6.4 Sustainability of the biomass or bioliquid fuel that a biomass or bioliquid-fuelled generating station will burn is a relevant and important consideration for the Secretary of State in deciding on any development consent applications. The sustainability criteria will apply to both new and existing generating stations to the extent that they claim renewable electricity support. The RO and CfD regimes (and any successor to them) are critical elements in the business case of most biomass and bioliquid plants, so that in any given case the incentive effect of linking the support to the satisfaction of sustainability criteria may constitute an entirely adequate control on the

[7] The Renewables Obligations closed to all new generating capacity on 31 March 2017. https://www.ofgem.gov.uk/environmental-programmes/ro/about-ro/ro-closure

sustainability of a plant's fuel sources. However, it is possible that the support may not be available for the whole of a plant's operational life, and it is also possible in principle that plants may be able to operate profitably without them at certain periods. The Secretary of State should therefore consider in each case whether it is appropriate to rely on the RO and CfD, or any successor incentive regime to ensure the sustainability of a plant's fuel over its whole life. The Secretary of State should not grant consent to a proposed biomass or bioliquid-fuelled generating station unless it is satisfied that the operator will (so far as it can reasonably be expected to do so) ensure that the biomass or bioliquid fuel it burns meets applicable RO, CfD or any successor incentive regime sustainability criteria, whether or not support is being claimed. Where appropriate, the Secretary of State may include a requirement to this effect in the Development Consent Order (DCO).

2.6.5 Methane gas, produced through anaerobic digestion (AD) of biodegradable waste, when injected into the gas grid, may also be used as a renewable fuel source. However, AD plant is not anticipated to have a generating capacity greater than 50MW and is not, therefore, described separately in this NPS.

2.6.6 EfW generating stations take fuel that would otherwise be sent to landfill. Waste can come from municipal or commercial and industrial sources. Some of the waste suitable for such plant may comprise biodegradable waste as described in the third bullet point of 2.6.1. This may also include refuse derived fuel (RDF) and solid recovered fuel (SRF) from waste. Where the proposed fuel is a prepared fuel, such as SRF, conformity of the waste / biomass with the waste hierarchy may have been considered by the Waste Authority from which the feedstock originated as part of their assessment of their waste management solution. The Secretary of State should take account of any assessment in considering the application.

2.6.7 A proportion of the biodegradable waste may be classed as "renewable" for the purposes of Renewable Obligation Certificates (ROCs)[8] eligibility and under the CfD scheme. However, this is not an issue of relevance to the Secretary of State.

2.6.8 All large installations are regulated by the Environment Agency (EA) or Natural Resources Wales (NRW) and must comply with strict emission limits set by the Environmental Permitting (England and Wales) Regulations 2016. Permits are not issued if the proposed installation will have unacceptable impacts on human health or the environment.

[8] Definition of biomass in the Renewable Obligation Order 2009.

2.7 Biomass and waste combustion impacts: combustion plant types and scale

2.7.1 Waste and biomass combustion plant covered by this NPS may include a range of different combustion technologies, including grate combustion, fluidised bed combustion, gasification and pyrolysis. The Secretary of State should not be concerned about the type of technology used. However, all types of technology will need to adhere to the policy set out below.

2.7.2 The fuel throughput capacity of the combustion plant considered by the Secretary of State may vary widely depending on composition, calorific value, and availability of fuel.

2.7.3 Throughput volumes are not, in themselves, a factor in Secretary of State decision-making as there are no specific minimum or maximum fuel throughput limits for different technologies or levels of electricity generation: this is a matter for the applicant. However, the increase in traffic volumes, any change in air quality, and any other adverse impacts as a result of the increase in throughput should be considered by the Secretary of State in accordance with this NPS and balanced against the net benefits of the combustion of waste and biomass as described in paragraph 2.5.2 above and in Section 3.3.33-4 of EN-1.

2.8 Biomass and waste combustion impacts: nature of applications

2.8.1 A waste/biomass combustion plant proposal is likely to consist of the following:

- a main combustion plant building incorporating emissions abatement technologies, electricity generation units, a cooling assembly (variety of types and methods), and chimney stack(s)
- buildings necessary for fuel reception, storage, sorting and pre-treatment facilities
- ancillary plant such as an electricity substation, civil engineering workshops and offices

2.8.2 Some development proposals may also incorporate additional features such as waste transfer facilities.

2.8.3 Where EfW proposals for mixed waste incineration include material of animal origin, applicants may require ancillary development in order to comply with the requirements of the Animal By-Products (Enforcement) (England) Regulations 2011.

2.9 Biomass and waste combustion impacts: commercial aspects of waste combustion plant

2.9.1 Commercial issues are not likely to be an important matter for the Secretary of State's decision making, but are set out below to provide background on the considerations taken into account by applicants.

2.9.2 Waste combustion plants are unlike other electricity generating power stations in that they have two roles: the principal purpose being treatment of waste; and secondly the recovery of energy. The commercial rationale for waste combustion plants will include both the gate fee received per tonne of waste handled and income received from energy recovery.

2.9.3 Like any combustion generating station, operators secure fuel through contracts. Local authorities issue municipal waste contracts which are often long term (up to 25 years). Contracts to manage private sector wastes are, generally, shorter. The operator may decide to focus on either public or private sector waste treatment contracts, or a combination of the two.

2.10 Biomass and waste combustion impacts: factors influencing site selection by applicants

2.10.1 Applicants should assure themselves that their applications satisfy the policies and considerations set out in Chapter 4 and Chapter 5 of EN-1, which detail the assessment principles and generic impacts in accordance with which applications relating to energy infrastructure are to be decided by the Secretary of State. Below is further guidance related to some specific considerations influencing site selection by applicants.

Grid connection

2.10.2 Biomass and EfW electricity generating stations connect into a transmission network. The technical feasibility of exporting electricity from a biomass or waste combustion plant is dependent on the capacity of the grid network to accept the likely electricity output together with the voltage and distance of the connection.

2.10.3 Applicants will usually have assured themselves that a viable connection exists before submitting the development proposal to the Secretary of State and where they have not done so, they take that commercial risk. In accordance with Section 4.10 in EN-1, any application to the Secretary of State must include information on how the generating station is to be connected and whether any environmental issues are likely to arise from that

connection. Further advice on grid connections is presented in EN-1 and EN-5.

Waste treatment capacity

2.10.4 As the primary function of EfW plants is to treat waste, applicants must demonstrate that proposed EfW plants are in line with Defra's policy position on the role of energy from waste in treating municipal waste.

2.10.5 The proposed plant must not result in over-capacity of EfW waste treatment at a national or local level.

Transport infrastructure

2.10.6 Biomass or EfW generating stations are likely to generate considerable transport movements. For example, a biomass or EfW plant that uses 500,000 tonnes of fuel per annum might require a large number of heavy goods vehicle (HGV) movements per day to import the fuel. There will also be residues which will need to be regularly transported off site.

2.10.7 Government policy encourages multi-modal transport and the Secretary of State should expect materials (fuel and residues) to be transported by water or rail routes where possible (see Section 5.14 of EN-1 on transport impacts). Applicants should locate new biomass or waste combustion generating stations in the vicinity of existing transport routes wherever possible. Although there may in some instances be environmental advantages to rail or water transport, whether such methods are viable is likely to be determined by the economics of the scheme. Road transport may be required to connect the site to the rail network, waterway or port. Therefore, any application should incorporate suitable access leading from the main highway network. If the existing access is inadequate and the applicant has proposed new infrastructure, the Secretary of State will need to be satisfied that the impacts of the new infrastructure are acceptable as set out in Section 5.14 of EN-1.

Combined heat and power

2.10.8 The government's strategy for combined heat and power (CHP) is described in Section 4.7 of EN-1, which sets out the requirements on applicants either to include CHP or present evidence in the application that the possibilities for CHP have been fully explored.

2.10.9 Given the importance which Government attaches to CHP, for the reasons set out in EN-1, if an application does not demonstrate that CHP has been considered the Secretary of State should seek further information from the applicant. The Secretary of State will need to be satisfied that the applicant has provided appropriate evidence that CHP is included or that the opportunities for CHP have been fully explored. For non-CHP stations, the

Secretary of State may also require that developers ensure that their stations are configured to allow heat supply at a later date as described in Section 4.7 of EN-1 and the guidance on CHP issued by then DTI9 in 2006.

Carbon capture readiness[10]

2.10.10 The government's policy and criteria on carbon capture readiness (CCR) for new combustion generating stations with a generating capacity at or over 300MW are set out in Section 4.8 of EN-1. They are relevant to proposed biomass plant at or over 300MW of generating capacity.

2.10.11 If an application does not demonstrate that CCR has been assessed according to this policy, the Secretary of State should seek further information from the applicant. The Secretary of State should not give development consent unless they are satisfied that the proposed development meets all the criteria for CCR set out in EN-1 and is, therefore, CCR.

2.10.12 The Secretary of State should impose requirements on any development consent, requiring operators to

- retain control over sufficient additional space (whether on or near the site) for the carbon capture equipment
- retain their ability to build carbon capture equipment on this space (whether on or near the site) in the future
- submit update reports on the technical aspects of its CCR status to the Secretary of State. These reports should be required within three months of the date on which a consented station first begins to supply electricity to the grid and every two years thereafter until the plant moves to retrofit CCS.

2.11 Biomass and waste combustion impacts: technical considerations for the Secretary of State

Flexibility in the project details

2.11.1 Generic information on flexibility is set out in Section 4.2 of EN-1. The Secretary of State should accept that biomass/waste combustion plant

[9] Guidance on background information to accompany notifications under Section 14(1) of the Energy Act 1976 and applications under Section 36 of the Electricity Act 1989.

[10] The Energy White Paper, published in December 2020, committed to consult on proposals to update the Carbon Capture Readiness requirements to reflect technological advances, such as conversion to low carbon hydrogen, and apply them more broadly, by removing the 300MW threshold and including all combustion technologies within scope. That separate consultation process, on new proposals for Decarbonisation Readiness, is running in parallel to the review of the national policy statements. If that consultation leads to changes in the relevant legal or policy framework then those new requirements will apply and this NPS will be updated to reflect any revised requirements ahead of designation. In the meantime, CCR policy remains as set out in this section.

operators may not know the precise details of all elements of the proposed development until some time after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised and give the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have (as set out in EN-1 paragraph 4.2.6) to ensure that the project as it may be constructed has been properly assessed. In this way the maximum-adverse case scenario will be assessed and the Secretary of State should allow for this uncertainty in its consideration of the application and consent.

2.12 Biomass and waste combustion: Secretary of State impact assessment principles

2.12.1 The Secretary of State should adhere to the following principles when examining and determining applications for biomass and relevant EfW infrastructure.

2.12.2 The impacts identified in Part 5 of EN-1 and this NPS are not intended to be exhaustive and the Secretary of State should therefore consider any impacts which they determine are relevant and important to its decision.

National designations

2.12.3 In sites with nationally recognised designations (SSSIs, National Nature Reserves, National Parks, the Broads, Areas of Outstanding Natural Beauty, Heritage Coasts, Registered Parks and Gardens and Marine Conservation Zones), consent for renewable energy projects should only be granted where the relevant tests in Sections 5.4 and 5.10 of EN-1 are met , and any adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.

2.12.4 In considering the impact on the historic environment as set out in Section 5.9 of EN-1 and whether it is satisfied that the substantial public benefits would outweigh any loss or harm to the significance of a designated heritage asset, the Secretary of State should take into account the positive role that large-scale renewable projects play in the mitigation of climate change, the delivery of energy security and the urgency of meeting the net zero target.

Green belts

2.12.5 Policy on energy infrastructure development in the green belt is set out in Section 5.11 of EN-1. When located in the green belt, elements of many biomass and EfW projects will constitute inappropriate development, which

may impact on the openness of the green belt. Careful consideration will therefore need to be given to the visual impact of projects, and developers will need to demonstrate very special circumstances that clearly outweigh any harm by reason of inappropriateness and any other harm if projects are to proceed. Such very special circumstances may include the wider environmental benefits associated with increased production of energy from renewable sources.

Other locational considerations

2.12.6 As most renewable energy resources can only be developed where the resource exists and where economically feasible, and because there are no limits on the need established in Chapter 3 of EN-1, the Secretary of State should not use a sequential approach in the consideration of renewable energy projects (for example, by giving priority to the re-use of previously developed land for renewable technology developments).

2.13 Biomass and waste combustion impacts: air quality and greenhouse gas emissions

Introduction

2.13.1 Generic air emissions impacts other than CO_2 are covered in Section 5.2 of EN-1. In addition, there are specific considerations which apply to biomass and Energy from Waste (EfW) combustion plant as set out below.

2.13.2 Operational CO_2 emissions may be a significant adverse impact of biomass and EfW electricity generating stations. Although a carbon assessment will be provided as part of the ES, the policies set out in Part 2 of EN-1 will apply. As set out in Section 5.3 of EN-1, the Secretary of State does not, therefore, need to assess individual applications for planning consent against operational carbon emissions and their contribution to carbon budgets, net zero and our international climate commitments.

2.13.3 In addition to the air quality legislation referred to in EN-1 (including the Environmental Permitting (England and Wales) Regulations 2016 (EPR) and the Air Quality Standards Regulations) the Waste Incineration Best Available Techniques (BAT) conclusions[11] are also relevant to waste combustion plant. This sets out specific emission limit values for waste combustion plants.

[11] Guidance for Best available techniques: environmental permits https://www.gov.uk/guidance/best-available-techniques-environmental-permits

Applicant's assessment

2.13.4 The applicant's ES should include an assessment of the air emissions resulting from the proposed infrastructure and demonstrate compliance with the relevant regulations (see Section 5.2 of EN-1).

Mitigation

2.13.5 Abatement technologies should be those set out in the relevant sector guidance notes as produced by the EA. The EA will determine if the technology selected for the waste/ biomass combustion generating station is considered Best Available Technique (BAT) and therefore the Secretary of State does not need to consider equipment selection in its determination process.

Secretary of State decision making

2.13.6 Compliance with the EPR is enforced through the environmental permitting regime regulated by the Environment Agency (EA). Plants not meeting the requirements of the EPR would not be granted a permit to operate. The Secretary of State should refer to the policy in Section 4.11 of EN-1 relating to other regimes.

2.13.7 The pollutants of concern arising from the combustion of waste and biomass may include NOx[12], SOx[13], NMVOCs[14] particulates. In addition, emissions of heavy metals, dioxins and furans are a consideration for waste combustion generating stations, but limited by the EPR and waste incineration BAT conclusions and regulated by the EA.

2.13.8 Where a proposed waste combustion generating station meets the requirements of the EPR and BAT conclusions and will not exceed the local air quality standards, the Secretary of State should not regard the proposed waste generating station as having adverse impacts on health.

2.13.9 Similarly, where a proposed biomass combustion generating station meets the requirements of the EPR and relevant BAT conclusions and will not exceed the local air quality standards, the Secretary of State should not regard the proposed biomass infrastructure as having adverse impacts on health.

[12] Nitrogen oxides
[13] Sulphur oxides.
[14] Non-Methyl Volatile Organic Compounds

2.14 Biomass and waste combustion impacts: landscape and visual

Introduction

2.14.1 Generic landscape and visual effects are covered in detail in Section 5.10 of EN-1. This includes specific policy guidance for developments proposed within nationally designated landscapes. In addition, there are specific considerations which apply to biomass / waste combustion generating stations as set out below.

2.14.2 The Secretary of State should be satisfied that the design of the proposed generating station is of appropriate quality and minimises adverse effects on the landscape character and quality.

Applicant's assessment

2.14.3 An assessment of the landscape and visual effects of the proposed infrastructure should be undertaken in accordance with the policy set out in 5.10 of EN-1.

Secretary of State decision making

2.14.4 The Secretary of State should take into account that any biomass/waste combustion generating station will require a building able to host fuel reception and storage facilities, the combustion chamber and abatement units. The overall size of the building will be dependent on design and fuel throughput, although it is unlikely to be less than 25m in height. External to the building there may be cooling towers, the size of which will also be dependent on the throughput of the generating station.

2.14.5 Good design that is sympathetic and contributes positively to the landscape character and quality of the area will go some way to mitigate adverse landscape and visual effects. Development proposals should consider the design of the generating station, including the materials to be used in the context of the local landscape character.

2.14.6 Although micro-siting within the development area can help, mitigation is achieved primarily through aesthetic aspects of site layout and building design including size and external finish and colour of the generating station to minimise intrusive appearance in the landscape as far as engineering requirements permit. The precise architectural treatment will need to be site-specific.

2.14.7 The Secretary of State should expect applicants to seek to design the landscape design of waste/biomass combustion generating station sites to

visually enclose them at low level as seen from surrounding external viewpoints. This makes the scale of the generating station less apparent, and helps conceal its lower level, smaller scale features. Earth bunds and mounds, tree planting or both may be used for softening the visual intrusion and may also help to attenuate noise from site activities. However, these features should be sympathetic to local landscape character and follow best practice.[15]

2.15 Biomass and waste combustion impacts: noise and vibration

Introduction

2.15.1 Generic noise and vibration impacts are covered in detail in Section 5.12 of EN-1. In addition, there are specific considerations which apply to biomass and EfW generating stations as set out below. Sources of noise and vibration may include:

- the delivery and movement of fuel and materials
- the processing of waste for fuel at EfW generating stations
- the gas and steam turbines that operate continuously during normal operation
- the external noise sources such as externally-sited air-cooled condensers that operate continuously during normal operation

Applicant's assessment

2.15.2 The ES should include a noise assessment of the impacts on amenity in case of excessive noise from the project as described in Section 5.12 in EN-1.

Mitigation

2.15.3 As described in EN-1, the primary mitigation for noise for biomass and EfW generating stations is through good design to enclose plant and machinery in noise-reducing buildings, wherever possible, and to minimise the potential for operations to create noise. Noise from gas turbines should be mitigated by attenuation of exhausts to reduce any risk of low-frequency noise transmission.

2.15.4 Noise from features including sorting and transport of material during operation of biomass or EfW generating stations is unavoidable. Similarly,

[15] Such as the 10 characteristics of good design which are set out in the National Design Guide https://www.gov.uk/government/publications/national-design-guide and the draft National Model Design Code and guidance notes https://www.gov.uk/government/consultations/national-planning-policy-framework-and-national-model-design-code-consultation-proposals

noise from apparatus external to the main generating station may be unavoidable. This can be mitigated through careful plant selection.

Secretary of State decision making

2.15.5 The Secretary of State should consider the noise and vibration impacts according to Section 5.12 in EN-1. It should be satisfied that noise and vibration will be adequately mitigated through requirements attached to the consent. The Secretary of State will need to take into consideration the extent to which operational noise will be separately controlled by the EA.

2.15.6 The Secretary of State should not grant development consent unless it is satisfied that the proposals will meet the aims set out in paragraph 5.12.10 of EN-1.

2.16 Biomass and waste combustion impacts: odour, insect and vermin infestation

Introduction

2.16.1 Generic impacts of dust, odour, artificial light, smoke, steam and insect infestation are set out in EN-1 Section 5.7. Insect and vermin infestation may be a particular issue with regard to storage of fuels for EfW generating stations as they may be attracted to biodegradable waste stored and processed at the facility. Odour is also likely to arise during the reception, storage and handling/processing of incoming biodegradable waste.

Applicant's assessment

2.16.2 The applicant should assess the potential for insect infestation and emissions of odour as set out in EN-1 Section 5.7 with particular regard to the handling and storage of waste for fuel.

Mitigation

2.16.3 In addition to the mitigation measures set out in EN-1, reception, storage and handling of waste and residues should be carried out within defined areas, for example bunkers or silos, within enclosed buildings at EfW generating stations.

2.16.4 To minimise potential for infestation, the time between reception, processing and combustion of waste may be limited by consent requirements.

Secretary of State decision making

2.16.5 The Secretary of State should satisfy itself that the proposal sets out appropriate measures to minimise impacts on local amenity from odour, insect and vermin infestation.

2.17 Biomass and waste combustion impacts: waste management

Introduction

2.17.1 Waste combustion generating stations need not disadvantage reuse or recycling initiatives where the proposed development accords with the waste hierarchy.

2.17.2 National, local and municipal strategies in England and Wales provide policy expectations for waste management at these different geographical levels. Local authorities will be responsible for providing an informative framework for the amount of waste management capacity sought. Information on the type of waste arising and those that are combustible may also be provided. In Wales, the relevant regional waste plan will set out the strategy for dealing with waste generated in that region and include waste targets.

Applicant's assessment

2.17.3 An assessment of the proposed waste combustion generating station should be undertaken that examines the conformity of the scheme with the waste hierarchy and the effect of the scheme on the relevant waste plan or plans where a proposal is likely to involve more than one local authority.

2.17.4 The application should set out the extent to which the generating station and capacity proposed is compatible with, and supports long-term recycling targets, taking into account existing residual waste treatment capacity and that already in development.

2.17.5 It may be appropriate for assessments to refer to the Annual Monitoring Reports published by relevant waste authorities which provide an updated figure of existing waste management capacity and future waste management capacity requirements.

2.17.6 The results of the assessment of the conformity with the waste hierarchy and the effect on relevant waste plans should be presented in a separate document to accompany the application to the Secretary of State.

Secretary of State decision making

2.17.7 The Secretary of State should be satisfied, with reference to the relevant waste strategies and plans, that the proposed waste combustion generating station is in accordance with the waste hierarchy and of an appropriate type and scale so as not to prejudice the achievement of local or national waste management targets in England and local, regional or national waste management targets in Wales. Where there are concerns in terms of a possible conflict, evidence should be provided to the Secretary of State by the applicant as to why this is not the case or why a deviation from the relevant waste strategy or plan is nonetheless appropriate and in accordance with the waste hierarchy. The Secretary of State should also consider whether a requirement, including monitoring, is appropriate to ensure compliance with the waste hierarchy.

2.18 Biomass and waste combustion impacts: residue management

Introduction

2.18.1 Generic waste management impacts are set out in Section 5.15 of EN-1. In addition, there are specific considerations which apply to waste and biomass combustion generating stations as set out below. All waste/biomass combustion generating stations will produce residues that require further management. Much of the residues can be used for commercial purposes.

2.18.2 Generating stations that burn waste (even if mixed with biomass fuel) produce two types of residues:

- combustion residue is inert material from the combustion chamber. The quantity of residue produced is dependent on the technology process and fuel type but might be as much as 30% (in terms of weight) of the fuel throughput of the generating station
- fly ash, a residue from flue gas emission abatement technology and usually 3-4% (in terms of weight) of the fuel throughput of the generating station

2.18.3 The two residues from waste combustion generating stations cannot be mixed; they must be disposed of separately, under different regimes.

2.18.4 Biomass combustion generating stations will also produce both combustion and flue gas treatment residues. However, the residue types can be mixed and managed as one product for disposal. Residues arising from biomass combustion generating stations are usually between 1% and 12% (in terms of weight) of the fuel capacity of the plant.

2.18.5 The regulations on waste disposal for waste combustion and flue gas residues from biomass combustion are intended to reduce the amount of waste that is sent to landfill. Waste combustion fly ash is classified as a hazardous waste material and needs to be managed as such.

2.18.6 Waste management is covered in the Environmental Permit for operation of waste or biomass generating stations. (See Section 5.15 of EN-1.)

Applicant's assessment

2.18.7 The assessment should include the production and disposal of residues as part of the ES. Any proposals for recovery of ash and mitigation measures should be described.

2.18.8 Applicants should set out the consideration they have given to the existence of accessible capacity in waste management sites for dealing with residues for the planned life of the power station.

Mitigation

2.18.9 The environmental burdens associated with the management of combustion residues can be mitigated through recovery of secondary products, for example aggregate or fertiliser, rather than disposal to landfill. The Secretary of State should give substantial positive weight to development proposals that have a realistic prospect of recovering these materials. The primary management route for fly ash is hazardous waste landfill; however, there may be opportunities to reuse this material for example in the stabilisation of industrial waste. The management of hazardous waste will be considered by the EA through the Environmental Permitting regime.

Secretary of State decision making

2.18.10 The Secretary of State should consult the EA on the suitability of the proposals.

2.18.11 When the Secretary of State considers noise and vibration, release of dust and transport impacts, as set out in this NPS and EN-1, it should recognise that these impacts may arise from the need for residue disposal as well as other factors.

2.18.12 The Secretary of State should be satisfied that management plans for residue disposal satisfactorily minimise the amount that cannot be used for commercial purposes. The Secretary of State should give substantial positive weight to development proposals that have a realistic prospect of recovering residues.

2.18.13 The Secretary of State should consider what requirements it may be appropriate to impose. If the EA has indicated that there are no known barriers

to it issuing an Environmental Permit for operation of the proposed biomass/waste fuelled generating station and agrees that management plans suitably minimise the wider impacts from ash disposal, any residual ash disposal impacts should have limited weight.

2.19 Biomass and waste combustion impacts: water quality and resources

Introduction

2.19.1 Generic water quality and resource impacts are set out in Section 5.16 of EN-1. The design of water-cooling systems for EfW and biomass generating stations will have additional impacts on water quality, abstraction and discharge. This can affect marine ecosystems where cooling systems use seawater. These may include:

- discharging water at a higher temperature than the receiving water, affecting the biodiversity of aquatic flora and fauna
- the use of resources may reduce the flow of watercourses, affecting the rate at which sediment is deposited, conditions for aquatic flora and potentially affecting migratory fish species (e.g. salmon)
- the fish impingement and/or entrainment, i.e. being taken into the cooling system during abstraction
- the discharging of water containing chemical anti-fouling treatment for use in cooling systems may have adverse impacts on aquatic biodiversity

Applicant's assessment

2.19.2 Where the project is likely to have effects on water quality or resources the applicant should undertake an assessment as required in EN-1, Section 5.16. The assessment should particularly demonstrate that appropriate measures will be put in place to avoid or minimise adverse impacts of abstraction and discharge of cooling water.

Mitigation

2.19.3 In addition to the mitigation measures set out in EN-1, design of the cooling system should include intake and outfall locations that avoid or minimise adverse impacts. There should also be specific measures to minimise fish impingement and/or entrainment and the discharge of excessive heat to receiving waters.

Secretary of State decision making

2.19.4 The Secretary of State should be satisfied that the applicant has demonstrated measures to minimise adverse impacts on water quality and resources as described above and in EN-1.

Offshore Wind

2.20 Offshore wind: introduction

2.20.1 The government expects that offshore wind (including floating wind) will play a significant role in decarbonising the energy system and has set an ambitious target to have 40 GW of offshore wind capacity (including 1 GW floating wind) by 2030, with an expectation that there will be a need for substantially more installed offshore capacity beyond this to achieve net-zero by 2050[16].

2.20.2 There are two main UK sea areas where offshore wind farms can be built:

- in UK territorial waters, which generally extend up to 12 nautical miles (nm) from the coast; and
- beyond the 12 nm limit where, under international law, the UK is able to construct wind farm installations or other structures to produce renewable energy in the Renewable Energy Zone (REZ) as declared in the Energy Act 2004[17].

2.20.3 For clarification, any reference within this NPS to offshore wind farm infrastructure includes all the elements which may be part of an application, including wind turbines, all types of foundations (fixed bottom or floating), onshore and offshore substations, anemometry masts, accommodation platforms and cabling.

2.20.4 The extent to which generic impacts set out in EN-1 are relevant may depend upon the phase of the proposed development being considered. For example, land-based traffic and transport and noise issues may be relevant during the construction and decommissioning periods only, depending upon the specific proposal.

2.20.5 The applicant should identify the impacts of a proposal and these impacts, together with proposals for their avoidance, minimisation, mitigation, or compensation, should be set out in an Environmental Statement (ES) and

[16] The Climate Change Act 2008 (2050 Target Amendment) Order 2019
[17] The REZ was designated by the Renewable Energy Zone (Designation of Area) Order 2004 (SI 2004/2668), exercising powers in section 8(4) of the Energy Act 2004. It extends from the seaward limit of the territorial sea up to a maximum of 200 nautical miles from the baseline.

Report to Inform Appropriate Assessment (if there are likely significant effects upon a protected site within the national site network) that should accompany each project application. The policy on ESs, HRAs and MCZ assessments is set out in Sections 4.2 and 5.4 of EN-1.

2.21 Offshore wind: offshore consenting process

Development Consent Order

2.21.1 A DCO is granted by the Secretary of State for developments over 100 MW in English waters and for developments over 350 MW in Welsh waters. Welsh Ministers are responsible for granting consent for developments up to 350 MW in Wales and in Welsh waters. Under Section 35 of the Planning Act 2008, the Secretary of State may also give a direction that other energy projects in English waters be treated as developments for which development consent is required.

2.21.2 The DCO provides permission to develop an offshore wind farm under the Planning Act 2008. Any DCO granted by the Secretary of State will include provision deeming the grant of a Marine Licence for operations carried out wholly in England and English waters. It is not possible to deem a Marine Licence as part of the DCO in Wales or Welsh waters.

Marine Licence

2.21.3 A Marine Licence is primarily concerned with the need to protect the environment and human health and to prevent interference with other legitimate uses of the sea.

2.21.4 Marine Licences are required for all the marine elements of a proposed wind development (up to Mean High Water Springs), including associated development such as the cabling and any offshore substations that are required.

2.21.5 The MMO is responsible for the enforcement and ongoing management of licence conditions, for operations carried out in English waters adjacent to England up to the seaward limits of the territorial sea or a REZ (except any part of a REZ in relation to which the Scottish or Welsh ministers have functions). Welsh ministers are responsible for marine licences for operations carried out in both inshore and offshore Welsh waters, under the Wales Act 2017. NRW are responsible for issuing, enforcing and ongoing management of the marine licence in Welsh waters. Further information on marine licence considerations are provided in paragraph 1.2.3 of EN-1.

2.21.6 The Secretary of State should liaise closely with the MMO on the proposed terms of any deemed marine licence.

2.22 Offshore wind: factors influencing site selection and design by applicant

Strategic Environmental Assessment

2.22.1 Through a series of Offshore Energy Strategic Environmental Assessments (SEAs), the government has assessed the environmental implications and spatial interactions of plans/ programmes for the expansion of offshore wind in the relevant parts of the UK Exclusive Economic Zone and the territorial waters of England and Wales. These assessments have reflected government policy on reducing greenhouse gas emissions, technological advances and the increasing offshore wind generation capacity, and devolution. In the light of the SEA processes, consultation responses and other available information, the government concluded that there were no overriding environmental considerations to prevent the achievement of the plans/programmes for offshore wind if measures were implemented to prevent reduce and offset significant adverse effects.

2.22.2 The next Offshore Energy SEA (OESEA4, anticipated to go to public consultation in late 2021) is expected to reflect the Energy White Paper "Powering our Net Zero Future" of December 2020[18] and contribute to the UK target of up to 40GW of offshore wind generation capacity deployed by 2030 (including 1GW of floating offshore wind). The offshore wind technologies will include fixed and floating foundations and this will require careful, site-specific evaluation through the planning process.

2.22.3 The government is undertaking a rolling Offshore Energy SEA programme, including a research programme[19] and data collection to facilitate future assessments. These future Offshore Energy SEAs and data will be relevant to applicants and to the Secretary of State when they become available.

2.22.4 Applicants should set out how they have drawn on the government's Offshore Energy SEA in making their site selection.

Marine planning

2.22.5 Marine planning enables the increasing demands for use of the marine area to be balanced and managed in an integrated way that protects the marine environment whilst supporting sustainable development. Marine plans provide a transparent framework for consistent, evidence-based decision making and should be used by applicants to guide site selection. Marine plans will help applicants understand generic potential impacts of their proposal at an early

[18] https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future
[19] https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-research-projects

stage e.g., in relation to other activities, or where there are marine protected areas. Further information is provided in Section 4.4 of EN-1.

Seabed leasing

2.22.6 The Crown Estate owns virtually the entire seabed out to the 12 nm territorial limit in England, Wales and Northern Ireland, including the rights to explore and utilise the natural resources of the UKCS (excluding oil, gas and coal). Therefore, it is necessary to obtain a lease from The Crown Estate prior to placing any offshore structures on, or passing cables over, the seabed and its foreshore. As well as owning the rights to explore and utilise waters up to 12 nm, the Energy Act 2004 gives The Crown Estate rights to issue licences for development beyond the territorial limit and within the REZ.

2.22.7 The Crown Estate Act 1961, section 1(3) states that, with regard to property and land, The Crown Estate commissioners must "maintain and enhance [The Crown Estate's] value and the return obtained from it, but with due regard to the requirements of good management".

2.22.8 The Crown Estate identifies potential development areas in accordance with the requirements of the Crown Estate Act 1961, other relevant legislation, government policy, plans and associated SEA work. The Crown Estate issues leases for offshore wind farms in tendering rounds. Rounds 1, 2 and 3 are closed and sites leased in those rounds are either operational, in construction, consented but yet to be constructed, awaiting determination, or yet to apply for development consent. The Crown Estate may also grant capacity extensions to existing wind farm leases, again in accordance with the above, and subject to applicants obtaining necessary consents. There are seven extension projects which have been granted development rights in the most recent extensions round.

2.22.9 Each of the leasing rounds was supported by a plan level HRA, which assessed the impact of the leasing round on protected sites. This is an objective, scientific assessment of the implications for the protected site qualifying features potentially affected by the plan in the context of their conservation objectives. The assessment serves to provide a better understanding of the potential effects and identify measures which can be put in place to avoid, mitigate, or reduce those significant effects at plan-level.

2.22.10 For the 4th leasing round, The Crown Estate undertook a tender process which selected six proposed new offshore wind projects in waters around England and Wales, to progress to a plan level HRA. Competent bidders were offered the opportunity to identify and propose project sites within four areas of seabed which were made available by The Crown Estate after extensive seabed analysis and consultation with stakeholders. Future offshore

development may occur in rounds, as piecemeal development or using any other development mechanism as required.

2.22.11 The Crown Estate has announced it is commencing work to design and deliver a new leasing opportunity for early commercial-scale floating wind projects in the Celtic Sea as part of The Crown Estate's commitment to enabling projects that can help deliver the government's 1 GW of floating wind by 2030 target.

Wind resource

2.22.12 The wind resource is critical to the economics of a proposed offshore wind farm. Applicants may have collected wind speed data using an anemometry mast or similar to inform their economic modelling. However, collection of this data is not obligatory as the suitability of the wind speed across the site and economics of the scheme are a matter for the technical and commercial judgement of the wind farm applicant.

Water depth and foundation conditions

2.22.13 Water depth, bathymetry and geological conditions are all important considerations for the selection of sites and will affect the design of the foundations of the turbines, the layout of turbines within the site and the siting of the cables that will export the electricity.

2.22.14 The onus is on the applicant to ensure that the foundation design is technically suitable for the seabed conditions and that the application caters for any uncertainty regarding the geological conditions. Whilst the technical suitability of the foundation design is not in itself a matter for the Secretary of State, the Secretary of State will need to be satisfied that the foundations will not have an unacceptable adverse effect on marine biodiversity, the physical environment or marine heritage assets.

Grid connection

2.22.15 As identified in EN-1, (paragraphs 3.3.51 - 3.3.58 and Section 4.10), it is expected that a more co-ordinated approach to transmission from multiple offshore windfarms to onshore networks will be adopted, compared with a radial connection approach for single windfarm projects. This will include connections via multi-purpose interconnectors (MPIs), which combine the connection of offshore wind with the function of market to market interconnectors.

2.22.16 It is expected that an increased number of proposals for transmission will be consented separately to those for the windfarm application. For some windfarm projects, the grid connection proposals in the application will therefore comprise an offshore grid connection to a transmission network taking power to shore or with an MPI.

2.22.17 MPIs can allow power flows from windfarms to two or more countries. They can be instrumental in providing the grid flexibility needed for the increased deployment of intermittent offshore renewable generation and its likely future export. They limit the need to curtail offshore wind generation when domestic demand has been met. MPIs can facilitate the transmission of offshore wind generation to shore and support the coordination of offshore infrastructure.

2.22.18 Applicants for consent for offshore wind farms will have to work within the regulatory regime for offshore transmission networks established by Ofgem. Under the regime, offshore transmission is a licensed activity regulated by Ofgem. Applicants must also follow the cable route protocol required by The Crown Estate[20].

Other offshore infrastructure

2.22.19 There may be constraints imposed on the siting or design of offshore wind farms because of the presence of other offshore infrastructure or activities.

2.22.20 UKCS is a vital resource for the UK as it makes progress towards its net zero commitments. Decarbonising power generation and key industrial processes will increase demand on the UKCS from a range of sectors. The occurrence of competition between offshore development projects in the short term could restrict the capacity of the UKCS to support the variety of technologies required for the delivery of net zero. Prior to the submission of any DCO application involving the development of the seabed, applicants such as offshore wind developers should ensure via engagement with The Crown Estate that they are aware of any current or emerging interests on or underneath the seabed which might give rise to a conflict with a specific application. Where applicable, the creation of statements of common ground between developers is recommended, including any evidence as to how potential conflicts might be mitigated. As an interested party, The Crown Estate may also provide further supporting information and evidence as part of the examination. This guidance is to encourage early engagement between parties with a potential overlap in their development plans so that a solution can be found that optimises the capacity of the UKCS to enable net zero.

National designations

2.22.21 In sites with nationally recognised designations (SSSIs, National Nature Reserves, National Parks, the Broads, Areas of Outstanding Natural Beauty, Registered Parks and Gardens, and Marine Conservation Zones), consent for renewable energy projects should only be granted where the relevant tests in Sections 5.4 and 5.10 of EN-1 are met and any significant adverse effects on

[20] The Crown Estate, 2019, Plan-Level Habitats Regulations Assessment for the 2017 Offshore Wind Farm Extensions, Cable Route Protocol

the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits. The Secretary of State should have regard to the aims and goals of the government's 25 Year Environment Plan[21] and other existing and future measures and targets in England, including under the new strategy for nature.

2.22.22 The UK has a commitment to protect the marine environment with a network of well managed MPAs. MCZs together with HRA sites and marine elements of SSSIs form an ecologically coherent network of MPAs. Authorities with decision making powers must assess the impact, either alone or in combination, on designated sites of any plans or projects before consenting them. Therefore, applicants will need to consider whether their proposal will impact an MPA. Full details are provided in Sections 4.2 and 5.4 of EN-1.

2.22.23 Given the level of deployment required to meet 2030 and 2050 targets, it is likely that applicants will need to consider closely the levels of mitigation and/or compensation (both individually and in combination with other plans or projects) which may be needed to approve their projects. It is likely that this consideration may need to include proactive measures to reduce the impact of deployment e.g., noise abatement technology, collision avoidance methods, or compensation for habitat loss.

2.22.24 Applicants should always employ the avoid, mitigate, compensate hierarchy to avoid as far as possible the need to find compensatory measures for offshore developments affecting MPAs. At the earliest possible stage alternative ways of working and use of technology should be employed to avoid environmental impacts. For example, construction vessels may be rerouted to avoid disturbing seabirds. Where impacts cannot be avoided, measures to mitigate and reduce impacts should be employed for example using alternative piling or trenching techniques. Once all feasible alternatives and mitigation measures have been employed, applicants should explore possible compensatory measures to make good any adverse effects site integrity. Advice on such measures should be sought from the Statutory Nature Conservation Bodies and Defra at the earliest opportunity. Further details on compensation are provided in paragraphs 2.24.14 – 2.24.19 of this NPS and paragraphs 4.2.9 – 4.2.13 of EN-1.

Green belts

2.22.25 Although offshore wind farms themselves will not have a direct impact on green belts, it is possible that some elements of these projects may be proposed on green belt land, such as electricity network infrastructure, and comprise inappropriate development which may impact on the openness of

[21] https://www.gov.uk/government/publications/25-year-environment-plan

the green belt. The policy on development in the green belt is set out in Section 5.11 of EN-1.

Other locational considerations

2.22.26 As most renewable energy resources can only be developed where the resource exists and where economically feasible, and because there are no limits on the need established in Section 3 of EN-1, the Secretary of State is not required to use a sequential approach in the consideration of renewable energy projects (for example, by giving priority to the re-use of previously developed land for renewable technology developments).

2.22.27 Where a number of offshore wind farms, or other developments or activities, have been proposed within an identified zone, applicants are also encouraged to consider working collaboratively with those other developers and sea users on shared mitigation, compensation and monitoring where appropriate.

2.22.28 The applicant will also need to assess impacts on civil and military radar and other aviation and defence interests (Section 5.5 of EN-1).

2.23 Offshore wind: technical considerations for the Secretary of State

Grid connection and onshore infrastructure

2.23.1 When considering grid connection issues, the Secretary of State should be mindful of the requirements of the regulatory regime for offshore transmission networks. As co-ordinated offshore transmission development will sometimes occur separate to that for wind farm development[22], it is expected that usually an initial agreement will be reached regarding connection with the offshore transmission network operator or owner and/ or connection into the onshore transmission network. However, it is recognised that at the time of the application, this agreement may not have been finalised.

2.23.2 The applicant is expected to define the precise route for the cable from the wind farm to the transmission network connection point offshore or, where the developer is proposing the transmission to shore, the precise onshore connection point together with the onshore and offshore locations of any associated infrastructure such as substations. The applicant should assess the effects of the cable and any associated infrastructure on the marine and coastal environment. Where the applicant does not know the precise location of the transmission cable connection to the offshore connection point or the

[22] The work to increase co-ordinated transmission for proposed wind farms and the development of a holistic network design for offshore transmission forms part of the Offshore Transmission Network Review (OTNR).

location for connection with onshore networks, including any necessary onshore and/or offshore substations and the onshore landing point, a corridor should be identified within which the specific infrastructure is proposed to be located. The ES for the proposed project should assess the effects of including this infrastructure within that corridor. Applicants must also follow the cable route protocol required by The Crown Estate.

2.23.3 All assessment of environmental effects of cabling infrastructure and any proposed offshore or onshore substations should assess effects both alone and cumulatively with other existing and proposed infrastructure. Applicants should include details on how avoidance has been achieved, good design principles followed, proposals for mitigation and how environmental net gain will be achieved (as set out in the 25 Year Environment Plan). Further information is provided in Sections 4.2, and 4.4 – 4.6 of EN-1.

2.23.4 A proposed offshore electricity transmission cable connecting the wind farm or wind farms with the onshore electricity infrastructure and any offshore electricity substations that may be required, may constitute associated development, depending on their scale and nature in relation to the offshore wind farm(s)[23]. Where the Secretary of State is satisfied that such offshore infrastructure does constitute associated development and can form part of the application, it should be considered by the Secretary of State in accordance with this NPS. However, transmission to shore will become increasingly co-ordinated with other wind farms and offshore infrastructure, and in these cases may be consented separately to the wind farm(s).

2.23.5 The onshore element of the grid connection (electric lines and substations) should be determined in accordance with the Electricity Networks Infrastructure NPS, EN-5. Depending upon the scale and type of this onshore development, elements of it could constitute either associated development or an energy NSIP in its own right.

Flexibility in the project details

2.23.6 Owing to the complex nature of offshore wind farm development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application to the Secretary of State, possibly including:

- the precise location and configuration of turbines and associated development
- the foundation type and size
- the installation technique or hammer energy

[23] Guidance on associated development: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/192681/Planning_Act_2008_Guidance_on_associated_development_applications_for_major_infrastructure_projects.pdf.

- the exact turbine tip height and rotor swept area
- the cable type and precise cable route
- the exact locations of offshore and/or onshore substations

2.23.7 In accordance with Section 4.2 of EN-1, the Secretary of State should accept that wind farm operators are unlikely to know precisely which turbines will be procured for the site until some time after any consent has been granted. Where some details have not been included in the application, the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have (as set out in EN-1 paragraph 4.2.6) to ensure that the project as it may be constructed has been properly assessed (the Rochdale Envelope)[24]. In this way the maximum adverse case scenario will be assessed and the Secretary of State should allow for this uncertainty in its consideration of the application and consent. See also paragraph 2.29.2 in relation to ornithological headroom.

Micrositing and microrouting

2.23.8 Any consent that is granted by the Secretary of State should be flexible to allow for necessary micrositing/microrouting of elements of the proposed wind farm during its construction where requested at the application stage. This allows for unforeseen events such as the discovery of previously unknown marine archaeology that it would be preferable to leave in situ.

2.23.9 Where micrositing/microrouting tolerance is requested by the applicant in any consent, given that the ES should assess a maximum adverse case scenario, the assessment should reflect the implications of any micrositing/microrouting as far as reasonably possible. The Secretary of State must be satisfied that there is sufficient space to microsite/microroute for any proposal to be acceptable as mitigation (e.g. any feature to avoid must not cover the full width of the assessed cable corridor).

Extensions

2.23.10 The Crown Estate may offer new leases in areas adjacent to existing consented wind farms. This could be to either the owner/operator of the existing site or to a different company from that operating the existing wind farm. These leases will form extensions to existing wind farms. Following a

[24] Case law (for example Rochdale MBC Ex. Parte C Tew [2000] Env LR 1) provides a legal principle that indicative sketches and layouts cannot provide the basis for determining applications for EIA development. The "Rochdale Envelope" is a series of maximum extents of a project for which the significant effects are established. The detailed design of the project can then vary within this 'envelope' without rendering the ES inadequate.

plan level HRA, there are seven extension projects which have been granted development rights in the most recent extensions round.

2.23.11 Leases may be awarded subject to the company obtaining the necessary consents and may be subject to various constraining conditions, including the presence of an existing operational wind farm.

2.23.12 The Secretary of State should be aware of the potential for applications for extensions to existing wind farms and that there may be constraints on such leases over which the applicant will have little or no control.

Repowering

2.23.13 Where an operational offshore wind farm reaches the end of its life, subject to obtaining the necessary lease from The Crown Estate or providing an existing lease is still valid, the owner of the wind farm may wish to "repower" the site with new turbines. Given the likely change in technology over the intervening time period, any repowering of sites is likely to involve wind turbines of a different scale and nature. This could result in significantly different impacts as well as a different electricity generating capacity and a new consent application would be required.

2.23.14 In determining an application for the repowering of a site, the proposed replacement scheme should be determined by the Secretary of State on its individual merits.

Future monitoring

2.23.15 Owing to the complex nature of offshore wind development, and the difficulty in establishing the evidence base for marine environmental recovery the Secretary of State should, where appropriate, require the applicant to undertake environmental monitoring (e.g., ornithological surveys, geomorphological surveys) prior to and during construction and operation. Monitoring will measure and document the effects of the development and the efficacy of any associated mitigation or compensation. This enables an assessment of the accuracy of the original predictions and improves the evidence base for future mitigation and compensation measures enabling better decision-making in future EIAs and HRAs. The Secretary of State may consider that monitoring of any impact is appropriate. Monitoring should be presented in formal reports which must be made publicly available.

Decommissioning

2.23.16 Section 105 of the Energy Act 2004 enables the Secretary of State to require the submission of a decommissioning programme for a proposed offshore wind farm, provided at least one of the statutory consents required (including

one under the 2008 Act) has been given or has been applied for and is likely to be given.

2.23.17 Where the Secretary of State decides to grant development consent for a proposed offshore wind farm, the Secretary of State should include a condition requiring the applicant to submit a decommissioning programme to the Secretary of State before any offshore construction works begin should be included. The decommissioning programme must satisfy the requirements of s.105(8) of the Energy Act 2004 and follow relevant guidance[25].

Environmental net gain

2.23.18 Environmental net gain is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. Biodiversity net gain is an essential component of environmental net gain. Projects should consider and seek to incorporate improvements in natural capital, ecosystem services and the benefits they deliver when planning how to deliver biodiversity net gain. Biodiversity net gain is addressed in Section 4.5 of EN-1. The applicant should demonstrate that they have considered how their proposal can contribute towards biodiversity net gain in line with the ambition set out in the 25 Year Environment Plan.

Impact assessment principles

2.23.19 The impacts identified in Part 5 of EN-1 and this NPS (identified below) are not intended to be exhaustive and the Secretary of State should therefore consider any impacts which it determines are relevant and important to its decision.

2.24 Offshore wind impacts: biodiversity

Introduction

2.24.1 Impacts on the physical environment may have indirect effects on marine biodiversity. Generic ecology and biodiversity effects are covered in detail in Section 5.4 of EN-1. The coastal change policy in Section 5.6 of EN-1 may also be relevant. In addition, there are specific considerations which apply to offshore wind energy infrastructure proposals as discussed below.

Biodiversity considerations to which applicants and the Secretary of State should have regard concerning offshore infrastructure include:

- fish

[25] https://www.gov.uk/government/publications/decommissioning-offshore-renewable-energy-installations

- seabed habitats and species (intertidal and subtidal)
- marine mammals
- birds

2.24.2 These considerations are described in Sections 2.26 – 2.30 by reference to both species and habitats, with impacts on the physical environment covered in Section 2.25.

2.24.3 Effects on commercial fish stocks are covered in Section 2.31.

2.24.4 Evidence from existing offshore wind farms demonstrates that it has been possible to locate wind farms in ecologically sensitive areas where careful siting of turbines has been undertaken following appropriate ecological surveys and assessments. However, with increasing deployment of offshore wind to 2030 and beyond, with a likely focus on deployment of fixed offshore wind in the shallow waters of the North Sea, it is likely that the cumulative impact of multiple wind farms on the marine environment will increase impacts beyond identified thresholds for some species and habitats, leading to the requirement for both mitigation and compensation for effects to be acceptable.

Applicant's assessment

2.24.5 Assessment of impacts on offshore ecology, biodiversity and the physical environment should be undertaken by the applicant for all stages of the lifespan of the proposed offshore wind farm and in accordance with the appropriate policy for offshore wind farm EIAs, HRAs and MCZ assessments (Sections 4.2 and 5.4 of EN-1). Applicants will also need to consider environmental net gain as set out in the 25 Year Environment Plan (Section 4.5 of EN-1).

2.24.6 Consultation on the assessment methodologies, baseline data collection, and potential mitigation and compensation options should be undertaken at early stages with the statutory consultees as appropriate.

2.24.7 Any relevant data that has been collected as part of post-construction ecological monitoring from existing, operational offshore wind farms should be referred to where appropriate. Reference must be made to relevant scientific research and literature. A range of research programmes are ongoing to investigate impacts of offshore wind farm development, including, but not

limited to: BEIS SEA Research Programme[26], ORJIP[27], ScotMER[28], the ORE Catapult[29] and OWEC[30].

2.24.8 The assessment should include the potential of the scheme to have both positive and negative effects on marine ecology and biodiversity.

2.24.9 Applicants are expected to have regard to guidance issued in respect of Marine Licence requirements.

Mitigation and monitoring

2.24.10 Mitigation will be possible in the form of careful design of the development itself and the construction techniques employed. General mitigation requirements and considerations are set out in Section 5.4 of EN-1.

2.24.11 Ecological monitoring will be appropriate during the pre-construction, construction and operational phases to identify the actual impacts caused by the project and compare them to what was predicted in the EIA/HRA. Should impacts be greater than those predicted, an adaptive management process may need to be implemented and additional mitigation required, to ensure that so far as possible the effects are brought back within the range of those predicted. Monitoring should be of sufficient standard to inform future decision-making. Increasing the understanding of the efficacy of alternatives and mitigation will deliver greater certainty on developer requirements.

Compensation

2.24.12 With increasing deployment of offshore wind farms, cumulative environmental impacts upon HRA sites and MCZs may not be able to be addressed by mitigation alone, therefore compensation measures may be required where adverse effects on site integrity and/or on conservation objectives cannot be ruled out. In such cases, derogation for Imperative Reasons of Overriding Public Interest (IROPI) and associated compensatory measures under the Habitats Regulations, or derogation where the benefit to the public clearly outweighs the risk of damage to the environment and associated measures of equivalent environmental benefit (MEEB) under Marine and Coastal Access Act, may be necessary to allow deployment to continue.

2.24.13 As set out in EN-1 (paragraphs 4.2.9 - 4.2.13) as a general principle, development should at the very least aim to avoid significant impacts to protected sites, including through mitigation and consideration of reasonable

[26] https://www.gov.uk/government/publications/uk-offshore-energy-strategic-environmental-assessment-research-projects
[27] http://www.orjip.org.uk/
[28] https://www.gov.scot/policies/marine-renewable-energy/science-and-research/
[29] https://ore.catapult.org.uk/
[30] https://www.thecrownestate.co.uk/en-gb/what-we-do/on-the-seabed/energy/offshore-wind-a-sustainable-future/

alternatives. Where such a significant impact cannot be avoided then appropriate compensation measures should be sought. In instances where the HRA determines that an energy infrastructure development proposal will result in significant adverse effects to a protected site, then the applicant should propose compensatory measures that compensate for those adverse effects identified.

2.24.14 If, during the pre-application stage, statutory nature advisors indicate that the proposed development is likely to adversely impact a protected site, the applicant should include with their application such information as may reasonably be required to assess potential derogations under the Habitats Regulations or the Marine and Coastal Access Act. Where such an indication is given later in the development consent process, the applicant should provide such information as soon as reasonably practical. This information includes, assessment of alternative solutions, a case for IROPI (or that the benefit to the public clearly outweighs the risk of damage to a MCZ) and appropriate securable environmental compensation. Provision of such information will not be taken as an acceptance of adverse impacts and if applicants dispute the likelihood of adverse effects they can provide this information 'without prejudice' to the Secretary of State's final decision on the impacts of the potential development. If, in these circumstances, an applicant does not supply information required for the assessment of a potential derogation, there will be no expectation that the Secretary of State will allow the applicant the opportunity to provide such information following the examination.

2.24.15 It is vital that applicants consider the need for compensation as early as possible in the design process as 'retrofitting' compensatory measures will introduce delays and uncertainty to the consenting process. Applicants should work with statutory nature conservation advisors and Defra to develop a compensation plan for all protected sites adversely affected by the development and include this plan with their application to the Secretary of State.

2.24.16 Where several developers are likely to have cumulative impacts on the same species or feature it may be appropriate to collaborate with each other on compensation measures. Applicants may also want to coordinate with other marine industry sectors also needing to find compensatory measures. Defra will be publishing guidance imminently to help applicants consider how compensation should be developed.

2.24.17 For many of the following receptors, the scale of offshore wind developments and potential in-combination effects means compensation could be required and applicants should refer to the latest Defra compensation guidance when making their assessments.

Secretary of State decision making

2.24.18 The Secretary of State should consider the effects of a proposal on marine ecology, biodiversity and the physical environment taking into account all relevant information made available. The Secretary of State should be satisfied that the applicant has used up to date research within their assessment (for example, using results from scientific peer reviewed papers and the programmes listed in paragraph 2.24.7) and assessed through HRA/MCZ processes, the impact on any protected species or habitats.

2.24.19 The designation of an area as a protected site (including HRA sites, MCZs and SSSIs) does not necessarily restrict the construction or operation of offshore wind farms in, near or through that area (see also Sections 4.2 and 5.4 of EN-1). However, where adverse effects on site integrity/conservation objectives are predicted, in coming to a decision, the Secretary of State should consider the extent to which the effects are temporary or reversible and the timescales for recovery.

2.25 Offshore wind impacts: physical environment

Introduction

2.25.1 The construction, operation and decommissioning of offshore energy infrastructure (including the preparation and installation of the cable route) can affect the following elements of the physical offshore environment, which can have knock on impacts on other biodiversity receptors:

- water quality – disturbance of the seabed sediments or release of contaminants can result in direct or indirect effects on habitats and biodiversity, as well as on fish stocks thus affecting the fishing industry
- waves and tides – the presence of the turbines can cause indirect effects on flood defences, marine ecology and biodiversity, marine archaeology and potentially coastal recreation activities
- scour effect – the presence of wind turbines and other infrastructure can result in a change in the water movements within the immediate vicinity of the infrastructure, resulting in scour (localised seabed erosion) around the structures. This can indirectly affect navigation channels for marine vessels, marine archaeology and impact biodiversity and seabed habitats
- sediment transport – the resultant movement of sediments, such as sand across the seabed or in the water column, can indirectly affect navigation channels for marine vessels, could affect sediment supply to sensitive coastal sites and impact biodiversity and seabed habitats
- suspended solids – the release of sediment during construction, operation and decommissioning can cause indirect effects on marine ecology and biodiversity.

Applicant's assessment

2.25.2 The assessment should include predictions of the physical effect that will result from the construction and operation of the required infrastructure and include effects such as the scouring that may result from the proposed development and how that might impact sensitive species and habitats.

2.25.3 Geotechnical investigations should form part of the assessment as this will enable design of appropriate construction techniques to minimise any adverse effects.

Mitigation

2.25.4 The Secretary of State should expect applicants to have considered the best ecological outcomes in terms of potential mitigation. These might include the burying of cables to a necessary depth, using scour protection techniques around offshore structures to prevent scour effects or designing turbines to withstand scour, so scour protection is not required or is minimised. Applicants should consult the statutory consultees on appropriate mitigation and monitoring.

Secretary of State decision making

2.25.5 As set out above, the direct effects on the physical environment can have indirect effects on a number of other receptors. Where indirect effects are predicted, the Secretary of State should refer to relevant sections of this NPS and EN-1.

2.25.6 The Secretary of State should be satisfied that the methods of construction, including use of materials, are such as to reasonably minimise the potential for impact on the physical environment. This could involve, for instance, the exclusion of certain foundations on the basis of their impacts or minimising quantities of rock that are used to protect cables whilst taking into account other relevant considerations such as safety.

2.26 Offshore wind impacts: fish

Introduction

2.26.1 Fish in the context of this NPS also includes elasmobranchs (sharks and rays) and shellfish (e.g., crabs). There is the potential for the construction and decommissioning phases, including activities occurring both above and below the seabed, to impact fish communities, migration routes, spawning activities and nursery areas of particular species. There are potential impacts associated with energy emissions into the environment (e.g. noise or

electromagnetic fields (EMF)), as well as potential interaction with seabed sediments.

Applicant's assessment

2.26.2 The applicant should identify fish species that are the most likely receptors of impacts with respect to:

- spawning grounds
- nursery grounds
- feeding grounds
- over-wintering areas for crustaceans
- migration routes
- protected areas (e.g. HRA sites and MCZs)

2.26.3 The assessment should also identify potential implications of underwater noise from construction and unexploded ordnance (both sound pressure and particle motion) and EMF on sensitive fish species.

Mitigation

2.26.4 Review of up-to-date research should be undertaken and all potential mitigation options presented. EMF in the water column during operation, is in the form of electric and magnetic fields, which are reduced by use of armoured cables for interarray and export cables. Burial of the cable increases the physical distance between the maximum EMF intensity and sensitive species. However, what constitutes sufficient depth to reduce impact will depend on the geology of the seabed. It is unknown whether exposure to multiple cables and larger capacity cables may have a cumulative impact on sensitive species. Therefore monitoring EMF emissions may provide the evidence to inform future EIAs. In the case of floating wind, the cables may hang freely in the water and thus potentially require alternative monitoring and mitigation.

2.26.5 Construction of specific elements can also be timed to reduce impacts on spawning or migration. Underwater noise mitigation can also be used to prevent injury and death of fish species.

Secretary of State decision making

2.26.6 The use of rock armouring as mitigation does have advantages in reducing electromagnetic fields (EMF) for individual cables on fish species. However, the Secretary of State should also consider any negative impacts from rock armouring on benthic habitats and a balance between protection of various receptors must be made, with all mitigation and alternatives to rock armouring reviewed.

2.27 Offshore wind impacts: intertidal habitats and species

Introduction

2.27.1 The intertidal zone is the area between mean high water and mean low water. Intertidal habitat and ecology are often recognised through statutory nature conservation designations.

2.27.2 Export cable routes will cross the intertidal zone resulting in habitat loss, and temporary disturbance of intertidal flora and fauna.

Applicant's assessment

2.27.3 An assessment of the effects of installing cable across the intertidal zone should follow The Crown Estate's cable route protocol and include information, where relevant, about:

- any alternative landfall sites that have been considered by the applicant during the design phase and an explanation for the final choice
- any alternative cable installation methods that have been considered by the applicant during the design phase and an explanation for the final choice
- potential loss of habitat
- disturbance during cable installation, maintenance/repairs and removal (decommissioning)
- increased suspended sediment loads in the intertidal zone during installation and maintenance/repairs
- predicted rates at which the intertidal zone might recover from temporary effects, based on existing monitoring data
- Protected sites (e.g. HRA sites, MCZs and SSSIs)

Mitigation

2.27.4 Effects on intertidal habitat cannot be avoided entirely. Review of up-to-date research should be undertaken and all potential mitigation options presented. Landfall and cable installation and decommissioning methods should be designed appropriately to minimise effects on intertidal habitats, taking into account other constraints. Where applicable, use of horizontal directional drilling (HDD) should be considered as a method to avoid impacts on sensitive habitats and species.

2.27.5 Where cumulative effects on intertidal habitats are predicted as a result of the cumulative impact of multiple cable routes, applicants of various schemes are encouraged to work together to ensure that the number of cables crossing the intertidal zone are minimised and installation and decommissioning phases are coordinated to ensure that disturbance is also reasonably minimised. As

identified in EN-1, (paragraphs 3.3.50 - 3.3.58 and Section 4.10), it is expected that a more co-ordinated approach to transmission from multiple offshore windfarms to onshore networks will be adopted in the future, compared with a radial connection approach for single windfarm projects. This will include connection with multi-purpose interconnectors (MPIs).

Secretary of State decision making

2.27.6 The conservation status of intertidal habitat is of relevance to the Secretary of State.

2.27.7 The Secretary of State should be satisfied that cable installation and decommissioning has been designed sensitively, taking into account intertidal habitats.

2.28 Offshore wind impacts: marine mammals

Introduction

2.28.1 Construction activities, including installing wind turbine foundations by pile driving, geophysical surveys, and clearing the site and cable route of unexploded ordinance (UXOs) may reach noise levels which are high enough to cause disturbance, injury, or even death to marine mammals. All marine mammals are protected under Part 3 of the Habitats Regulations. In addition, whales, dolphins and porpoises (collectively known as cetaceans) are legally protected species. Therefore, if construction and associated noise levels are likely to lead to an offence under Part 3 of the Habitats Regulations (which would include deliberately disturbing, injuring or killing), an application will have to be made for a wildlife licence[31] to allow the activity to take place.

2.28.2 The development of offshore wind farms can also impact fish species, which can have indirect impacts on marine mammals if those fish are prey species. There is also the risk of collision with construction and maintenance vessels and potential entanglement risks from floating wind structures.

Applicant's assessment

2.28.3 Where necessary, assessment of the effects on marine mammals should include details of:

- likely feeding areas and impacts on prey species and prey habitat
- known birthing areas / haul out sites for breeding and pupping
- migration routes

[31] https://www.gov.uk/guidance/understand-marine-wildlife-licences-and-report-an-incident

- protected areas (e.g. HRA sites and SSSIs)
- baseline noise levels
- predicted construction and soft start noise levels in relation to mortality, permanent threshold shift (PTS), temporary threshold shift (TTS) and disturbance
- operational noise
- duration and spatial extent of the impacting activities including cumulative/in-combination effects with other plans or projects
- collision risk
- entanglement risk
- barrier risk

2.28.4 The scope, effort and methods required for marine mammal surveys should be discussed with the relevant statutory nature conservation body.

2.28.5 The applicant should discuss any proposed noisy activities with the relevant body and must reference the JNCC underwater noise guidance[32] in relation to noisy activities (alone and in-combination with other plans or projects) within HRA sites. Where assessment shows that noise from construction and UXO clearance may reach noise levels likely to lead to noise thresholds being exceeded (as detailed in the JNCC guidance) or an offence as described in paragraph 2.28.1 above, the applicant should look at possible alternatives or appropriate mitigation (detailed below).

Mitigation

2.28.6 Monitoring of the surrounding area before and during the piling procedure can be undertaken by various methods including marine mammal observers and passive acoustic monitoring. Active displacement of marine mammals outside potential injury zones can be undertaken using equipment such as acoustic deterrent devices.

2.28.7 Soft start procedures during pile driving may be implemented. This enables marine mammals in the area disturbed by the sound levels to move away from the piling before physical or auditory injury is caused.

2.28.8 Where noise impacts cannot be reduced to acceptable levels, other mitigation should be considered, including spatial/temporal restrictions on noisy activities, alternative foundation types, alternative installation methods and noise abatement technology. Review of up-to-date research should be undertaken and all potential mitigation options presented.

[32] https://hub.jncc.gov.uk/assets/2e60a9a0-4366-4971-9327-2bc409e09784

Secretary of State decision making

2.28.9 The Secretary of State should be satisfied that the preferred methods of construction, in particular the construction method needed for the proposed foundations and the preferred foundation type, where known at the time of application, are designed to reasonably minimise significant impacts on marine mammals. Unless suitable noise mitigation measures can be imposed by requirements to any development consent the Secretary of State may refuse the application.

2.28.10 The conservation status of cetaceans and seals are of relevance and the Secretary of State should be satisfied that cumulative and in-combination impacts on marine mammals have been considered.

2.29 Offshore wind impacts: birds

Introduction

2.29.1 Offshore wind farms have the potential to impact on birds through:

- collisions with rotating blades
- direct habitat loss
- disturbance from construction activities such as the movement of construction/decommissioning vessels and piling
- displacement during the operational phase, resulting in loss of foraging/ roosting area
- impacts on bird flight lines (i.e. barrier effect) and associated increased energy use by birds for commuting flights between roosting and foraging areas
- impacts upon prey species and prey habitat
- protected sites (e.g. SPAs)

2.29.2 Currently, cumulative impact assessments for ornithology are based on the consented Rochdale Envelope parameters of projects, rather than the ‘as-built’ parameters, which may pose a lower risk to birds. The Secretary of State will therefore require any consents to include provisions to define the final 'as built' parameters (which may not then be exceeded) so that these parameters can be used in future cumulative impact assessments. In parallel we will look to explore opportunities to reassess ornithological impact assessment of historic consents to reflect their 'as built' parameters. Any ornithological ‘headroom’ between the effects defined in the 'as built' parameters and Rochdale Envelope parameters can then be released. We will also consider the potential applicability of these principles to other consent parameters.

Applicant's assessment

2.29.3 The scope, effort and methods required for ornithological surveys should be discussed with the relevant statutory advisor, taking into consideration baseline and monitoring data from operational windfarms.

2.29.4 Collision risk modelling, as well as displacement and population viability assessments must be undertaken for certain species of birds. Where necessary, the assessments carried out by applicants should assess collision risk using survey data collected from the site at the pre-application EIA stage. Assessments should cover all aspects included in paragraph 2.29.1 above.

Mitigation

2.29.5 Review of up-to-date research should be undertaken and all potential mitigation options presented. Aviation and navigation lighting should be minimised and/or on demand (as encouraged in EN-1 Section 5.5) to avoid attracting birds, taking into account impacts on safety.

2.29.6 Subject to other constraints, wind turbines should be laid out within a site, in a way that minimises collision risk. Turbine parameters should also be developed to reduce collision risk where the assessment shows there is a significant risk of collision (e.g., altering rotor height).

2.29.7 Construction vessels associated with offshore wind farms should, where practicable and compatible with operational requirements and navigational safety, avoid rafting seabirds during sensitive periods and follow agreed navigation routes to and from the site.

2.29.8 The exact timing of peak migration events is inherently uncertain. Therefore, shutting down turbines within migration routes during estimated peak migration periods is unlikely to offer suitable mitigation.

Secretary of State decision making

2.29.9 The Secretary of State must be satisfied that the collision risk and displacement assessments have been conducted to a satisfactory standard having had regard to the advice from the relevant statutory advisor.

2.29.10 The conservation status of seabirds are of relevance and the Secretary of State should take into account the views of the relevant statutory advisors and be satisfied that cumulative and in-combination impacts on seabird species have been considered.

2.30 Offshore wind impacts: subtidal habitats and species

Introduction

2.30.1 The subtidal zone is the area below low water springs which remains submerged at low tide. Subtidal habitat and ecology are often recognised through statutory nature conservation designations. Offshore wind construction and maintenance activities can cause loss and temporary disturbance of subtidal habitat and benthic ecology.

Applicant's assessment

2.30.2 The applicant should follow The Crown Estate's cable route protocol. Assessment of the effects on the subtidal environment should include:

- loss of habitat due to foundation type including associated seabed preparation, predicted scour, scour protection and altered sedimentary processes
- environmental appraisal of inter-array and export cable routes and installation/maintenance methods, including predicted loss of habitat due to predicted scour and scour protection
- habitat disturbance from construction and maintenance/repair vessels' extendible legs and anchors
- increased suspended sediment loads during construction and from maintenance/repairs
- predicted rates at which the subtidal zone might recover from temporary effects
- potential impacts from EMF on benthic fauna
- impacts on protected sites (e.g. HRA sites and MCZs)

Mitigation

2.30.3 Construction, maintenance and decommissioning methods should be designed appropriately to minimise effects on subtidal habitats, taking into account other constraints. Review of up-to-date research should be undertaken and all potential mitigation options presented. Mitigation measures which the Secretary of State should expect the applicants to have considered may include:

- surveying and micrositing or re-routing of the export and inter-array cables to avoid adverse effects on sensitive habitats, biogenic reefs or protected species
- burying cables at a sufficient depth, taking into account other constraints, to allow the seabed to recover to its natural state
- the use of anti-fouling paint might be minimised on subtidal surfaces, to encourage species colonisation on the structures

2.30.4 Where cumulative impacts on subtidal habitats are predicted as a result of multiple cable routes, applicants for various schemes are encouraged to work together to ensure that the number of cables crossing the subtidal zone is minimised and installation/ decommissioning phases are coordinated to ensure that disturbance is reasonably minimised. As identified in EN-1, (paragraphs 3.3.50 - 3.3.58 and Section 4.10) and EN-5 (Section 2.5), it is expected that more co-ordinated approaches to transmission from multiple offshore windfarms to onshore networks will be adopted, compared with a radial connection approach for single windfarm projects. This will include connection with multi-purpose interconnectors (MPIs).

Secretary of State decision making

2.30.5 The conservation status of subtidal habitat and species are of relevance to the Secretary of State.

2.30.6 The Secretary of State should be satisfied that activities have been designed considering sensitive subtidal environmental aspects and discussions with the relevant conservation bodies have taken place.

2.31 Offshore wind impacts: commercial fisheries and fishing

Introduction

2.31.1 There are a number of different fishing activities within UK waters including:

- bottom trawling – fishing with one or more towed nets being dragged along the seabed
- mid-water trawling – fishing for pelagic species such as herring and mackerel by towing one or more nets through the water column
- long-lining – using static or trailed hooks and lines usually set on the seabed and left for a number of hours
- dredging – towing several dredges either side of a vessel and through the seabed, typically for scallops but also other shellfish
- fixed netting – using ‘fleets’ of nets anchored in some way to the seabed and lifted, cleared and re-set from time to time
- drift netting – allowing nets (attached to a vessel) to drift with the vessel downwind/tide
- potting – typically for crab, lobster and whelks using numbers of pots (a string of pots) anchored to the seabed

2.31.2 Whilst the footprint of an offshore wind farm and any associated infrastructure may be a hindrance to certain types of commercial fishing activity such as trawling and long-lining, other fishing activities may be able to take place

within operational wind farms without unduly disrupting or compromising navigational safety. Consequently, the establishment of a wind farm can increase the potential for some fishing activities, such as potting, where this would not compromise any safety zone in place.

2.31.3 In some circumstances, transboundary issues may be a consideration as fishermen from other countries may fish in waters within which offshore wind farms are sited.

2.31.4 Where an offshore wind farm could affect a species of fish that is of commercial interest, but is also of ecological value, the Secretary of State should refer to Section 2.26 of this NPS with regard to the latter. The applicant should also speak to Defra and representatives of the fishing industry to explore possible coordination of activities.

2.31.5 In some circumstances, applicants may seek declaration of safety zones around wind turbines and other infrastructure, although these might not be applied until after consent to the wind farm has been granted. The declaration of a safety zone excludes or restricts activities within the defined sea areas including commercial fishing.

Applicant's assessment

2.31.6 Early consultation should be undertaken with the MMO, Defra, statutory advisors and with representatives of the fishing industry which could include discussion of impact assessment methodologies. Where any part of a proposal involves a grid connection to shore, appropriate inshore fisheries groups should also be consulted.

2.31.7 The assessment by the applicant should include detailed surveys of the effects on fish stocks of commercial interest and any potential reduction in such stocks, as well as any likely constraints on fishing activity within the project's boundaries. Robust baseline data should have been collected and studies conducted as part of the assessment.

2.31.8 Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on commercial fishing.

2.31.9 Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the Maritime and Coastguard Agency (MCA). Exclusion of certain types of fishing may make an area more productive for other types of fishing. The assessment by the applicant should include detailed surveys of the effects on fish stocks of commercial interest and the potential reduction or increase in such stocks that will result from the presence of the wind farm development and of any safety zones.

Mitigation

2.31.10 Any mitigation proposals should result from the applicant having detailed consultation with relevant representatives of the fishing industry, the MMO and the relevant Defra policy team.

2.31.11 Mitigation should be designed to enhance where reasonably possible any potential medium and long-term positive benefits to the fishing industry, commercial fish stocks and the marine environment.

Secretary of State decision making

2.31.12 The Secretary of State should be satisfied that the site selection process has been undertaken in a way that reasonably minimises adverse effects on fish stocks, including during peak spawning periods and the activity of fishing itself. This will include siting in relation to the location of prime fishing grounds. The Secretary of State should consider the extent to which the proposed development occupies any recognised important fishing grounds and whether the project would prevent or significantly impede protection of sustainable commercial fisheries or fishing activities. Where the Secretary of State considers the wind farm would significantly impede protection of sustainable fisheries or fishing activity at recognised important fishing grounds, this should be attributed a correspondingly significant weight. The Secretary of State should consider adverse or beneficial impacts on different types of commercial fishing on a case-by-case basis.

2.31.13 The Secretary of State should be satisfied that the applicant has sought to design the proposal having consulted the MMO, Defra and representatives of the fishing industry with the intention of minimising the loss of fishing opportunity taking into account effects on other marine interests. Guidance has been jointly agreed by the renewables and fishing industries on how they should liaise with the intention of allowing the two industries to successfully co-exist.

2.31.14 The Secretary of State will need to consider the extent to which disruption to the fishing industry, whether short term during construction or long term over the operational period, including that caused by the future implementation of any safety zones, has been mitigated where reasonably possible.

2.32 Offshore wind impacts: marine historic environment

Introduction

2.32.1 Impacts arising from offshore wind farm projects on the onshore historic environment effects are covered in Section 5.9 of EN-1. For offshore energy

infrastructure, there are further considerations for the marine historic environment.

2.32.2 Heritage assets and other remains of past human activity as described in Section 5.9 of EN-1, may exist offshore and within the intertidal area (the area between mean high and mean low water). This can include evidence of pre-historic human activity and submerged prehistoric landscapes which existed prior to sea level rises, as well as maritime wreck sites, remains of crashed aircraft and associated cultural material.

2.32.3 The marine historic environment can be affected by offshore wind farm development in two principal ways:

- from direct effects arising from of the physical siting of the development itself such as the installation of wind turbine foundations and electricity cables or the siting of plant required during the construction phase of development
- from indirect changes to the physical marine environment (such as scour, coastal erosion or sediment deposition) caused by the proposed infrastructure itself or its construction (see the policy on physical environment in Section 2.25 of this NPS).

Applicant's assessment

2.32.4 Consultation with the relevant statutory consultees on the potential impacts on the marine historic environment should be undertaken by applicants at an early stage of development, taking into account any applicable guidance (e.g., offshore renewables protocol for archaeological discoveries[33]).

2.32.5 Assessment of potential impacts upon the historic environment should be considered as part of the Environmental Impact Assessment process undertaken to inform any application for consent. Desk based studies to characterise the features of the historic environment that may be affected by a proposed development and assess any likely significant effects should be undertaken by competent archaeological experts. These studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design.

2.32.6 Assessment may also include the identification of any beneficial effects on the marine historic environment, for example through improved access or the contribution to new knowledge that arises from investigation.

2.32.7 Where elements of a proposed project (whether offshore or onshore) may interact with historic environment features that are located onshore, the effects should be assessed in accordance with the policy at Section 5.9 in EN-1.

[33] https://www.wessexarch.co.uk/our-work/offshore-renewables-protocol-archaeological-discoveries

Mitigation

2.32.8 The avoidance of important heritage assets to ensure their protection *in situ*, is the most effective form of protection. This can be achieved through the implementation of exclusion zones around known and potential heritage assets which preclude development activities within their boundaries. The boundaries can be drawn around either discrete sites or more extensive areas identified in the Environmental Statement produced to support an application for consent.

2.32.9 As set out in paragraphs 2.23.8 and 2.23.9 above, where requested by applicants, the Secretary of State should consider granting consents that allow for micrositing/microrouting to be undertaken within a specified tolerance. This allows changes to be made to the precise location of infrastructure during the construction phase so that account can be taken of unforeseen circumstances such as the discovery of marine archaeological remains.

Secretary of State decision making

2.32.10 The Secretary of State should be satisfied that any proposed offshore wind farm project has appropriately considered and mitigated for any impacts to the historic environment, including both known heritage assets, and discoveries that may be made during the course of development.

2.33 Offshore wind impacts: navigation and shipping

Introduction

2.33.1 Offshore wind farms will occupy an area of the sea and therefore it is inevitable that there will be some impact on navigation in and around the area of the site. This is relevant to both commercial and recreational users of the sea who may be affected by disruption or economic loss because of the proposed offshore wind farm. To ensure safety of shipping, it is Government policy that wind farms should reduce risks to navigational safety to as low as reasonably practicable (ALARP), however consent may not be given to projects which pose unacceptable risks to navigational safety after all possible mitigation measures have been adopted.

2.33.2 Impacts on navigation can arise from the wind farm or other infrastructure and equipment creating a physical barrier during construction and operation. The presence of the wind turbines can also have impacts on communication and shipborne and shore-based radar systems.

2.33.3 Further impacts may arise from the granting of safety zones. Applicants may seek declaration of safety zones around wind turbines and other infrastructure, although these might not be applied for until after consent for the wind farm

has been granted. The declaration of a safety zone excludes or restricts activities within the defined sea areas.

2.33.4 There is a public right of navigation over navigable tidal waters. In International Law, foreign vessels have the right of innocent passage through the UK's territorial waters. Beyond the seaward limit of the territorial sea, shipping has the freedom of navigation although offshore infrastructure and the imposition of safety zones can hinder this.

2.33.5 The use of the sea by recreational craft is also an important consideration. Recreational craft, such as yachts, may try to avoid areas of sea used by commercial vessels such as recognised sea lanes essential to international navigation. In some circumstances, vessels from other countries may sail in waters within which offshore wind farms are sited.

Applicant's assessment

2.33.6 Applicants should establish stakeholder engagement with interested parties in the navigation sector early in the development phase of the proposed offshore wind farm and this should continue throughout the life of the development including during the construction, operation and decommissioning phases. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and navigation uses of the sea to successfully co-exist.

2.33.7 Assessment should be underpinned by consultation with the MMO, Maritime and Coastguard Agency (MCA), the relevant General Lighthouse Authority, the relevant industry bodies (both national and local) and any representatives of recreational users of the sea, such as the Royal Yachting Association (RYA), who may be affected.

2.33.8 Information on internationally recognised sea lanes is publicly available and this should be considered by applicants prior to undertaking assessments. The assessment should include reference to any relevant, publicly available data available on the Maritime Database.

2.33.9 Applicants should undertake a Navigational Risk Assessment (NRA) in accordance with relevant government guidance prepared in consultation with the MCA and the other navigation stakeholders listed above.

2.33.10 The navigation risk assessment will for example necessitate:

- a survey of vessels in the vicinity of the proposed wind farm
- a full NRA of the likely impact of the wind farm on navigation in the immediate area of the wind farm in accordance with the relevant marine guidance

- cumulative and in-combination risks associated with the development and other developments (including other wind farms) in the same area of sea

2.33.11 Where there is a possibility that safety zones will be sought around offshore infrastructure, potential effects should be included in the assessment on navigation and shipping.

2.33.12 Where the precise extents of potential safety zones are unknown, a realistic worst-case scenario should be assessed. Applicants should consult the MCA and refer to the government guidance on safety zones.

2.33.13 The potential effect on recreational craft, such as yachts, should be considered in any assessment.

Extinguishing public rights of navigation

2.33.14 The Secretary of State may include provisions within the terms of a development consent as respects rights of navigation so far as they pass through waters in or adjacent to Great Britain which are between the mean low water mark and the seaward limits of the territorial sea. The provisions may specify or describe rights of navigation which:

- are extinguished
- are suspended for the period that is specified in the DCO
- are suspended until such time as may be determined in accordance with provisions contained in the DCO
- are exercisable subject to such restrictions or conditions, or both, as are set out in the DCO

2.33.15 The Secretary of State should specify the date on which any such provisions are to come into force, or how that date is to be determined.

2.33.16 The Secretary of State should require the applicant to publish any provisions that are included within the terms of the DCO, in such a manner as appears to the Secretary of State to be appropriate for bringing them, as soon as is reasonably practicable, to the attention of persons likely to be affected by them.

2.33.17 The Secretary of State should include provisions as respects rights of navigation within the terms of a DCO only if the applicant has requested such provision be made as part of their application for development consent.

Mitigation

2.33.18 Mitigation measures will include site configuration, lighting and marking of projects to take account of any requirements of the General Lighthouse

Authority and also the provision of an acceptable Active Safety Management System.

2.33.19 In some circumstances, the Secretary of State may wish to consider the potential to use requirements involving arbitration as a means of resolving how adverse impacts on other commercial activities will be addressed.

Secretary of State decision making

2.33.20 The Secretary of State should not grant development consent in relation to the construction or extension of an offshore wind farm if it considers that interference with the use of recognised sea lanes essential to international navigation is likely to be caused by the development. The use of recognised sea lanes essential to international navigation means:

(a) anything that constitutes the use of such a sea lane for the purposes of article 60(7) of the United Nations Convention on the Law of the Sea 1982

(b) any use of waters in the territorial sea adjacent to Great Britain that would fall within paragraph (a) if the waters were in a REZ

2.33.21 The Secretary of State should be satisfied that the site selection has been made with a view to avoiding or minimising disruption or economic loss to the shipping and navigation industries with particular regard to approaches to ports and to strategic routes essential to regional, national and international trade, lifeline ferries[34] and recreational users of the sea. Where after carrying a site selection, a proposed development is likely to adversely affect major commercial navigation routes, for instance by causing appreciably longer transit times, the Secretary of State should give these adverse effects substantial weight in its decision making. There may be some situations where reorganisation of traffic activity might be both possible and desirable when considered against the benefits of the wind farm proposal. The MCA, BEIS, and the commercial shipping sector should proactively engage with offshore wind farm developers and help identify mitigation measures, including alterations to navigation routes, to facilitate proposed offshore wind development.

2.33.22 Where a proposed offshore wind farm is likely to affect less strategically important shipping routes, a pragmatic approach should be employed by the Secretary of State. For example, vessels usually tend to transit point to point routes between ports (regional, national, and international). Many of these routes are important to the shipping and ports industry as is their contribution to the UK economy. In such circumstances the Secretary of State should expect the applicant to minimise negative impacts to as low as reasonably

[34] “Lifeline ferries” provide an essential service between islands or an island and the mainland on which the occupiers of the island rely for transportation of passengers and goods.

practicable (ALARP). Again, there may be some situations where reorganisation of traffic activity might be both possible and desirable when considered against the benefits of the wind farm application and such circumstances should be discussed with the MCA and the commercial shipping sector.

2.33.23 A detailed Search and Rescue Response Assessment should be undertaken prior to commencement of construction should consent for the offshore wind farm be granted. This assessment could be secured by a requirement to any consent. However, where there are significant concerns over the frequency or the consequences of such incidents, a full assessment may be required before the application can be determined.

2.33.24 Applicants will be required to demonstrate that risks to navigational safety will be reduced to ALARP. The Secretary of State should not consent applications which pose unacceptable risks to navigational safety after all possible mitigation measures have been considered.

2.33.25 The Secretary of State should be satisfied that the scheme has been designed to minimise the effects on recreational craft and that appropriate mitigation measures, such as buffer areas, are built into applications to allow for recreational use outside of commercial shipping routes. In view of the level of need for energy infrastructure, where an adverse effect on the users of recreational craft has been identified, and where no reasonable mitigation is feasible, the Secretary of State should weigh the harm caused with the benefits of the scheme.

2.33.26 Providing proposed schemes have been carefully designed by the applicants, and that the necessary consultation with the MCA and the other navigation stakeholders listed above has been undertaken at an early stage, mitigation measures may be possible to negate or reduce effects on navigation to a level sufficient to enable the Secretary of State to grant consent. The MCA will use the NRA as described in paragraphs 2.33.9 and 2.33.10 above when advising the Secretary of State on any mitigation measures proposed.

2.33.27 The Secretary of State should, in determining whether to grant consent for the construction or extension of an offshore wind farm, and what requirements to include in such a consent, have regard to the extent and nature of any obstruction of or danger to navigation which (without amounting to interference with the use of such sea lanes) is likely to be caused by the development.

2.33.28 In considering what interference, obstruction or danger to navigation and shipping is likely and its extent and nature, the Secretary of State should have regard to the likely overall effect of the development in question and to any cumulative effects of other relevant proposed, consented and operational offshore wind farms.

2.34 Offshore wind impacts: other offshore infrastructure and activities

Introduction

2.34.1 The scale and location of future offshore wind development around England and Wales means that development has occurred, and will continue to occur, in or close to areas where other offshore infrastructure, such as telecommunication cables or oil and gas pipelines and platforms, are located or other activities, including oil and gas exploration/drilling, carbon dioxide pipelines and storage or marine aggregate dredging, take place.

2.34.2 Furthermore, it is likely that developers will apply for development consent to deploy other technologies that may interact with offshore wind farms, including other marine renewable electricity generation, such as wave and tidal devices, and the infrastructure required for the transportation and storage of carbon as a result of its capture from industrial sources.

2.34.3 The use of the offshore area for most other offshore activities and all siting of new infrastructure is regulated. For example, the Oil and Gas Authority grants licences to companies to explore for and develop oil and gas reserves in waters around the UK. Such activity could result in the construction of offshore infrastructure necessary for extraction of any reserves discovered, including offshore platforms and pipelines, much of which require access for helicopters. In some situations, new developments may be able to access existing pipelines, but in some circumstances new pipelines will need to be constructed.

Applicant's assessment

2.34.4 Where a potential offshore wind farm is proposed close to existing operational offshore infrastructure or has the potential to affect activities for which a licence has been issued by government, the applicant should undertake an assessment of the potential effects of the proposed development on such existing or permitted infrastructure or activities. The assessment should be undertaken for all stages of the lifespan of the proposed wind farm in accordance with the appropriate policy and guidance for offshore wind farm EIAs. Marine plans (paragraph 2.22.5 of this NPS and Section 4.4 of EN-1) will help applicants consider which activities may be most affected by their proposal and thus where to target their assessment.

2.34.5 Applicants should engage with interested parties in the potentially affected offshore sectors early in the development planning phase of the proposed offshore wind farm, with an aim to resolve as many issues as possible prior to the submission of an application.

2.34.6 Such stakeholder engagement should continue throughout the life of the development including construction, operation and decommissioning phases where necessary. As many of these offshore industries are regulated by government, the relevant Secretary of State should also be a consultee where necessary. Such engagement should be taken to ensure that solutions are sought that allow offshore wind farms and other uses of the sea to successfully co-exist.

Mitigation

2.34.7 Detailed discussions between the applicant for the offshore wind farm and the relevant consultees should have progressed as far as reasonably possible prior to the submission of an application. As such, appropriate mitigation should be included in any application, and ideally agreed between relevant parties.

2.34.8 In some circumstances, the Secretary of State may wish to consider the potential to use requirements involving arbitration as a means of resolving how adverse impacts on other commercial activities will be addressed.

Secretary of State decision making

2.34.9 There are statutory requirements concerning automatic establishment of navigational safety zones relating to offshore petroleum developments[35].

2.34.10 Where a proposed offshore wind farm potentially affects other offshore infrastructure or activity, a pragmatic approach should be employed by the Secretary of State. Much of this infrastructure is important to other offshore industries as is its contribution to the UK economy. In such circumstances the Secretary of State should expect the applicant to minimise negative impacts and reduce risks to as low as reasonably practicable.

2.34.11 As such, the Secretary of State should be satisfied that the site selection and site design of the proposed offshore wind farm has been made with a view to avoiding or minimising disruption or economic loss or any adverse effect on safety to other offshore industries. Applicants will be required to demonstrate that risks to safety will be reduced to as low as reasonably practicable. The Secretary of State should not consent applications which pose unacceptable risks to safety after mitigation measures have been considered.

2.34.12 Where a proposed development is likely to affect the future viability or safety of an existing or approved/licensed offshore infrastructure or activity, the Secretary of State should give these adverse effects substantial weight in its decision-making.

[35] Section 21, Part 3 Petroleum Act 1987.

2.34.13 Providing proposed schemes have been carefully designed, and that the necessary consultation with relevant bodies and stakeholders has been undertaken at an early stage, mitigation measures may be possible to negate or reduce effects on other offshore infrastructure or operations to a level sufficient to enable the Secretary of State to grant consent.

2.35 Offshore wind impacts: seascape and visual effects

Introduction

2.35.1 Generic landscape and visual impacts are covered in Section 5.10 of EN-1. In addition, there are specific considerations which apply to offshore wind energy infrastructure proposals as set out below.

2.35.2 Seascape is an additional issue for consideration given that it is an important environmental, cultural and economic asset. This is especially so where seascape provides the setting for a nationally designated landscape (National Park, the Broads or AONB) and supports the delivery of the designated area's statutory purpose; and for stretches of coastline identified as Heritage Coasts which are associated with a largely undeveloped coastal character. Seascape is a discrete area within which there is shared inter-visibility between land and sea.[36] In some circumstances it may be necessary to carry out a seascape and visual impact assessment (SLVIA[37]) in accordance with the relevant offshore wind farm EIA policy. This will always be the case where a coastal National Park, the Broads or AONB, or a Heritage Coast is potentially affected.

Applicant's assessment

2.35.3 Relevant guidance should be followed including, but not limited to seascape character assessments[38] and marine plan seascape character assessments (e.g., northeast marine plan[39]). Some applications for offshore wind farms that are submitted to the Secretary of State will be proposed at distances that mean that a project would not be visible from the shore. In these instances, the Secretary of State is likely to be able to conclude that an SLVIA will not be required.

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[36] Definition taken from Appendix 3 of DTI (2005) Guidance on the Assessment of the Impact of Offshore Wind Farms: Seascape and Visual Impact Report.
[37] Seascape, Landscape and Visual Impact Assessment. See Landscape Institute Guidelines for Landscape and Visual impact Assessment Edition 3
[38] https://www.gov.uk/government/publications/seascape-character-assessments-identify-and-describe-seascape-types
[39] https://www.gov.uk/government/publications/seascape-assessments-for-north-east-north-west-south-east-south-west-marine-plan-areas-mmo1134

2.35.4 Where a proposed offshore wind farm will be visible from the shore and would be within the setting of a nationally designated landscape with potential effects on the area's statutory purpose, an SLVIA should be undertaken which is proportionate to the scale of the potential impacts. Impact on seascape should be addressed in addition to the landscape and visual effects discussed in Section 5.10 of EN-1.

2.35.5 Where necessary, assessment of the seascape should include an assessment of four principal considerations on the likely effect of offshore wind farms on the coast:

- the limit of visual perception from the coast under poor, good and best lightening conditions
- the effects of navigation and hazard prevention lighting on dark night skies
- individual landscape and visual characteristics of the coast and the special qualities of designated landscapes, which limits the coasts capacity to absorb a development
- how people perceive and interact with the coast and seascape

2.35.6 As part of the SLVIA, photomontages[40] will be required. Viewpoints to be used for the SLVIA should be selected in consultation with the statutory consultees at the EIA Scoping stage.

2.35.7 Magnitude and significance of change to both the identified seascape receptors (such as seascape and landscape units, visual receptors and designated landscapes) should be assessed in accordance with the standard methodology for SLVIA.

2.35.8 Where appropriate, cumulative SLVIA should be undertaken in accordance with the policy on cumulative assessment outlined in EN-1.

Mitigation

2.35.9 Neither the design nor scale of individual wind turbines can be changed without significantly affecting the electricity generating output of the wind turbines. Therefore, the Secretary of State should expect it to be unlikely that mitigation in the form of reduction in scale will be feasible. However, the layout of the turbines should be designed appropriately to minimise harm, taking into account other constraints such as ecological effects, safety reasons or engineering and design parameters.

[40] See Landscape Institute Technical Advice Note. https://www.landscapeinstitute.org/visualisation/

Secretary of State decision making

2.35.10 The Secretary of State should assess the proposal in accordance with the policy set out in the landscape and visual impacts Section 5.10 of EN-1.

2.35.11 Where a proposed offshore wind farm is within sight of the coast, there may be adverse effects. The Secretary of State should not refuse to grant consent for a development solely on the ground of an adverse effect on the seascape or visual amenity unless:

- it considers that an alternative layout within the identified site could be reasonably proposed which would minimise any harm, taking into account other constraints that the applicant has faced such as ecological effects, while maintaining safety or economic viability of the application
- taking account of the sensitivity of the receptor(s) and impacts on the statutory purposes of designated landscapes as set out in Section 5.10 of EN-1, the harmful effects are considered to outweigh the benefits of the proposed scheme

2.35.12 Where adverse effects are anticipated either during the construction or operational phases, in coming to a judgement, the Secretary of State should consider the extent to which the effects are temporary or reversible.

Pumped Hydro Storage

2.36 Pumped hydro storage: introduction

2.36.1 Pumped hydro storage (PHS) uses the difference in height between two reservoirs or other bodies of water to store energy. By transferring water from the upper reservoir to the lower reservoir through a turbine, power can be generated. Later, the water must then be pumped back to the upper reservoir using power from the grid or elsewhere.

2.36.2 This section of EN-3 refers specifically to PHS, not hydroelectric power generation (for example where the upper reservoir is filled naturally from a watercourse or rainfall, or a run-of-the-river scheme). No applications for hydroelectric power generation NSIPs are expected, but if such an application is made then the information in this section may be relevant.

2.36.3 Unlike hydroelectric power generation, PHS is not a net generator of electricity: any power generation must subsequently be balanced by consumption to return the water to the upper reservoir. However, the storage capability is useful to the electricity grid as it helps to correct for imbalances in electricity supply and demand, as well as providing a range of other services to the grid, including inertia. In general, PHS is likely to consume electricity when there is excess renewable generation on the system, and generate electricity when renewable electricity is scarce. This helps to decarbonise the energy system by integrating more renewable electricity and providing greater flexibility.

2.36.4 PHS can have significant impacts on local landscape, including: flooding of land to form the reservoirs; construction of a dam to artificially hold back large volumes of water; and significant infrastructure including pipework, turbine and pumping stations, electricity transmission lines and vehicular access. PHS is most likely to be located in mountainous or hilly locations, and less likely to be situated in lowland areas.

2.37 Pumped hydro storage: technology details

2.37.1 PHS consists of two reservoirs, with a dam to hold back the flow of water from the upper reservoir. A pipeline (“penstock”) connects the upper reservoir to the generating station, which has another pipeline connecting it to the lower reservoir.

2.37.2 The generating station includes one or more turbines that convert the flow of water into rotational energy. “Reaction” type turbines are typically used,

although “impulse” type turbines can also be used. The choice of turbine could affect the power station performance, requirements for supporting equipment, and impacts on fish. Often the turbines are reversible so can be used to pump the water back to the upper reservoir. However, in some cases separate pumps are used.

2.37.3 Each turbine is coupled to a generator to convert the rotational energy to electricity. A substation for electrical equipment such as transformers is also required. Where the purpose of this substation is entirely to support the operation of the PHS facility itself, it should be considered integral to the PHS facility, and not an associated development. Finally, the power station must be connected to the electricity grid using electricity lines.

2.37.4 PHS facilities range in size, with generating capacities typically <100 MW to 3000 MW. Schemes can typically deliver their full rated power for several hours before the upper reservoir is depleted and typically have a round-trip efficiency of 70-80%. Most schemes can ramp from zero to full load in a matter of minutes.

2.38 Pumped hydro storage: significance to renewable generation

2.38.1 Due to the losses in pumping the water, PHS is a net consumer of electricity. However, it is valuable to the electricity grid as it enables storage of electricity at times when supply exceeds demand. PHS can then be called on at short notice to provide electricity when demand exceeds supply. Few technologies that are commercial or have been demonstrated at scale are able to provide such storage services at the scale of PHS.

2.38.2 As the electricity grid sees increasing levels of generation from variable renewable generators such as offshore wind, onshore wind and solar power, there will be an increasing need for storage infrastructure to balance electricity supply and demand. Therefore, PHS could be a key piece of infrastructure for enabling increased use of renewable generation.

2.39 Pumped hydro storage: factors influencing site selection by applicants

Site topography

2.39.1 Site topography is essential for PHS schemes, as they require two bodies of water at different heights (typically hundreds of metres apart in elevation). It may be possible to use natural bodies of water, especially for the lower reservoir.

2.39.2 PHS schemes are likely to require at least one man-made reservoir, therefore requiring suitable land to be flooded, such as a valley or former quarry. The site may also require space to build a dam to hold back the water flow.

2.39.3 The site will also require a sufficient water source to fill the reservoirs. This may be from a single watercourse or wider rainfall catchment area.

Grid connection

2.39.4 The connection of the proposed PHS scheme into the relevant electricity network will be an important consideration for applicants. The grid connection text at Section 4.10 in EN-1 sets out the important issues.

2.39.5 PHS schemes typically connect to the electricity network at an intermediate voltage of 275 kV or 400 kV. PHS schemes can play an essential role in maintaining grid stability, including at times where the grid is under stress (such as rapid changes in supply or demand). Therefore, it is critical that PHS schemes have grid connections with sufficient capacity. This may be especially challenging given the typically remote locations of PHS schemes.

Access

2.39.6 Applicants will need to consider the suitability of the access routes to the proposed site for both the construction and operation of the PHS scheme with the former likely to raise more significant issues. Section 5.14 of EN-1 advises on generic traffic and transport impacts. Construction of a new PHS scheme is likely to require a significant amount of civil engineering, potentially including the extraction of large amounts of material using heavy goods vehicles. PHS schemes are often located in remote, mountainous areas where access may be limited.

2.40 Pumped hydro storage: technical considerations for the Secretary of State

Flexibility in the project details

2.40.1 Generic information on flexibility is set out in Section 4.2 of EN-1. The Secretary of State should accept that PHS plant operators may not know the precise details of all elements of the proposed development until some time after any consent has been granted. Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised and give the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have, particularly in the worse-case

scenario, (as set out in EN-1 paragraph 4.2.6) to ensure that the project as it may be constructed has been properly assessed. In this way the maximum-adverse case scenario will be assessed and the Secretary of State should allow for this uncertainty in its consideration of the application and consent.

2.41 Pumped hydro storage: Secretary of State impact assessment principles

2.41.1 The Secretary of State should adhere to the following principles when examining and determining applications for PHS infrastructure.

2.41.2 The impacts identified in Part 5 of EN-1 and this NPS are not intended to be exhaustive and the Secretary of State should therefore consider any impacts which it determines are relevant and important to its decision.

National designations

2.41.3 In sites with nationally recognised designations (SSSIs, National Nature Reserves, National Parks, the Broads, Areas of Outstanding Natural Beauty, Registered Parks and Gardens, and Marine Conservation Zones), consent for renewable energy projects should only be granted where the relevant tests in Sections 5.4 and 5.10 of EN-1 are met and any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by the environmental, social and economic benefits.

2.41.4 In considering the impact on the historic environment as set out in Section 5.9 of EN-1 and whether it is satisfied that the substantial public benefits would outweigh any loss or harm to the significance of a designated heritage asset, the Secretary of State should take into account the positive role that large-scale renewable projects play in the mitigation of climate change, the delivery of energy security and the urgency of meeting net zero as well as national targets for renewable energy supply.

Other locational considerations

2.41.5 As most renewable energy resources can only be developed where the resource exists and where economically feasible, and because there are no limits on the need established in Chapter 3 of EN-1, the Secretary of State should not use a sequential approach in the consideration of renewable energy projects (for example, by giving priority to the re-use of previously developed land for renewable technology developments).

2.42 Pumped hydro storage impacts: landscape and visual

Introduction

2.42.1 Generic landscape and visual effects are covered in detail in Section 5.10 of EN-1. In addition, there are specific considerations which apply to PHS schemes as set out below.

2.42.2 The Secretary of State should be satisfied that the design of the proposed PHS scheme is of appropriate quality and minimises adverse effects on the landscape character and quality.

Applicant's assessment

2.42.3 An assessment of the landscape and visual effects of the proposed infrastructure should be undertaken in accordance with the policy set out in 5.10 of EN-1.

Secretary of State decision making

2.42.4 PHS schemes have the potential to have significant impacts on the landscape, which may include:

- construction of a substantial concrete dam (potentially several hundred metres in length, depending on the scale of the PHS scheme)
- construction of the generating station (requiring a building in excess of 25m in height)
- substantial civil works for the scheme foundations and to dig the reservoir(s), generating significant amounts of spoil
- flooding of land to create the reservoir(s) (potentially covering an area of several hundred square metres)

2.42.5 Good design that contributes positively to the character and quality of the area will go some way to mitigate adverse landscape/visual effects. Development proposals should consider the design of the dam and generating station, including the materials to be used in the context of the local landscape.

2.42.6 Construction of PHS schemes has the potential to generate large amounts of spoil, from the digging of foundations and the reservoirs themselves. If these spoil heaps are to be kept within the locality, they should be located in a way that minimises their visual impact. The safety and stability of the heaps will also need to be continually managed.

2.42.7 Mitigation is achieved primarily through aesthetic aspects of site layout and building design including size and external finish and colour of the infrastructure to minimise intrusive appearance in the landscape as far as

engineering requirements permit. In some cases it may be possible to house some of the station, including the generation station, underground or inside the dam. The precise architectural treatment will need to be site-specific.

2.42.8 The Secretary of State should expect applicants to seek to landscape PHS sites to visually enclose them at a low level as seen from surrounding external viewpoints. This makes the scale of the scheme less apparent, and helps conceal its lower level, smaller scale features. Earth bunds and mounds, tree planting or both may be used for softening the visual intrusion and may also help to attenuate noise from site activities.

2.43 Pumped hydro storage impacts: noise and vibration

Introduction

2.43.1 Generic noise and vibration impacts are covered in detail in Section 5.12 of EN-1. In addition, there are specific considerations which apply to PHS schemes. During operation, noise may arise from the operation of the turbines and other power generation equipment. There is also likely to be considerable noise in the construction phase, where blasting is required to create reservoirs and penstocks.

Applicant's assessment

2.43.2 The ES should include a noise assessment of the impacts on amenity in case of excessive noise from the project as described in Section 5.12 in EN-1.

Mitigation

2.43.3 As described in EN-1, the primary mitigation for noise for PHS schemes is through good design to enclose plant and machinery in noise-reducing buildings, wherever possible, and to minimise the potential for operations to create noise.

2.43.4 Noise from the operation of the PHS generating stations may be unavoidable. Similarly, noise from apparatus external to the main generating station may be unavoidable. This can be mitigated through careful plant selection.

2.43.5 Noise during construction, particularly from blasting, will be unavoidable. Careful consideration should be given to mitigating the impact of this on noise sensitive receptors.

Secretary of State decision making

2.43.6 The Secretary of State should consider the noise and vibration impacts according to Section 5.12 in EN-1, to ensure that noise and vibration will be adequately mitigated through requirements attached to the consent. The

Secretary of State will need to take into consideration the extent to which operational noise will be separately controlled by the EA.

2.43.7 The Secretary of State should not grant development consent unless it is satisfied that the proposals will meet the aims set out in paragraph 5.12.10 in EN-1.

2.44 Pumped hydro storage impacts: water quality and resources

Introduction

2.44.1 Generic water quality and resource impacts are set out in Section 5.16 of EN-1. Both the construction of a PHS scheme (including creation of reservoirs) and operation of the scheme may have impacts on the water quality and resource. Specific impacts may include:

- disposal of spoil from the scheme construction in the reservoirs may alter sedimentation rates and alter conditions for aquatic flora and fauna
- altering the flow of watercourse, affecting the rate at which sediment is deposited, conditions for aquatic flora and potentially affecting migratory fish species (e.g. salmon)
- fish impingement and/or entrainment – i.e. being drawn into the PHS turbines
- discharging water of an altered quality or temperature than the received water, affecting the biodiversity of aquatic flora and fauna. In particular, pumping of water to the upper reservoir is likely to result in increased temperatures.

Applicant's assessment

2.44.2 Where the project is likely to have effects on water quality or resources the applicant should undertake an assessment as required in EN-1, Section 5.16. The assessment should demonstrate that appropriate measures will be put in place to avoid or minimise adverse impacts of abstraction and discharge of water.

Mitigation

2.44.3 In addition to the mitigation measures set out in EN-1, design of the PHS scheme should include intake and outfall locations that avoid or minimise adverse impacts. There should also be specific measures to minimise fish impingement and/or entrainment and the discharge of excessive heat to receiving waters.

Secretary of State decision making

2.44.4 The Secretary of State should be satisfied that the applicant has demonstrated measures to minimise adverse impacts on water quality and resources as described above and in EN-1.

2.45 Pumped hydro storage impacts: biodiversity

Introduction

2.45.1 Generic biodiversity impacts are set out in Section 5.4 of EN-1. The design and construction of PHS schemes will have additional impacts on biodiversity. These may include:

- habitat loss resulting from flooding of land and/or clearing of vegetation
- soil removal for infrastructure causing alterations to landscape hydrology
- compromised water quality impacting aquatic flora and fauna, as described in 2.44.1

Applicant's assessment

2.45.2 Where the project is likely to have effects on biodiversity the applicant should undertake an assessment as required in EN-1, Section 5.4. The assessment is likely to need to take account of the ecological status of the water environment.

Mitigation

2.45.3 The mitigation measures set out in EN-1 should be followed. Additionally, it should be noted that PHS schemes can also provide benefits to local biodiversity, including through habitat creation and/or enhancement, fish re-stocking, and bankside planting. Some turbines may assist in increasing dissolved oxygen levels.

Secretary of State decision making

2.45.4 The Secretary of State should be satisfied that the applicant has demonstrated measures to minimise adverse impacts on biodiversity as described above and in EN-1.

2.46 Pumped hydro storage impacts: recreation

Introduction

2.46.1 As PHS schemes are likely to be located in hilly or mountainous areas, they are likely to have specific impacts on recreation. Impacts on the landscape and water courses could have adverse impacts on recreational activities such as watersports (e.g., canoeing) and fishing.

Applicant's assessment

2.46.2 Where the project is likely to have impacts on recreational activities, the applicant should undertake a full assessment, accounting for the views of relevant representational bodies and taking measures to minimise adverse impacts.

Mitigation

2.46.3 PHS schemes should be designed to minimise impacts on existing recreational activities. It may be possible for the PHS scheme to be designed in such a way that these activities can be enhanced.

Secretary of State decision making

2.46.4 The Secretary of State should be satisfied that the applicant has demonstrated measures to minimise adverse impacts on recreational activities as described above.

Solar Photovoltaic Generation

2.47 Solar photovoltaic generation: introduction

2.47.1 Solar farms are one of the most established renewable electricity technologies in the UK and the cheapest form of electricity generation worldwide. Solar farms can be built quickly and, coupled with consistent reductions in the cost of materials and improvements in the efficiency of panels[41], large-scale solar is now viable in some cases to deploy subsidy-free and at little to no extra cost to the consumer. The government has committed to sustained growth in solar capacity to ensure that we are on a pathway that allows us to meet net zero emissions. As such solar is a key part of the government's strategy for low-cost decarbonisation of the energy sector.

2.47.2 Solar farm proposals are currently likely to consist of solar panel arrays, mounting structures, piles, inverters, transformers and cables. Associated infrastructure may also be proposed such as energy storage[42] or security arrangements (which may encompass flood defences, fencing, lighting and surveillance). A typical solar panel for large-scale developments will measure 2msq with an output of around 450W. Along with associated infrastructure, generally a solar farm requires between 2 to 4 acres for each MW of output. A typical 50MW solar farm will consist of around 100,000 to 150,000 panels and cover between 125 to 200 acres, although this can vary significantly depending on the site and is also expected to change over time as the technology continues to evolve to become more efficient. Nevertheless, this scale of development will inevitably have impacts, particularly if sited in rural areas. Developers will be expected to consider the criteria for good design set out in EN1 Section 4.6 at an early stage when developing projects.

2.48 Solar photovoltaic generation: factors influencing site selection by applicant

2.48.1 The key considerations involved in the siting of a solar farm are likely to be influenced by factors set out in the following paragraphs.

Irradiance and site topography

2.48.2 Irradiance will be a key consideration for the applicant in identifying a potential site as the amount of electricity generated on site is directly affected by irradiance levels. Irradiance of a site will in turn be affected by surrounding

[41] https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020
[42] See paras 3.3.24 -3.3.27 in EN-1

topography, with an uncovered or exposed site of good elevation and favourable south-facing aspect more likely to increase year-round irradiance levels. This in turn affects the carbon emission savings and the commercial viability of the site.

2.48.3 In order to maximise irradiance, applicants may choose a site and design its layout with variable and diverse panel aspects, and panel arrays may also follow the movement of the sun in order to further maximise the solar resource.

Proximity of a site to dwellings

2.48.4 Utility-scale solar farms are large sites that may have a significant zone of visual influence. The two main impact issues that determine distances to sensitive receptors are therefore likely to be visual amenity and glint and glare. These are considered in Landscape, Visual and Residential Amenity (Section 2.51) and Glint and Glare (Section 2.52) impact sections below.

Capacity of a site

2.48.5 In order for a solar farm to generate electricity efficiently, site layout must be designed so as to maximise irradiance levels, and the panel array spacing should also seek to maximise the potential power output of the site. The type, spacing and aspect of panel arrays will depend on the physical characteristics of the site such as site elevation. However, this is a matter for the applicant.

2.48.6 Solar panels generate electricity in direct current (DC) form. A number of panels feed an external inverter, which is used to convert the electricity to alternating current (AC). After inversion a transformer will step-up the voltage for export to the grid. Because the inverter is separate from the panels, the total capacity of a solar farm can be measured either in terms of the combined capacity of installed solar panels (measured in DC) or in terms of combined capacity of installed inverters (measured in AC).

2.48.7 For the purposes of determining the capacity thresholds in Section 15 of the 2008 Act, all forms of generation other than solar are currently assessed on an AC basis, while solar farms are assessed on their DC capacity. Having reviewed this matter, the Secretary of State is now content that this disparity should end, particularly as electricity from some other forms of generation is switched between DC and AC within a generator before it is measured. Therefore, from the date of designation of this NPS, for the purposes of Section 15, the combined capacity of the installed inverters (measured in AC) should be used for the purposes of determining solar site capacity. The capacity threshold is 50MW (AC) in England and 350MW (AC) in Wales.

2.48.8 It should also be noted that the DC installed generating capacity of a solar farm will decline over time in correlation with the reduction in panel array

efficiency. Light induced degradation affects most solar panels and on average panels degrade at a rate of up to 1% each year. Applicants may account for this by overplanting solar panel arrays[43]. Therefore, AC installed export capacity should not be seen as an appropriate tool to constrain the impacts of a solar farm. Other measurements, such as panel size, total area and percentage of ground cover should be used to set the maximum extent of development when determining the planning impacts of an application.

2.48.9 Nothing in this section should be taken to change any development consent or other planning permission granted prior to the designation of this NPS. Any such permission should be interpreted on the basis upon which it was examined and granted. In particular, any permissions granted on the basis of a DC installed generating capacity should be built on that basis, unless an amendment is made to that permission and the difference in impacts is considered.

Grid connection

2.48.10 The connection of the proposed solar farm into the relevant electricity network will be an important consideration for applicants of solar. The grid connection text at Section 4.10 in EN-1 sets out the important issues.

2.48.11 Most solar farms are connected into the local distribution network. The capacity of the local grid network to accept the likely output from a proposed solar farm is critical to the technical feasibility of a development and as such some larger developments may seek connection to the transmission network if there is available network capacity and/or supportive infrastructure. The connection voltage, availability of network capacity, and the distance from the solar farm to the existing network can have a significant effect on the commercial feasibility of a development proposal.

2.48.12 The applicant may choose a site based on nearby available grid export capacity. Locating solar farms at places with grid connection capacity enables the applicant to maximise existing grid infrastructure, minimise disruption to local community infrastructure or biodiversity and reduce overall costs. Where this is the case, consideration should be given to the cumulative impacts of situating a solar farm in proximity to other energy generating stations and infrastructure.

[43] "Overplanting" refers to the situation in which the installed generating capacity or nameplate capacity of the facility is larger than the generator's grid connection. In the case described in para 2.48.8 solar generators may install but not initially use additional panels to act as a back-up for when panels degrade, thereby enabling the grid connection to be maximised across the lifetime of the site. For planning purposes, the proposed development will be assessed on the impacts of the total number of panels installed on the site (i.e., the impacts of the overplanted site).

Agriculture land classification and land type

2.48.13 Solar is a highly flexible technology and as such can be deployed on a wide variety of land types. Where possible, ground mounted Solar PV projects should utilise previously developed land, brownfield land, contaminated land, industrial land, or agricultural land preferably of classification 3b, 4, and 5 (avoiding the use of "Best and Most Versatile" cropland where possible)[44]. However, land type should not be a predominating factor in determining the suitability of the site location.

2.48.14 The Agricultural Land Classification (ALC) is the only approved system for grading agricultural quality in England and Wales and should be used to establish the ALC and identify the soil types to inform soil management at the construction, operation and decommissioning phases. This should be extended to the underground cabling and access routes. The soil survey may also inform the suitable beneficial use of the land during the operational phase. Criteria for grading the quality of agricultural land using the Agricultural Land Classification (ALC) of England and Wales is decided by Natural England[45] and considerations relating to land classification are expected to be made with reference to this guidance, or any successor to it.

2.48.15 Whilst the development of ground mounted solar arrays is not prohibited on sites of agricultural land classified 1, 2 and 3a, or designated for their natural beauty, or recognised for ecological or archaeological importance, the impacts of such are expected to be considered and are discussed under paragraphs 2.50 and 2.53. It is recognised that at this scale, it is likely that applicants' developments may use some agricultural land, however applicants should explain their choice of site, noting the preference for development to be on brownfield and non-agricultural land.

Accessibility

2.48.16 Applicants will need to consider the suitability of the access routes to the proposed site for both the construction and operation of the solar farm with the former likely to raise more issues. Section 5.14 of EN-1 advises on generic traffic and transport impacts while those which are specific to solar farms are considered under Section 2.54 of this NPS. Given that potential solar farm sites are largely in rural areas, access for the delivery of solar arrays and associated infrastructure during construction can be a significant consideration for solar farm siting.

[44] Details of the Agricultural Land Classification are at : http://publications.naturalengland.org.uk/publication/6257050620264448
[45] Ibid

2.49 Solar photovoltaic generation: technical considerations for the secretary of state

2.49.1 Applications for solar farms are likely to comprise a number of elements including solar panel arrays, piling, inverters, mounting structures, cabling, earthworks and measures associated with site security.

Access tracks

2.49.2 Applicants will sometimes need to construct access tracks to connect solar farms to the public road network. Applications should include the full extent of the access tracks necessary and an assessment of their effects. Developers will usually need to construct on-site access routes for operation and maintenance activities, such as footpaths, earthworks or landscaping. Applications should include the full extent of the access routes for operation and maintenance and their effects.

Site layout, design, and appearance

2.49.3 Developers will consider several factors when considering the location and layout of sites including levels of solar irradiance, proximity to available grid capacity to accommodate the scale of generation, predominance of open land, topography (a flat topography is often favoured), previous land use and ability to mitigate environmental impacts and any flood risk.

2.49.4 In terms of design and layout, developers may favour a south-facing arrangement of panels to maximise output although other orientations may be chosen. For example, an east-west layout, whilst likely to result in reduced output compared to south-facing panels on a panel-by-panel basis, may allow for a greater density of panels to compensate and therefore for generation to be spread more evenly throughout the day.

2.49.5 Considering the likely extent of solar sites, it is possible that proposed developments may affect the provision of local footpath networks and public rights of way. Public rights of way may need to be temporarily stopped up to enable construction; however it should be the applicant's intention, where practicable and safe, to keep all public rights of way that cross the proposed development site open during construction and to protect users where a public right of way borders or crosses the site. Developers are encouraged to design the layout and appearance of the site to ensure continued recreational use of public rights of way, where possible during construction, but in particular across the operation of the site, and to minimise as much as possible the visual outlook from existing footpaths. It should be noted that sites may provide the opportunity to facilitate enhancements to the local footpath network and the adoption of new public rights of way through site layout and design of access.

2.49.6 It is anticipated that detail on how public rights of way would be managed to ensure they are safe to use is detailed in an outline Public Rights of Way Management Plan.

2.49.7 It is likely that extensive underground cabling will be required to connect the electrical assets of the site, such as from the substation to the panel arrays or storage facilities. In the case of underground cabling, developers are expected to provide a method statement describing cable trench design, installation methodology, as well as details of the operation and maintenance regime.

Security and lighting

2.49.8 Security of the site is likely to be a key consideration for developers. When considering sites, developers may wish to consider the availability of natural defences such as steep gradients, hedging and rivers. Perimeter security measures such as fencing, electronic security, CCTV and lighting may also be needed, with the measures chosen considered on a site-specific basis. The visual impact of these security measures, as well as the impacts on local residents, including for example issues relating to intrusion from CCTV and light pollution in the vicinity of the site, should be assessed.

Project lifetimes

2.49.9 Solar panels typically have a design life of between 25 and 30 years, although this can sometimes be longer, and can be decommissioned relatively easily and cheaply. Solar panel efficiency deteriorates over time and applicants may elect to replace panels during the lifetime of the site. Applicants may apply for consent for a specified period, based on the design life of the panels. Such consent, where granted, is described as temporary because there is a finite period for which it exists, after which the project would cease to have consent and therefore must seek to extend the period of consent or be decommissioned and removed.

2.49.10 The nature and extent of decommissioning of a site can vary. Generally, the panel arrays and mounting structures will always be decommissioned with any underground cabling dug out to ensure that prior use of the site can continue.

2.49.11 Applications should set out what would be decommissioned and removed from the site at the end of the operational life of the generating station. There may be some instances where it may be less harmful for the ecology of the site to keep or retain certain types of infrastructure. Furthermore, there may be socio-economic benefits in retaining site infrastructure after the operational life, such as retaining pathways through the site or a site substation.

2.49.12 Where the consent for a solar farm is to be time-limited, the DCO should impose a requirement setting that time-limit from the date the solar farm starts to generate electricity. Such a requirement should also secure the

decommissioning of the generating station after the expiration of its permitted operation to ensure that inoperative plant is removed after its operational life. A limit of 25 years is typical, although applicants may seek consent for differing time-periods for operation.

2.49.13 The time-limited nature of solar farms, where a time-limit is sought by an applicant as a condition of consent, is likely to be an important consideration for the Secretary of State when assessing impacts such as landscape and visual effects and potential effects on the settings of heritage assets. Such judgements should include consideration of the period of time sought by the applicants for the generating station to operate. The extent to which the site will return to its original state may also be a relevant consideration.

Flexibility

2.49.14 Many different makes and models of solar panel arrays are available, each with differing size, mounting, and generating capacity. Associated infrastructure (such as inverters or transformers) may also vary depending on the model of the panels.

2.49.15 As set out in Chapter 4 of EN-1, at the time of application, solar farm operators may have multiple commercial agreements under consideration and may not know precisely which panels will be procured for the site until sometime after any consent has been granted. If panel details, or any other relevant information, are not available, then the applicant should assess the worst-case effects that the project could have (as set out in EN-1 paragraph 4.2.6) to ensure that the project as it may be constructed has been properly assessed. In this respect some flexibility should be provided in the consent.

2.49.16 In the case of solar farms, it is likely that this flexibility will be needed in relation to the dimensions of the panels and their layout and spacing. It may also be the case that applicants seek flexibility for the installation of energy storage, with the option to install further panels as a substitute. When this is the case, applications may include a range of options based on different panel numbers, types and layout, with and without storage. The maximum impact case scenario will be assessed and the Secretary of State will consider the maximum adverse effects in its consideration of the application and consent.

2.49.17 Where other specific details of the design of the site are uncertain at the time of application, this should be made clear by the applicant with the reasons for the uncertainty given. Where elements of the design of the scheme are unknown, the maximum impact case scenario should be assessed, and the Secretary of State should consider the maximum adverse effects in its consideration of the application and consent.

2.50 Solar photovoltaic generation impacts: biodiversity and nature conservation

Introduction

2.50.1 Generic biodiversity, ecology and geological impacts are covered in Section 5.4 of EN-1. In addition, there are specific considerations which apply to solar farms as set out below.

Applicant's assessment

2.50.2 The applicant's ecological assessments should identify any ecological risk from developing on the proposed site. Issues that may need assessment include habitats, ground nesting birds, wintering birds, bats, dormice, reptiles, great crested newts, water voles and badgers. The use of an advising ecologist during the design process can ensure that adverse impacts are mitigated, and biodiversity enhancements are maximised, although this is a decision for the individual applicant. The assessment may be informed by a 'desk study' of existing ecological records, an evaluation of the likely impacts of the solar farm upon ecological features, and should specify mitigation to avoid or minimise these impacts, and any further surveys required.

2.50.3 The assessment should consider earthworks associated with construction compounds, access roads and cable trenching. Where such soil stripping occurs topsoil and subsoil should be stripped, stored, and replaced separately in order to minimise soil damage and to provide optimal conditions for site restoration. Soil handling may be informed through a soil and Agricultural Land Classification (ALC) survey, with detailed guidance available in Defra's guidance on Construction Code of Practice for the Sustainable Use of Soils on Construction Sites[46] or any subsequent updates.

2.50.4 The assessment should consider how security and lighting installations may impact on the local ecology. Where pole mounted CCTV facilities are proposed the location of these facilities should be carefully considered in order to minimise impact. If lighting is necessary, it should be minimised and directed away from areas of likely habitat.

2.50.5 The assessment should consider how site boundaries are managed. If any hedges/scrub are to be removed, further surveys may be necessary to account for impacts. Buffer strips between perimeter fencing and hedges may be proposed, and the construction and design of any fencing should account

[46] Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (2009) https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites

for enabling mammal, reptile and other fauna access into the site if required to do so in the ecological report.

2.50.6 The assessment should consider the impacts of mobile arrays or trackers (if proposed) to avoid animals becoming trapped in moving parts.

2.50.7 The applicant's assessment may be accompanied by a Flood Risk Assessment. This will need to consider the impact of drainage. As solar PV panels will drain to the existing ground, the impact will not in general be significant. Where access tracks need to be provided, permeable tracks should be used, and localised Sustainable Drainage Systems (SuDS), such as swales and infiltration trenches, should be used to control any run-off where recommended. Given the temporary nature of solar PV farms, sites should be configured or selected to avoid the need to impact on existing drainage systems and watercourses. Culverting existing watercourses/drainage ditches should be avoided. Where culverting for access is unavoidable, it should be demonstrated that no reasonable alternatives exist and where necessary it will only be in place temporarily for the construction period.

2.50.8 The assessment should consider enhancement, management, and monitoring of biodiversity. Solar farms have the potential to increase the biodiversity value of a site, especially if the land was previously intensively managed. In some instances, the increase in biodiversity caused by the repurposing of previously developed or intensely managed land for solar generation may equate to a net positive impact.

2.50.9 The applicant should consider whether they need to provide geotechnical and hydrological information (such as identifying the presence of peat at each site) including the risk of landslide connected to any development work.

Mitigation

2.50.10 Proposed enhancements should take account of the above factors and as set out in Section 5.4 of EN1 and aim to achieve environmental and biodiversity net gain in line with the ambition set out in the 25 Year Environment Plan. This might include maintaining or extending existing habitats and potentially creating new important habitats, for example by instating: cultivated strips/plots for rare arable plants, rough grassland margins, bumble bee plant mixes, and wild bird seed mixes. It is advised that an ecological monitoring programme is developed to monitor impacts upon the flora of the site and upon any particular ecological receptors (e.g., bats and wintering birds). Results of the monitoring will then inform any changes needed to the land management of the site, including, if appropriate, any livestock grazing regime.

Secretary of State decision making

2.50.11 Water management is a critical component of site design for ground mount solar plants. Where previous management of the site has involved intensive agricultural practice, solar sites can deliver significant ecosystem services value in the form of drainage, flood attenuation, natural wetland habitat, and water quality management. The maximum impact case scenario will be assessed, and the Secretary of State will consider the maximum adverse effects in its consideration of the application and consent.

2.50.12 In addition to Section 5.4 of EN-1 there are specific considerations which should inform Secretary of State decision-making where developments are proposed on peat. In these cases, the Secretary of State should be satisfied that the solar farm layout and construction methods have been designed to minimise soil disturbance when building and maintaining roads and tracks and other infrastructure. This is to ensure the development will result in minimal disruption to the ecology, or release of CO2 and that the carbon balance savings of the scheme are maximised.

2.51 Solar photovoltaic generation impacts: landscape, visual and residential amenity

Introduction

2.51.1 Generic landscape and visual impacts are covered in Section 5.10 of EN-1. In addition, there are specific considerations which apply to solar panels, which are set out in the following paragraphs.

2.51.2 The approach to assessing cumulative landscape and visual impact of large-scale solar farms is likely to be the same as assessing other onshore energy infrastructure. Solar farms are likely to be in low lying areas of good exposure and as such may have a wider zone of visual influence than other types of onshore energy infrastructure. However, whilst it may be the case that the development covers a significant surface area, in the case of ground-mounted solar panels it should be noted that with effective screening and appropriate land topography the area of a zone of visual influence could be zero.

Applicant’s assessment

2.51.3 The applicant should carry out a landscape and visual assessment and report it in the ES. Visualisations may be required to demonstrate the effects of a proposed solar farm on the setting of heritage assets and any nearby residential areas or viewpoints.

2.51.4 Applicants should follow the criteria for good design set out in Section 4.6 of EN-1 when developing projects and will be expected to direct considerable effort towards minimising the landscape/visual impact of solar PV arrays. Whilst there is an acknowledged need to ensure solar PV installations are adequately secured, required security measures such as fencing should consider the need to minimise the impact on the landscape and visual impact.

2.51.5 The applicant should have regard in both the design layout of the solar farm, and future maintenance plans, to the retention of growth of vegetation on boundaries, including the opportunity for individual trees within the boundaries to grow on to maturity. The landscape and visual impact should be considered carefully at the pre-application stage. Existing hedges and established vegetation, including mature trees, should be retained wherever possible. Trees and hedges should be protected during construction. The impact of the proposed development on established trees and hedges should be informed by a tree survey or a hedge assessment as appropriate.

Mitigation

2.51.6 Applicants should consider the potential to mitigate landscape and visual impacts through, for example, screening with native hedges. Efforts should be made to minimise the use and height of security fencing. Where possible projects should utilise existing features, such as hedges or landscaping, to screen security fencing and use natural features, such as vegetation planting, to assist in site security. Projects should minimise the use of security lighting. Any lighting should utilise a passive infra-red (PIR) technology and should be designed and installed in a manner which minimises impact.

Secretary of State decision making

2.51.7 The Secretary of State will consider visual impact of any proposed solar PV farm, taking account of any sensitive visual receptors, and the effect of the development on landscape character, together with the possible cumulative effect with any existing or proposed development.

2.52 Solar photovoltaic generation impacts: glint and glare

Introduction

2.52.1 Solar panels may reflect the sun’s rays, causing glint and glare. Glint is defined as a momentary flash of light that may be produced as a direct reflection of the sun in the solar panel. Glare is a continuous source of excessive brightness experienced by a stationary observer located in the path of reflected sunlight from the face of the panel. The effect occurs when the solar panel is stationed between or at an angle of the sun and the receptor.

Applicant's assessment

2.52.2 In some instances, it may be necessary to seek a glint and glare assessment as part of the application. This may need to account for 'tracking' panels if they are proposed as these may cause differential diurnal and/or seasonal impacts. The potential for solar PV panels, frames and supports to have a combined reflective quality should be assessed. This assessment needs to consider the likely reflective capacity of all of the materials used in the construction of the solar PV farm.

Mitigation

2.52.3 Applicants should consider using, and in some cases the Secretary of State may require, solar panels to be of a non-glare/ non-reflective type and the front face of the panels to comprise of (or be covered) with a non-reflective coating for the lifetime of the permission.

Secretary of State decision making

2.52.4 Solar PV panels are designed to absorb, not reflect, irradiation. However, the Secretary of State should assess the potential impact of glint and glare on nearby homes and motorists.

2.52.5 There is no evidence that glint and glare from solar farms interferes in any way with aviation navigation or pilot and aircraft visibility or safety. Therefore, the Secretary of State is unlikely to have to give any weight to claims of aviation interference as a result of glint and glare from solar farms.

2.53 Solar photovoltaic generation impacts: cultural heritage

Introduction

2.53.1 Historic environment impacts are covered in Section 5.9 of EN-1. However, with respect to solar farms, the following considerations also apply.

2.53.2 The impacts of solar PV developments on the historic environment will require expert assessment in most cases. Solar PV developments may affect heritage assets (sites, monuments, buildings, and landscape) both above and below ground. Above ground impacts may include the effects of applications on the setting of Listed Buildings and other designated heritage assets as well as on Historic Landscape Character. Below ground impacts may include direct impacts on archaeological deposits through ground disturbance associated with trenching, cabling, foundations, fencing, temporary haul routes etc. Equally archaeological finds may be protected by a solar PV farm as the site is removed from regular ploughing and shoes or low-level piling is stipulated.

Applicant's assessment

2.53.3 It is anticipated that the applicant's assessment will be informed by a consultation with the Historic Environment Record (HER). Alternatively, the applicant may contact the local authority for this information. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should submit an appropriate desk-based assessment and, where necessary, a field evaluation. These are expected to be carried out, using expertise where necessary and in consultation with the local planning authority, and should identify archaeological study areas and propose appropriate schemes of investigation, and design measures, to ensure the protection of relevant heritage assets.

2.53.4 In some instances, field studies may include investigative work such as trial trenching beyond the boundary of the proposed site to assess the impacts of any underground cabling on archaeological assets. The extent of investigative work should be proportionate to the sensitivity of, and extent of proposed cabling in, the associated study area.

2.53.5 Applications should take account of the results of historic environment assessments in their design, for instance through the sensitive planning of installations. The applicant should consider what steps can be taken to ensure heritage assets are conserved in a manner appropriate to their significance, including the impact of proposals on views important to their setting. As the significance of a heritage asset derives not only from its physical presence, but also from its setting, careful consideration should be given to the impact of large-scale solar farms on such assets. Depending on their scale, design and prominence, a large-scale solar farm within the setting of a heritage asset may cause substantial harm to the significance of the asset. Visualisations may be required to demonstrate the effects of a proposed solar farm on the setting of heritage assets.

Mitigation

2.53.6 The ability of the applicants to microsite specific elements of the proposed development during the construction phase should be an important consideration by the Secretary of State when assessing the risk of damage to archaeology. Therefore, where requested by the applicant, the Secretary of State should consider granting consents which allow for the micro siting within a specified tolerance of elements of the permitted infrastructure so that precise locations can be amended during the construction phase in the event that unforeseen circumstances, such as the discovery of previously unknown archaeology, arise.

Secretary of State decision making

2.53.7 Consistent with the generic policy on historic environmental impacts in EN1 (Section 5.9) the Secretary of State should be satisfied that solar farms and associated infrastructure have been designed sensitively taking into account known heritage assets and their status.

2.53.8 Solar farms are generally consented on the basis that they will be time-limited in operation. The Secretary of State should therefore consider the length of time for which consent is sought when considering the impacts of any indirect effect on the historic environment, such as effects on the setting of designated heritage assets.

2.54 Solar photovoltaic generation impacts: construction including traffic and transport noise and vibration

Introduction

2.54.1 Generic traffic and transport impacts are covered in EN-1, Section 5.14. In addition, there are specific considerations which apply to solar farms as set out below. Public perception of the construction phase of solar farm will derive mainly from the effects of traffic movements.

2.54.2 Many solar farms will be sited in areas served by a minor road network. Modern solar farms are large sites that are mainly comprised of small structures that can be transported separately and constructed on-site. It is likely that applicants will designate a construction compound on-site for the delivery and assemblage of the necessary components. Traffic is likely to involve smaller vehicles than typical onshore energy infrastructure but may be more voluminous. It is important that all sections of roads and bridges on the proposed delivery route can accommodate the weight and volume of the loads.

Applicant's assessment

2.54.3 The applicant should have assessed the various potential routes to the site for delivery of materials and components where the source of the materials is known at the time of the application and selected the route that is the most appropriate. It is possible that the exact location of the source of construction materials, such as crushed stone or concrete will not be known at the time of the application to the Secretary of State. In these circumstances, the impact of additional vehicles on the likely potential routes should have been assessed.

2.54.4 The applicant should assess whether the access roads are suitable for the transportation of components which will include whether they are sufficiently

wide for the proposed vehicles, or bridges sufficiently strong for the heavier components to be transported to the site. It is unlikely that sections of the route will require modification to allow for the transportation of components to the site, given the nature of solar developments, but any potential modifications should be identified, and potential effects assessed as part of the ES.

2.54.5 There may be several other energy infrastructure developments proposed that use a common port and/or access route and pass through the same towns. It is common for solar farms to locate where there is existing or surplus grid capacity, for instance. Where a cumulative impact is likely then a cumulative transport assessment should form part of the ES to consider the impacts of abnormal traffic movements relating to the project in question in combination with those from any other relevant development. Consultation with the relevant local highways authorities is likely to be necessary.

Mitigation

2.54.6 In some cases, the local highways authority may request that the Secretary of State impose controls on the number of vehicle movements to and from the solar farm site in a specified period during its construction and, possibly, on the routeing of such movements particularly by heavy vehicles. Where the Secretary of State agrees that this is necessary considering all representations, this could be achieved by imposing suitable requirements on development consent.

2.54.7 Where cumulative effects on the local road network or residential amenity are predicted from multiple solar farm developments, it may be appropriate for applicants for various projects to work together to ensure that the number of abnormal loads and deliveries are minimised, and the timings of deliveries are managed and coordinated to ensure that disruption to local residents and other highway users is reasonably minimised. It may also be appropriate for the highway authority to set limits for and coordinate these deliveries through active management of the delivery schedules through the abnormal load approval process.

2.54.8 Once consent for a scheme has been granted, applicants should liaise with the relevant local highway authority (or other coordinating body) regarding the start of construction and the broad timing of deliveries. It may be necessary for an applicant to agree a planning obligation to secure appropriate measures, including restoration of roads and verges. It may be appropriate for any non-permanent highway improvements carried out for the development (such as temporary road widening) to be made available for use by other subsequent solar farm developments.

Secretary of State decision making

2.54.9 Consistent with the generic policy set out in EN-1, the Secretary of State should be satisfied, taking into account the views of the relevant local highway authorities, that if there are abnormal loads proposed, they can be safely transported in a way that minimises inconvenience to other road users and that the environmental effects of this and other construction traffic, after mitigation, are acceptable.

2.54.10 Once solar farms are in operation, traffic movements to and from the site are generally very light, in some instances as little as a few visits each month by a light commercial vehicle or car. Should there be a need to replace machine components, this may generate heavier commercial vehicle movements, but these are likely to be infrequent. Therefore, it is very unlikely that traffic or transport impacts from the operational phase of a project would prevent it from being approved by the Secretary of State.

Tidal Stream Energy

2.55 Tidal stream energy: introduction

2.55.1 Tidal stream energy technology is at an early commercial stage in the UK and may start to play a role over the next 5 years, in helping to secure the UK's ambition to achieve net zero by 2050. Although it is not currently cost-competitive with other renewable energy technologies, there are indications of the scope for significant future cost reductions. Tidal stream operational capacity in the UK is 10MW; however, there are several sites under development and a further 1,000MW sites are leased. There is a realistic chance of projects above 100MW coming forward for planning consent within the next 5-6 years.

2.55.2 Most tidal stream projects, unlike offshore wind, are likely to be located close to the coastline. There are two main UK sea areas where tidal stream arrays can be built:

- in UK territorial waters, which generally extend up to 12nm from the coast
- beyond the 12nm limit where, under international law, the UK is able to construct wind farm installations or other structures to produce renewable energy in the REZ as declared in the Energy Act 2004[47].

2.55.3 For clarification, any reference within this NPS to tidal stream infrastructure includes all the elements which may be part of an application, including tidal stream turbines, all types of mounting mechanisms (fixed bottom or floating), onshore and offshore substations, and cabling.

2.55.4 Tidal stream energy projects can be expected to have impacts on wildlife, underwater sound, seabed habitats (through damage/ alterations) and on distributions or movements of marine species but there is currently a lack of a robust evidence base related to environmental impacts. The extent to which generic impacts set out in EN-1 are relevant to a project will have to be assessed on a case-by-case basis. There are 21 tidal stream developers across the UK, most of which are small projects located at testing/ demonstration sites. It is possible that we will see projects of the order of 100MW or above from scaling up over the next few years. Consolidation of the evidence base can be achieved through the monitoring of environmental impacts of existing smaller projects to help inform further planning guidance (EN-3) versions.

[47] The REZ was designated by the Renewable Energy Zone (Designation of Area) Order 2004 (SI 2004/2668), exercising powers in section 8(4) of the Energy Act 2004. It extends from the seaward limit of the territorial sea up to a maximum of 200 nautical miles from the baseline.

2.55.5 The applicant should identify the impacts of a proposal and these impacts, together with proposals for their avoidance or mitigation or compensation wherever possible, should be set out in an ES that should accompany each project application. Policy on ESs is set out in Section 4.2 of EN-1.

2.56 Tidal stream energy: consenting process

2.56.1 Welsh Ministers are responsible for issuing DCOs for renewable energy projects up to 350MW in Wales and in Welsh waters.

Marine licence

2.56.2 Any consent granted by BEIS will be able to include provision deeming the grant of a marine licence for operations carried out wholly in England and in English waters.

2.56.3 Welsh Ministers will be responsible for issuing marine licences for operations carried out in Wales and in Welsh waters.

2.56.4 Marine licences are primarily concerned with the need to protect the environment and human health, and to prevent interference with legitimate uses of the sea.

2.56.5 Marine licences are likely to be required for all the offshore elements of the proposed tidal stream array, including associated development such as the offshore cabling and any offshore substations that are required.

2.56.6 The MMO is responsible for enforcement and ongoing management of licence conditions, for operations carried out in England, waters adjacent to England up to the seaward limits of the territorial sea or a REZ (except any part of a REZ in relation to which the Scottish ministers have functions).

2.56.7 The Planning Inspectorate should liaise closely with the MMO on the proposed terms of any marine licence.

2.57 Tidal stream energy: factors influencing site selection and design by applicant

Strategic Environmental Assessment

2.57.1 The Government's Offshore Energy Strategic Environmental Assessment 2016 (SEA) concluded that that individual and small arrays of tidal stream devices may have localised effects that are detectable but unlikely to be highly significant at distance from the devices. However recent modelling work has demonstrated the potential for significant, far reaching impacts, from larger

arrays of these devices depending on site location and size/layout of the array. Studies have indicated that impacts could be reduced at certain sites through careful siting, although uncertainty still arises as the models used only broadly represent the natural complexity of the water movements of an area.

2.57.2 Applicants should set out how they have drawn on the Government's Offshore Energy SEA in making their site selection.

2.57.3 Government is undertaking a rolling SEA programme for offshore energy, including a research programme and data collection to facilitate future assessments. These future offshore SEAs and data will be relevant to the applicants and the Secretary of State as and when they become available.

The Crown Estate

2.57.4 The Crown Estate owns virtually the entire seabed out to the 12nm territorial limit, including the rights to explore and utilise the natural resources of the UKCS (excluding oil, gas and coal). The seabed around England, Wales and Northern Ireland is managed by The Crown Estate, whereas the seabed around Scotland is managed by Crown Estate Scotland. It is therefore necessary to obtain a licence from The Crown Estate prior to placing any offshore structures on, or passing cables over, the seabed and its foreshore. As well as owning the rights to explore and utilise waters up to 12nm, the Energy Act 2004 gives The Crown Estate rights to issue licences for development beyond the territorial limit and within the REZ.

2.57.5 The Crown Estate Act 1961, Section 1(3) states that, with regard to property and land, The Crown Estate Commissioners must "maintain and enhance [The Crown Estate's] value and the return obtained from it, but with due regard to the requirements of good management". The Crown Estate identifies potential development areas in accordance with the requirements of The Crown Estate Act, government policy, plans and associated SEA work. In 2013, The Crown Estate agreed seabed rights for three new tidal stream demonstration zones, which would enable organisations to manage and sub-let parts of the seabed to a range of wave and tidal stream developers, and for five new tidal stream sites, each with the potential to deliver a project of between 10 and 30MW.

Tidal stream resource assessment

2.57.6 Predictability of tidal stream via condition monitoring and known tide variations is crucial to the level of availability of a project and its business case. However, collection of this data is not obligatory as the suitability of the tidal stream resource across the site and economics of the scheme are a matter for the technical and commercial judgement of the tidal stream applicant.

Foundation conditions

2.57.7 Devices will generally be anchored to fixed points in the seabed.

2.57.8 The onus is on the applicant to ensure that the foundation design is technically suitable for the seabed conditions and that the application caters for any uncertainty regarding the geological conditions. Whilst the technical suitability of the foundation design is not in itself a matter for the Secretary of State, it will need to be satisfied that the foundations will not have an unacceptable adverse effect on marine biodiversity, physical environment and marine heritage assets in accordance with the policy below. The applicant should have provided the necessary details to allow the Secretary of State to assess such impacts.

Grid connection

2.57.9 The connection of a proposed tidal stream array into the relevant electricity network will be an important consideration for applicants. The grid connection text at Section 4.10 of EN-1 sets out the important issues here.

2.57.10 Applicants for consent for tidal stream energy projects will have to work within the regulatory regime for offshore transmission networks established by Ofgem. Under the regime offshore transmission will be a licensed activity regulated by Ofgem.

Other offshore infrastructure

2.57.11 There may be constraints imposed on the siting or design of tidal stream arrays because of restrictions resulting from the presence of other offshore infrastructure or activities.

2.58 Tidal stream energy: technical considerations for the Secretary of State

Grid connection infrastructure

2.58.1 When considering grid connection issues, the Secretary of State should be mindful of the constraints of the regulatory regime for offshore transmission networks. At the time of the application, the applicant may or may not have secured a connection with the network operator into the onshore transmission network and is unlikely to know who will own and manage the offshore transmission assets required for the wind farm.

2.58.2 Where the applicant has identified a precise route for the cable from tidal stream project site to a precise location for the onshore substation and

connection to the transmission network, the ES should assess the effects of the cable.

2.58.3 Where the applicant does not know the precise location of any cabling or any necessary onshore and/or offshore substations, a corridor should be identified within which the cable and any offshore substation is likely to be located. The EIA for the proposed project should assess the effects of including this infrastructure within that corridor.

2.58.4 Where the point of onshore connection is unknown at the time of the application, the applicant should assess a corridor from the tidal stream array to the shore that is a reasonably likely area for the cable and any offshore substation should be assessed as part of the EIA.

2.58.5 A proposed offshore electricity cable connecting the tidal stream array with the onshore electricity infrastructure and any offshore electricity substations that may be required, may constitute associated development, depending on their scale and nature in relation to the tidal stream project[48]. Where the Secretary of State is satisfied that such offshore infrastructure does constitute associated development and can form part of the application, it should be considered by the Secretary of State in accordance with this NPS.

2.58.6 The onshore element of the grid connection (electric lines and substations) should be determined in accordance with the Electricity Networks Infrastructure NPS EN-5. Depending upon the scale and type of this onshore development, elements of it could constitute either associated development or an energy NSIP in its own right.

Flexibility in the project details

2.58.7 Owing to the nascent nature of tidal stream development, many of the details of a proposed scheme may be unknown to the applicant at the time of the application to the Secretary of State, possibly including:

- the precise location and configuration of turbines and associated development
- the foundation type
- the cable type and cable route
- the exact locations of offshore and/or onshore substations

2.58.8 In accordance with Section 4.2 of EN-1, the Secretary of State should accept that tidal stream operators are unlikely to know precisely which turbines will be procured for the site until some time after any consent has been granted.

[48] "Planning Act 2008: associated development applications for major infrastructure projects", can be found at https://www.gov.uk/government/publications/planning-act-2008-associated-development-applications-for-major-infrastructure-projects.

Where some details have not been included in the application to the Secretary of State, the applicant should explain which elements of the scheme have yet to be finalised, and the reasons. Therefore, some flexibility may be required in the consent. Where this is sought and the precise details are not known, then the applicant should assess the effects the project could have (as set out in EN-1 paragraph 4.2.6) to ensure that the project as it may be constructed has been properly assessed. In this way the maximum adverse case scenario will be assessed and the Secretary of State should allow for this uncertainty in its consideration of the application and consent.

Micrositing

2.58.9 Any consent that is granted by the Secretary of State should be flexible to allow for necessary micrositing of elements of the proposed tidal array during its construction, where requested at the application stage. This allows for unforeseen events such as the discovery of previously unknown marine archaeology that it would be preferable to leave in situ.

2.58.10 Where micrositing tolerance is requested by the applicant in any consent, given that the EIA should assess a maximum adverse case scenario, the assessment should reflect the implications of any micrositing as far as reasonably possible.

Repowering

2.58.11 Where an operational tidal array reaches the end of its life, subject to obtaining the necessary lease from The Crown Estate or providing an existing lease is still valid, the owner of the tidal array may wish to “repower” the site with new turbines. Given the likely change in technology over the intervening time period, any repowering of sites is likely to involve tidal turbines of a different scale and nature. This could result in significantly different impacts as well as a different electricity generating capacity and a new consent application would be required.

2.58.12 In determining an application for the repowering of a site, the proposed replacement scheme should be determined by the Secretary of State on its individual merits.

Future monitoring

2.58.13 Owing to the relatively new and complex nature of tidal stream development, the Secretary of State should consider requiring the applicant to undertake monitoring prior to and during construction and during its operation to measure and document the effects of the development and the efficacy of any associated mitigation or compensation. This enables an assessment of the accuracy of the original predictions and may inform the scope of future EIAs.

2.58.14 The Secretary of State may consider that monitoring of any impact is appropriate. Monitoring should be presented in formal reports which should be made publicly available.

Decommissioning

2.58.15 Section 105 of the Energy Act 2004 enables the Secretary of State to require the submission of a decommissioning programme for a proposed tidal array, provided at least one of the statutory consents required has been given or has been applied for and is likely to be given.

2.58.16 Where the Secretary of State decides to grant consent for a proposed tidal stream array, a condition requiring the applicant to submit a decommissioning programme to the Secretary of State before any offshore construction works begin should be included. The decommissioning programme must satisfy the requirements of s.105(8) of the Energy Act 2004.

2.59 Tidal stream energy: Secretary of State impact assessment principles

2.59.1 The Secretary of State should adhere to the principles set out in paragraphs 2.11.1, 2.12.1 and 2.12.2 since these also apply to tidal array and associated infrastructure.

Green belts

2.59.2 Although tidal arrays themselves will not have a direct impact on green belts, it is possible that some elements of these projects, such as onshore substations may be proposed on green belt land, and comprise inappropriate development which may impact on the openness of the green belt. The policy on development in the green belt is set out in Section 5.11 of EN-1 and paragraph 2.12.5 of this NPS.

Other locational considerations

2.59.3 As most renewable energy resources can only be developed where the resource exists and where economically feasible, the Secretary of State should not use a sequential approach in the consideration of renewable energy projects (for example, by giving priority to the re-use of previously developed land for renewable technology developments).

2.60 Tidal stream energy impacts: biodiversity and ecological conservation

Introduction

2.60.1 Generic ecology and biodiversity effects are covered in detail in Section 5.4 of EN-1. The coastal change policy in Section 5.6 of EN-1 may also be relevant. In addition, there are specific considerations which apply to offshore renewable energy infrastructure proposals, including tidal arrays as discussed below.

2.60.2 Biodiversity considerations to which applicants and the Secretary of State should have regard concerning offshore infrastructure include:

- fish
- seabed habitats – intertidal and subtidal
- marine mammals

2.60.3 The ecological effects of large tidal arrays during the construction and operational phases are not yet well understood. There is a paucity of knowledge regarding their impacts on the biodiversity of their surrounding environment. More studies are required to investigate the effect of large tidal arrays on biodiversity and the surrounding physical environment. There is the potential for physical disturbance to occur to varying degrees during the construction, routine operation and decommissioning of a tidal array. Construction and decommissioning are likely to cause significant though temporary physical disturbance to the local environment.

2.60.4 Continuous operation of large arrays could result in underwater noise and emission of electromagnetic fields, thus adversely impacting marine life. The possible collision with or avoidance of underwater turbine structures by marine life constitute further potential impacts associated with the operation of tidal arrays.

Applicant's assessment

2.60.5 Assessment of offshore ecology and biodiversity should be undertaken by the applicant for all stages of the lifespan of the proposed tidal arrays and in accordance with the appropriate policy for tidal arrays ESs.

2.60.6 Until more technology specific information is obtained, it is expected that biodiversity impacts will be broadly similar to offshore wind infrastructure (with the exception of birds in flight) and therefore applicants should consider the relevant paragraphs of the offshore wind section above. Consultation on the assessment methodologies should be undertaken at early stages with the statutory consultees as appropriate.

2.60.7 Any relevant data that has been collected as part of post-construction ecological monitoring from existing, operational tidal arrays farms should be referred to where appropriate.

2.60.8 The assessment should include the potential of the scheme to have both positive and negative effects on marine ecology and biodiversity.

Mitigation

2.60.9 Mitigation may be possible in the form of careful design of the development itself and the construction techniques employed.

2.60.10 Ecological monitoring is likely to be appropriate during the construction and operational phases to identify the actual impact so that, where appropriate, adverse effects can then be mitigated and to enable further useful information to be published relevant to future projects.

Secretary of State decision making

2.60.11 The Secretary of State should consider the effects of a proposal on marine ecology and biodiversity considering all relevant information made available to it.

2.60.12 The designation of an area as an HRA site does not necessarily restrict the construction or operation of tidal arrays in or near that area (see also Section 4.5 of EN-1).

2.61 Tidal stream energy impacts: other impacts

2.61.1 There is not yet sufficient evidence regarding impacts of tidal arrays to give separate guidance for the aspects listed below:

- commercial fisheries and fishing
- historic environments
- navigation and shipping
- oil, gas, carbon capture usage & storage and other offshore infrastructure and activities
- physical environment
- seascape and visual impacts

2.61.2 However, large tidal stream arrays are likely to share most characteristics of offshore wind with regard to impacts in respect of the considerations above. Tidal array applicants should therefore refer to the relevant parts of the offshore wind section above for guidance on these impacts.

3 Glossary

This glossary sets out the most frequently used terms in this NPS. There is a glossary in each of the energy NPSs. The glossary set out in EN-1 may also be useful when reading this NPS.

Abbreviation	Definition
AD	Anaerobic Digestion
AoS	Appraisal of Sustainability
Associated infrastructure	Development associated with the NSIP as defined in Section 115 of the Planning Act 2008
Biomass	Material of recent biological origin derived from plant or animal matter
CCGT	Combined Cycle Gas Turbine
CfD	Contracts for Difference
CHP	Combined Heat and Power
CCS	Carbon Capture and Storage
Co-firing	Use of two fuel types (e.g. natural gas and biomass) in a thermal generating station
DCO	Development Consent Order made under the Planning Act 2008.
DECC	Department of Energy and Climate Change
Defra	Department of Environment, Food and Rural Affairs
DfT	Department for Transport
EA	The Environment Agency
EIA	Environmental Impact Assessment
English Waters	Waters adjacent to England up to the 12 nm seaward limits of the territorial sea and in a REZ, except the Welsh zone or any part of a REZ in relation to which the Scottish Ministers have functions
EN-1	Overarching NPS for Energy
EP	Environmental Permit issued by EA
EPR	Environmental Permitting (England and Wales) Regulations 2016
ES	Environmental Statement
Generic Impacts	Potential impacts of any energy infrastructure projects, the general policy for consideration of which is set out in Part 5 of EN-1

Abbreviation	Definition
Habitats Regulations	The Conservation of Habitats and Species Regulations 2017 and the Conservation of Offshore Marine Habitats and Species Regulations 2017
HRA	Habitats Regulations Assessment
HRA site	One of the sites set out in paragraph 5.4.8 of EN-1 for which an HRA will assess the implications of a plan or project
MCZ	Marine Conservation Zone: areas that protect a range of nationally important, rare or threatened habitats and species. MCZs are established under section 116(1) of the Marine and Coastal Access Act 2009
MHCLG	Ministry for Housing, Communities and Local Government
Mean High Water Springs (MHWS)	The averaged highest level of spring tides. Calculated by measuring the average of two successive high waters during those 24 hours (approximately once a fortnight) when the range of the tide is greatest
MMO	Marine Maritime Organisation: set up under the Marine and Coastal Access Act 2009
MPA	Marine Protected Area
MW	Megawatt = one million watts
NE	Natural England: the Statutory Nature Conservation Body for England
NRW	Natural Resources Wales: the Statutory Nature Conservation Body for Wales
NSIP	Nationally Significant Infrastructure Project
Ofgem	Office of Gas and Electricity Markets
RDF	Refuse derived fuel
REZ	The Renewable Energy Zone
RO	Renewables Obligation
SAC	Special Area of Conservation under the Habitats Regulations
SEA	Strategic Environmental Assessment (under the Environmental Assessment of Plans and Programmes Regulations 2004)
SLVIA	Seascape, Landscape and Visual Impact Assessment
SNCB	Statutory Nature Conservation Body: bodies responsible for advising the Government on, and the administration of, nature conservation. Bodies include Natural England (NE, England), Natural Resources Wales (NRW, Wales),

Abbreviation	Definition
	NatureScot (NS, Scotland) and the Joint Nature Conservation Committee (JNCC, UK wide)
SPA	Special Protection Area under the Habitats Regulations
SRF	Solid recovered fuel
SSSI	Site of Special Scientific Interest designated under the Wildlife and Countryside Act 1981
Thermal Generating Station	Electricity generating station that uses a heat source (combustion of fuel or nuclear) to create steam that drives a generating turbine or which uses gas directly to drive a generating turbine
UKCS	United Kingdom Continental Shelf
Welsh Waters	Waters adjacent to Wales up to the 12 nm seaward limits of the territorial sea and the Welsh Zone of the REZ as defined by section 158 of the Government of Wales Act 2006

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APPENDIX 3

DRAFT NATIONAL POLICY STATEMENT

FOR ELECTRICITY NETWORKS INFRASTRUCTURE (EN5)

Department for
Business, Energy
& Industrial Strategy

Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)

September 2021

Any enquiries regarding this publication should be sent to us at:
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1 Introduction

1.1 Background

1.1.1 As we build the new electricity generation, storage, and interconnection infrastructure that our country needs in order to transition to net zero, we must also build the electricity networks that connect these vital facilities with each other and with centres of consumer demand. Moreover, as the electricity system grows in dispersion, variety, and complexity, reinforcement of the networks writ large will be necessary to maintain system robustness and security of supply.

1.1.2 This National Policy Statement (NPS), taken together with the Overarching National Policy Statement for Energy (EN-1), provides the primary policy for decisions taken by the Secretary of State on applications it receives for electricity networks infrastructure (see Section 1.6 of this NPS). The way in which NPSs guide the Secretary of State's decision making, and the matters which the Secretary of State is required by the Planning Act 2008 (the 2008 Act) to take into account in considering applications, are set out in Sections 1.1 and 4.1 of EN-1.

1.1.3 Applicants should ensure that their applications, and any accompanying supporting documents and information, are consistent with the instructions and guidance given to Applicants in this NPS, EN-1 and any other NPSs that are relevant to the application in question.

1.1.4 This NPS may be helpful to local planning authorities (LPAs) in preparing their local impact reports.

1.2 Role of this NPS in the wider planning system

1.2.1 In England and Wales this NPS may be a material consideration in decision making on applications that fall under the Town and Country Planning Act 1990 (as amended). Whether, and to what extent, this NPS is a material consideration, will be judged on a case by case basis and will depend upon the extent to which the matters are already covered by applicable planning policy.

1.2.2 Paragraph 1.2.3 and Section 4.4 of EN-1 provide details of how this NPS may be relevant to the decisions of the Marine Management Organisation (MMO) and how the Marine Policy Statement (MPS) and any applicable Marine Plan may be relevant to the Secretary of State in its decision making.

1.3 Relationship with EN-1

1.3.1 This NPS is part of a suite of energy NPSs. It should be read in conjunction with EN-1, which describes:

- the objectives, policy landscape and regulatory framework governing new nationally significant energy infrastructure projects (NSIPs) and any associated development
- the need and urgency for new energy infrastructure to be consented and built with the objective to ensure our supply of energy always remains secure, reliable, affordable, and consistent with net zero emissions in 2050 for a wide range of future scenarios, including through delivery of our carbon budgets and Nationally Determined Contribution (NDC), and supporting the government's policies on sustainable development, in particular by mitigating and adapting to climate change
- the need for specific technologies, including the types of infrastructure covered by this NPS
- key principles to be followed in the examination and determination of applications
- the role of the Appraisals of Sustainability (AoS) (see Section 1.7 below) in relation to the suite of energy NPSs
- policy on good design, climate change adaptation and other matters relevant to more than one technology specific NPS
- the assessment and handling of generic impacts that are not specific to particular technologies

1.3.2 Accordingly, this technology specific NPS will not repeat the material considerations set out in EN-1, which apply to all energy NSIPs unless clearly stated otherwise. This NPS focusses on policies and considerations that are specific to electricity networks infrastructure. (As construed in paragraph 1.6.2 below).

1.4 Geographical coverage

1.4.1 This NPS, together with EN-1, is the primary decision-making guidance document for the Secretary of State when considering development consent applications for NSIPs for electricity networks infrastructure in England and Wales as described in paragraph 1.6.2.

1.4.2 In Scotland, the Secretary of State will not examine applications for electricity network NSIPs. However, energy policy is generally a matter reserved to UK Ministers and this NPS may therefore be a relevant consideration in planning decisions in Scotland, particularly given the increase in Scotland to England onshore and offshore network connections required to meet the government's Net Zero target.

1.4.3 In Northern Ireland, planning consents for energy infrastructure projects are devolved to the Northern Ireland Executive, so the Secretary of State will not examine applications for energy infrastructure in Northern Ireland.

1.5 Period of validity and review

1.5.1 This NPS will remain in force in its entirety unless withdrawn or suspended in whole or in part by the Secretary of State. It will be subject to review by the Secretary of State in order to ensure that it remains appropriate. Information on the review process is set out in Sections 10 to 12 of the Annex to CLG's letter of 9 September 2009[1] and the MHCLG guidance on Review of NPSs.[2]

1.5.2 For transitional provisions following review, see Section 1.6 of EN-1.

1.6 Infrastructure covered by this NPS

1.6.1 Infrastructure for electricity networks generally can be divided into two main elements:

- transmission systems (the long distance transfer of electricity through 400kV and 275kV lines), and distribution systems (lower voltage lines from 132kV to 230V from transmission substations to the end-user) which can either be carried on towers/poles or undergrounded
- associated infrastructure, e.g. substations (the essential link between generation, transmission, and the distribution systems that also allows circuits to be switched or voltage transformed to a useable level for the consumer) and converter stations to convert DC power to AC power and vice versa. These are particularly relevant to the conversion of long distance offshore DC transmission to AC, when it arrives onshore for distribution

1.6.2 This NPS covers above ground electricity lines i) whose nominal voltage is expected to be 132kV or above, ii) whose length is greater than 2km, iii) that are not a replacement line within the meaning of Section 16(3)(ab) of the 2008 Act, and iv) that are not otherwise exempted for reasons set out in Sections 16(3)(b) and (c) of the 2008 Act. Other kinds of electricity infrastructure (including lower voltage overhead lines, underground or sub-sea cables at any voltage, and associated infrastructure as referred to above) will only be subject to the 2008 Act – and so be covered by this NPS – if it constitutes associated development for which consent is sought along with an NSIP such as a generating station or relevant overhead line or if the Secretary of

[1] https://www.gov.uk/guidance/planning-guidance-letters-to-chief-planning-officers
[2] https://www.gov.uk/guidance/planning-act-2008-guidance-on-the-process-for-carrying-out-a-review-of-existing-national-policy-statements

State gives a direction under Section 35 of the 2008 Act that it should be treated as an NSIP and require a development consent order.

1.7 Appraisal of Sustainability and Habitats Regulations Assessment

1.7.1 All the energy NPSs have been subject to an Appraisal of Sustainability (AoS), as required by the Planning Act 2008. The AoSs also incorporate the analysis of likely significant environmental effects required by the Strategic Environmental Assessment (SEA) Regulations (The Environmental Assessment of Plans and Programmes) 2004.

1.7.2 The purposes and methods of the AoSs are explained in the draft of the AoS for EN-1 (AoS-1) which is published alongside this document. Their primary function is to inform consultation on the draft NPSs by providing an analysis of the environmental, social and economic impacts of implementing the energy NPSs. The key findings from AoS-1 are included in EN-1.

1.7.3 In addition to those generic effects identified through the AoS and reported in AoS-1, a number of specific effects relating to EN-5 were identified, due to the type of technology promoted under this NPS.

1.7.4 Key points from the AoS for EN-5 are:

- Electricity networks infrastructure development has similar effects to other types of energy infrastructure, although due to the linear nature of cross-country, long electricity lines, effects are often more dispersed and spread across a wider area. Therefore, for the majority of AoS objectives, the strategic effects of EN-5 are considered to match those identified in AoS-1.
- However, associated with additional detail provided about the Technologies in EN-5, non-generic effects were considered for four AoS objectives (Carbon Emissions, Biodiversity, Landscape and Townscape, as well as Health and Wellbeing). The non-generic effects have been found to be generally negative across short, medium and long terms for all four AoS Objectives.
- In relation to the national target of reducing carbon emissions to Net Zero by 2050, technology specific effects were considered to be negative across the short medium and long term, due to the potentially unavoidable use of SF6 in swtichgear.
- Significant and ongoing negative effects across the short, medium and long term are expected in terms of landscape and townscape / visual amenity dur to overhead lines.
- Regarding health and well-being, negative technology specific effects expected to arise across short, medium of long term, due to potential EMF exposure.

- Uncertainty is associated with this assessment, as at this level of appraisal, actual effects are dependent on the sensitivity of the environment and the location and design of infrastructure.

1.7.5 As required by the SEA Regulations, an assessment of reasonable alternatives has also been carried out in respect of EN-5. One alternative was identified and assessed: adopt a blanket presumption that all electricity lines should be put underground.

1.7.6 The key differences between this alternative and EN-5 are:

- adverse for the achievement of Net Zero due to the additional emissions associated with energy intensive tunnelling technologies
- adverse for the Security of Energy Supply and the Economy due to higher costs and increased disruption for maintenance and repair

1.7.7 Although undergrounding for all electricity lines will have significant positive effects for landscape receptors in the medium to long term by removing long term visual impacts associated with overhead lines the short-term effects from undergrounding on the landscape may be more significant due to the larger construction footprint and disruption of soil.

1.7.8 Given that underground lines are not without a range of adverse impacts of their own, and that they are significantly more expensive, it is considered better to adopt the policies set out in EN-1 and EN-5. This is because the range of factors to be taken into account means that any decision to underground is best taken within a more flexible policy framework that follows a case by case evaluation of all of the impacts of a particular project, and supports the use of both undergrounding and overhead lines as appropriate, in line with the appraisal findings.

1.8 Habitats Regulation Assessments

1.8.1 Habitats Regulation Assessments (HRA) have also been carried out and published for the non-locationally specific NPSs EN-1 to EN-5. As EN-1 to EN-5 do not specify locations for energy infrastructure, the HRA is a high-level strategic overview. Although the lack of spatial information within the EN-1 to EN-5 made it impossible to reach certainty on the effect of the plan on the integrity of any HRA site, the potential for proposed energy infrastructure projects of the kind contemplated by EN-1 to EN-5 to have adverse effects on the integrity of such sites cannot be ruled out, based on following the precautionary principle. The HRA explains why the government considers that EN-1 to EN-5 are, nevertheless, justified by imperative reasons of overriding public interest, while noting that its conclusions are only applicable at the NPS level and are without prejudice to any project-level HRA, which may result in the refusal of consent for a particular application.

2 Assessment and Technology-Specific Information

2.1 Introduction

2.1.1 Part 4 of EN-1 sets out the general principles that should be applied in the assessment of development consent applications across the range of specified energy technologies. Part 5 of EN-1 sets out policy on the assessment of impacts which are common to all of these technologies (generic impacts). This NPS is concerned with impacts and other matters which are specific to electricity networks infrastructure or where, although the impact or issue is generic and covered in EN-1, there are further specific considerations arising from this technology.

2.1.2 The policies set out in this NPS are additional to those on generic impacts set out in EN-1 and do not replace them. Accordingly, the Secretary of State should consider this NPS and EN-1 in tandem when evaluating applications relating to electricity networks infrastructure. Notably, Part 3 of EN-1 sets out the government's conclusion that there is a significant need for new major energy infrastructure generally, and for electricity networks infrastructure specifically – including in areas with comparatively little infrastructure build to date. In light of this, and in accordance with the need statement set out in Section 3.3 of EN-1, in making recommendations to the Secretary of State the Secretary of State should act on the basis that the need for the electricity networks infrastructure covered in this NPS has been demonstrated.

2.2 Factors influencing site selection by Applicants

2.2.1 The Secretary of State should bear in mind that the macro-level location – or development zone – of new electricity networks infrastructure is not substantially within the control of the Applicant, but is rather a function of i) the location of new generating stations or other infrastructure requiring connection to the network, and/or ii) system capacity and resilience requirements determined by the Electricity System Operator. These twin constraints, coupled with the government's legislative commitment to Net Zero by 2050 and strategic commitment to new interconnectors with the European mainland and 40GW of offshore wind generation, will inevitably mean significant new electricity networks infrastructure construction, including in areas hosting comparatively little build-out to date (for instance, the North Sea coast of England).

2.2.2 However, Applicants retain substantial control over routing and site selection within the identified macro-level location or development zone. Moreover, the locational constraints identified above do not, of course, exempt Applicants from their duty to consider and balance the site-selection considerations set out below, much less the policies on good design and impact mitigation detailed in Sections 2.7-2.14.

2.2.3 Applicants should bear in mind that the connection between the initiating and terminating points of a proposed new electricity line need not go via the most direct route. Indeed, engineering, environmental, and community constraints may make this infeasible or unsuitable.

2.2.4 There will usually be a degree of flexibility in the location of the development's associated substations, and applicants should consider carefully their placement in the local landscape. In particular, the applicant should consider such characteristics as the local topography and/or the possibilities for screening of the infrastructure. (See Section 2.11 below and Section 5.10 in EN-1.)

2.2.5 As well as having duties under Section 9 of the Electricity Act 1989, (in relation to developing and maintaining an economical and efficient network), developers will be influenced by Schedule 9 to the Electricity Act 1989, which places a duty on all transmission and distribution licence holders, in formulating proposals for new electricity networks infrastructure, to "have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest; and …do what [they] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects."[3] Depending on the location of the proposed development, statutory duties under Section 85 of the Countryside and Rights of Way Act 2000,Section 11A of the National Parks and Access to the Countryside Act 1949, and Section 17A of the Norfolk and Suffolk Broads Act 1988 may be relevant.

2.2.6 Transmission and distribution licence holders are also required under Schedule 9 of the Electricity Act 1989 to produce and publish a statement setting out how they propose to perform this duty generally.

2.3 Land Rights and Land Interests

2.3.1 In order to be lawfully able to install, inspect, maintain, repair, adjust, alter, replace or remove an electricity line (above or below ground), its related equipment (such as poles, pylons/transmission towers, transformers and cables), and/or its associated mitigation schemes, developers must i) own the land on, over, or under which the relevant activity is to take place; or ii) hold sufficient rights over or interests in that land

[3] This assumes that the developer in question is also a licence-holder under the terms of the Electricity Act 1989. In the rare case that the developer is not a licence-holder, the developer will nonetheless be influenced by the duties laid out in Section 9, even though they are not themselves under obligation. Subsequent references to the 'developer', or to the 'applicant', in the context of duties under the Electricity Act, should be read in this light.

(typically in the form of an easement); or iii) have permission for the activity from the present owner or occupier of that land (typically in the form of a wayleave)[4].

2.3.2 Where the network company does not own or wish to own the land in question, it may reach a voluntary agreement giving it sufficient rights and/or permissions to undertake the relevant work. Where it does not succeed in reaching the agreement that it wants, the network company may, as part of its application to the Secretary of State, seek to acquire rights compulsorily over the land in question by means of a provision in the Development Consent Order (DCO). In such cases (i.e. where the compulsory acquisition of rights is sought) permanent arrangements are strongly preferred over wayleaves (which are terminable on notice by the landowner) in virtue of their greater reliability and economic efficiency, and reflecting the importance of the relevant infrastructure to the nation's net zero goals.

2.3.3 The Applicant may also seek the compulsory acquisition of land. This will not normally be necessary where lines and cables are installed, but may be sought where other forms of electricity networks infrastructure (such as new substations), or associated mitigation efforts (such as landscape enhancement or biodiversity net gain programmes) are required.

2.4 General assessment principles for electricity networks

2.4.1 EN-1 explains in Section 4.10 that the 2008 Act aims to create a holistic planning regime, such that the cumulative effects of the same project can be considered together. Accordingly, the government envisages that, wherever reasonably possible, applications for new generating stations and their related infrastructure should be contained in a single application to the Secretary of State[5].

2.4.2 However, particularly for generating stations and their related electricity networks infrastructure, a consolidated approach of this kind may not be possible, nor represent the most efficient strategy for delivery of new infrastructure. This could be, for example, due to the differing lengths of time needed to prepare the applications for submission to the Secretary of State, or because a network application relates to multiple generation projects, or because the works involved are strategic reinforcements required for a number of reasons. It may also be the case that the networks infrastructure application and the application for a related generating station will of necessity come from different legal entities, or from entities subject to different commercial and regulatory frameworks.

[4] Note that for onshore bootstraps and offshore transmission infrastructure there is a separate regime of seabed leasing and marine licensing requirements.
[5] Note that a principal exception to this will be for the development of the associated onshore components of co-ordinated offshore transmission. More of the latter is expected to be consented as planned co-ordinated transmission projects serving multiple wind farms, with projects potentially regional in scale including Multi-Purpose Interconnector (MPI) projects and consented separately from the offshore wind generation.

2.4.3 It will also be common for applications to be submitted for the general purpose of reinforcing the network, especially in light of the drive towards net zero. In these cases (i.e. where the application does not accompany an application for a generating station, or is not underpinned by a contractually-supported agreement to provide an as-yet-unconsented generating station with a connection), the Secretary of State should have regard to the need case for new electricity networks infrastructure set out in Section 3.3 of EN-1.

2.4.4 The Secretary of State should also take into account that Transmission Owners (TOs) and Distribution Network Operators (DNOs) are required under Section 9 of the Electricity Act 1989 to bring forward efficient and economical proposals in terms of network design. TOs and DNOs are also required to facilitate competition in the generation and supply of electricity, and electricity distributors have a statutory duty to provide a connection where requested.

2.4.5 Given that individual electricity lines are only component parts of a country-spanning network, it may arise that a single application covers works to be undertaken at different geographical locations. Where it can be demonstrated that such a set of works will reinforce the network as a whole, or reinforce the network to accommodate a subset of new connections, the Secretary of State should be willing – in line with the need statement set out in Section 3.3 of EN-1 – to accept an application seeking development consent for the entire set of works. Applicants should ensure that any such applications are kept to a scale which they can manage within the statutory timescales and discuss putative applications of this kind with the Planning Inspectorate before formally submitting an application.

2.5 Special Assessment Principles for Onshore-Offshore

2.5.1 The scale of offshore transmission infrastructure required to support the government's offshore wind development targets means that a substantial amount of the new onshore network infrastructure required, including network reinforcements, will be to enable transmission of the domestic and international offshore power flows coming onshore. As identified in EN-1, (paragraphs 3.3.5 – 3.3.4), there is a need for the network planning for offshore transmission, including interconnectors and multi-purpose interconnectors (MPIs), to be much more closely co-ordinated with the planning of connections to and reinforcements of the onshore transmission network[6].

2.5.2 As identified in EN-1 (paragraphs 3.3.50 and 3.3.54), it is expected that a more co-ordinated approach to transmission to multiple offshore windfarms will be adopted by applicants, compared with a radial connection approach for single windfarm projects. In due course, it is anticipated that applications comprising packages of co-ordinated

[6] Work to co-ordinate transmission for proposed wind farms and the development of a holistic network design for offshore transmission forms part of the Offshore Transmission Network Review (OTNR): https://www.gov.uk/government/groups/offshore-transmission-network-review.

offshore transmission infrastructure, potentially regional in scale, will be brought forward[7]. It is expected that this increased co-ordination will reduce the number of landing sites and landfall impacts associated with bringing offshore transmission onshore compared with the number which would otherwise be needed, and that applicants would be able to demonstrate this. Similarly, the related onshore infrastructure (number of substations and transmission lines) is expected to be consolidated compared with that which would otherwise be required for radial connections from single offshore windfarms to the shore and that applicants would also be able to demonstrate this.

2.5.3 The sensitivities of many coastal locations, as well as the potential environmental, community and other impacts in neighbouring onshore areas, means that optimum onshore connection points for offshore transmission must be considered as part of the overall offshore transmission network design and in conjunction with the onshore network. Optimum onshore connection locations for offshore transmission are those which minimise environmental and other impacts, including to local communities, and follow good design, avoidance and mitigation principles.

2.5.4 Applicants are expected to be able to demonstrate: how the optimum onshore connection locations have been identified; how environmental, community and other impacts have been considered and where possible how adverse impacts have been avoided or mitigated through good design; and how enhancements to the environment post construction will be achieved including any biodiversity net gain proposals.

2.5.5 Radial offshore transmission options to single windfarms should only be proposed where these can be demonstrated to be the only feasible solution and a co-ordinated solution is not possible. In these instances, the Secretary of State should have regard to the need case set out in Section 3.3 of EN-1.

2.6 Climate change adaptation and resilience[8]

2.6.1 Section 4.9 of EN-1 sets out the generic considerations that Applicants and the Secretary of State should take into account in order to ensure that electricity networks infrastructure is resilient to the effects of climate change. As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, Applicants should in particular set out to what extent the proposed

[7] The transition to more co-ordinated transmission is led by two temporal workstreams under the Offshore Transmission Network Review (OTNR). Co-ordinated transmission projects are being brought forward as pathfinders as part of the 'early opportunities' workstream. For other offshore wind projects, their connection to a transmission network will form part of the holistic network design under the 'pathway to 2030' workstream.
[8] Note that generic requirements on the resilience of infrastructure to major accidents and disasters are covered in EN-1.

development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to:

- flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change
- the effects of wind and storms on overhead lines
- higher average temperatures leading to increased transmission losses
- earth movement or subsidence caused by flooding or drought (for underground cables)
- coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively

2.6.2 Section 4.9 of EN-1 advises that the resilience of the project to the effects of climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment (see Section 5.8 in EN-1).

2.7 Consideration of 'good design' for energy infrastructure

2.7.1 The 2008 Act requires the Secretary of State to have regard, in designating an NPS, to the desirability of good design. Section 4.6 of EN-1 sets out general criteria for good design that, where possible, all energy infrastructure should embody.

2.7.2 However, the Secretary of State should bear in mind that electricity networks infrastructure must in the first instance be safe and secure, and that the functional design constraints of safety and security may limit an applicant's ability to influence the aesthetic appearance of that infrastructure. While the above principles should govern the design of an electricity networks infrastructure application to the fullest possible extent – including in its avoidance and/or mitigation of potential adverse impacts (particularly those detailed in Sections 2.9-2.14 below) – the functional performance of the infrastructure in respect of security of supply and public and occupational safety must not thereby be threatened.

2.8 Environmental and Biodiversity Net Gain

2.8.1 When planning and evaluating the proposed development's contribution to environmental and biodiversity net gain, it will be important – for both the Applicant and the Secretary of State – to supplement the generic guidance set out in EN-1 (Section 4.5) with recognition that the linear nature of electricity networks infrastructure allows excellent opportunities to: i) reconnect important habitats via green corridors, biodiversity stepping zones, and reestablishment of appropriate hedgerows; and/or ii) connect people to the environment, for instance via footpaths and cycleways constructed in tandem with biodiversity enhancements.

2.9 Impacts of electricity networks

2.9.1 Part 5 of EN-1 sets out the policies that the Secretary of State should follow when assessing the generic potential impacts of energy infrastructure projects. It also contains material intended to assist in the interpretation of the impact Sections of each individual energy infrastructure NPS. When evaluating the impacts of electricity networks infrastructure in particular, all of the generic impacts detailed in EN-1 are likely to be in play, even if only during specific phases of the development (such as construction), or at one specific part of the development (such as a substation). This NPS sets out additional technology-specific considerations for the following generic impacts covered in EN-1:

- Biodiversity and Geological Conservation
- Landscape and Visual
- Noise and Vibration

2.9.2 In addition, this NPS also sets out technology specific considerations for the impact of electromagnetic fields, which is not an impact considered in EN-1.

2.9.3 The impacts identified in Part 5 of EN-1 and Part 2 of this NPS are not exhaustive. Applicants must assess all likely significant effects of their proposals (see Section 4.2 of EN-1), and the Secretary of State is free also to consider any impacts it judges to be of relevance to the acceptability of the proposals in planning and/or land rights terms.

2.10 Biodiversity and Geological Conservation

Introduction

2.10.1 Generic biodiversity effects and generic policies on biodiversity net gain are covered in Sections 4.5 and 5.4 of EN-1. However electricity networks infrastructure pose a particular potential risk to birdlife. Large birds such as swans and geese may collide with overhead lines especially in poor visibility. Large birds may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts of the infrastructure.

Applicant's Assessment

2.10.2 The Applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds, where they are functionally linked to sites designated or allocated under the 'national site network' provisions of the Conservation of Habitats and Species Regulations.

Mitigation

2.10.3 Careful siting of a line away from, or parallel to, but not across, known flight paths can reduce the numbers of birds colliding with overhead lines considerably.

2.10.4 Making lines more visible by methods such as the fitting of bird flappers and diverters to the earth wire, which swivel in the wind, glow in the dark and use fluorescent colours designed specifically for bird vision can also reduce the number of deaths. The design and colour of the diverters will be specific to the conditions – the line and pylon/transmission tower specifications and the species at risk.

2.10.5 Electrocution risks can be reduced through the design of crossarms, insulators and the construction of other parts of high voltage power lines so that birds find no opportunity to perch near energised power lines on which they might electrocute themselves.

Secretary of State Decision Making

2.10.6 The Secretary of State should ensure that this issue has been considered in the ES and that appropriate mitigation measures will be taken where necessary.

2.11 Landscape and Visual

Introduction

2.11.1 Generic landscape and visual effects are covered in Section 5.10 of EN-1. Additional considerations specific to electricity networks infrastructure are set out below.

2.11.2 While government does not believe that the development of overhead lines is incompatible in principle with developers' statutory duty under Schedule 9 of the Electricity Act 1989 to have regard to visual and landscape amenity and to mitigate to the fullest extent reasonably possible any impacts thereon, in practice new overhead lines – whether supported by lattice steel towers or monopole structures – can give rise to adverse landscape and visual impacts. These impacts depend on the type, scale, siting, and degree of screening of the lines, as well as the characteristics of the landscape and local environment through which they are routed.

2.11.3 New substations, sealing end compounds, and other above-ground installations that serve as connection, switching, and voltage transformation points on the electricity network may also give rise to adverse landscape and visual impacts. Nonetheless, government does not believe that the development of these installations is incompatible in principle with developers' statutory duty under Schedule 9 of the Electricity Act 1989.

2.11.4 Cumulative adverse landscape and visual impacts may arise where new overhead lines are required along with other related developments such as substations, wind farms, and/or other new sources of generation.

2.11.5 Landscape and visual benefits may arise through the reconfiguration, rationalisation, or undergrounding of existing electricity network infrastructure.

2.11.6 Though mitigation of the landscape and visual impacts arising from overhead lines and their associated infrastructure is usually possible, it may not always be so, and the impossibility of full mitigation in these cases does not countermand the need for the infrastructure. However, in nationally designated landscapes (for instance, National Parks and Areas of Outstanding Natural Beauty) even residual impacts may well make an overhead line proposal unacceptable in planning terms. (See Section 2.11.13. below for guidance on this case.)

Applicant's Assessment

2.11.7 Where at all possible Applicants should ensure that the principles detailed in Sections 2.11.9-2.11.12 below are embodied in the design of their proposed overhead line route and its associated infrastructure. Applicants should also offer proposals (for instance those detailed in Sections 2.11.15-2.11.16 below) for additional mitigation.

2.11.8 Where the nature or proposed route of an overhead line will likely result in particularly significant landscape and/or visual impacts, the Applicant should demonstrate that they have given due consideration to the costs and benefits of feasible alternatives to the line, including – where appropriate – underground or subsea cables. The ES should set out details of this consideration, including the Applicant's rationale for eschewing feasible alternatives to the overhead line, and the mitigation cost-calculation methodology that this rationale may rely upon.

2.11.9 The Holford Rules – guidelines for the routing of new overhead lines – were originally set out in 1959. These guidelines, intended as a common-sense approach to overhead line route design, were reviewed and updated by the industry in the 1990s, and they should be embodied in developers' proposals for new overhead lines[9].

2.11.10 In brief, the Holford Rules state that developers should:

- avoid altogether, if possible, the major areas of highest amenity value, by so planning the general route of the line in the first place, even if total mileage is somewhat increased in consequence
- avoid smaller areas of high amenity value or scientific interest by deviation, provided this can be done without using too many angle towers, i.e. the bigger structures which are used when lines change direction

[9] The rules are not published as a single work, but they are referred to in a number of planning publications including *Visual Amenity Aspects of High Voltage Transmission* by George A. Goulty (1989) and *Planning Overhead Power Line Routes* by RJB Carruthers (1987) Research Studies Press Ltd, Letchworth. Notes and explanations of the Holford Rules are available on the National Grid website http://www.nationalgrid.com/NR/rdonlyres/E9E1520A-EB09-4AD7-840B-A114A84677E7/41421/HolfordRules1.pdf

- other things being equal, choose the most direct line, with no sharp changes of direction and thus with fewer angle towers
- choose tree and hill backgrounds in preference to sky backgrounds wherever possible. When a line has to cross a ridge, secure this opaque background as long as possible, cross obliquely when a dip in the ridge provides an opportunity. Where it does not, cross directly, preferably between belts of trees
- prefer moderately open valleys with medium or moderate levels of tree cover where the apparent height of towers will be reduced, and views of the line will be broken by trees
- where country is flat and sparsely planted, and unless specifically preferred otherwise by relevant stakeholders, keep the high voltage lines as far as possible independent of smaller lines, converging routes, distribution poles and other masts, wires and cables, so as to avoid a concentration of lines or 'wirescape'
- approach urban areas through industrial zones, where they exist; and when pleasant residential and recreational land intervenes between the approach line and the substation, carefully assess the comparative costs of undergrounding

2.11.11 The Horlock Rules – guidelines for the design and siting of substations – were established by National Grid in 2009 in pursuance of its duties under Schedule 9 of the Electricity Act 1989. These principles should be embodied in Applicants' proposals for the infrastructure associated with new overhead lines[10].

2.11.12 In brief, the Horlock Rules state that developers should:

- consider environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum
- seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections
- protect as far as reasonably practicable areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas
- take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum
- keep the visual, noise and other environmental effects to a reasonably practicable minimum

[10] The Horlock Rules are available at https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

- consider the land use effects of the proposal when planning the siting of substations or extensions
- consider the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum
- use space effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation
- make the design of access roads, perimeter fencing, earth-shaping, planting and ancillary development an integral part of the site layout and design, so as to fit in with the surroundings
- in open landscape especially, high voltage line entries should be keep high voltage line entries, especially in open landscape, as far as possible visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance
- study the inter-relationship between towers and substation structures and background and foreground features so as to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines

Undergrounding

2.11.13 Although it is the government's position that overhead lines should be the strong starting presumption for electricity networks developments in general, this presumption is reversed when proposed developments will cross part of a nationally designated landscape (i.e. National Park, Broads, or Area of Outstanding Natural Beauty). In these areas, and where harm to the landscape cannot feasibly be avoided by mitigation or re-routing, the strong starting presumption will be that the developer should underground the relevant Section of the line. Note however that undergrounding will not be required where it is infeasible in engineering terms, or where the harm that it causes is not outweighed by its corresponding landscape and/or visual benefits.

2.11.14 Additionally, cases will arise where – though no part of the proposed development crosses a designated landscape – a high potential for widespread and significant adverse landscape and/or visual impacts along certain Sections of its route may nonetheless recommend undergrounding the relevant segments of the line. In these cases, and taking account of the fact that the government has not laid down any further rule on the circumstances *requiring* undergrounding, the Secretary of State must weigh the feasibility, cost, and any harm of the undergrounding option against i) the adverse implications of the overhead line proposal; ii) the cost and feasibility of re-routing the relevant line Section; and iii) the cost and feasibility of the reconfiguration, rationalisation, and/or undergrounding of proximate existing or proposed electricity

networks infrastructure[11]. In such cases the Secretary of State should only grant development consent for underground (or subsea) Sections of a proposed line over an overhead alternative if it is satisfied that the benefits accruing from the former proposal clearly outweigh any extra economic, social, or environmental impacts that it presents, and that any technical obstacles associated with it are surmountable. In this context it should consider:

- the landscape and visual baseline characteristics of the setting of the proposed route (in particular, the impact on high sensitivity visual receptors as defined in the current edition of the Landscape Institute's Guidelines for Landscape and Visual Impact Assessment, residential areas, and areas of natural beauty or historic importance, including those in proximity to nationally designated landscapes)
- the additional cost of the proposed underground or sub-sea alternatives, including their significantly higher lifetime cost of repair and later uprating
- the potentially very disruptive effects of undergrounding on local communities, habitats, archaeological and heritage sites, soil, geology, and, for a substantial time after construction, landscape and visual amenity. (Undergrounding a 400kV line may mean digging a deep trench 40-110m wide along the length of the route, and so such works will often be considerably more disruptive – albeit temporarily – to the receptors listed above than would an overhead line of equivalent rating)
- the developer's commitment, as set out in their ES, to mitigate the potential detrimental effects of undergrounding works on any relevant agricultural land and soils, particularly regarding Best and Most Versatile land. Such a commitment must guarantee appropriate handling of soil, backfilling, and return of the land to the baseline Agricultural Land Classification (ALC), thus ensuring no loss or degradation of agricultural land. Such a commitment should be based on soil and ALC surveys in line with the 1988 ALC criteria and due consideration of the Defra Construction Code

Mitigation

2.11.15 In addition to good design in accordance with the Holford and Horlock rules, and the consideration of undergrounding or rerouting the line, the principal opportunities for mitigating adverse landscape and visual impacts of electricity networks infrastructure are:

- consideration of network reinforcement options (where alternatives exist) which may allow improvements and/or extensions to an existing line rather than the building of an entirely new line

[11] Proposed underground cables do not require development consent under the Planning Act, but they may form part of a scheme of new infrastructure which is the subject of an application under the Act, and requirements or obligations regarding undergrounding may feature as a means of mitigating some of the adverse impacts of a proposal which does require and is granted development consent.

- selection of the most suitable type and design of support structure in order to minimise the overall visual impact on the landscape. In particular, ensuring that lattice steel towers are of the smallest possible footprint and internal volume
- the rationalisation, reconfiguration, and/or undergrounding of existing electricity networks infrastructure in the vicinity of the proposed development

2.11.16 Additionally, there are more specific measures that might be taken, and which the Secretary of State could mandate through DCO requirements if appropriate, as follows:

- landscape schemes, comprising off-site tree and hedgerow planting, are sometimes used for larger new overhead line projects to mitigate potential landscape and visual impacts, softening the effect of a new above ground line whilst providing some screening from important visual receptors. These may be implemented with the agreement of the relevant landowner(s), or the developer may compulsorily acquire the land in question. Advice from the relevant statutory authority may also be needed
- screening, comprising localised planting in the immediate vicinity of residential properties and principal viewpoints can also help to screen or soften the effect of the line, reducing the visual impact from a particular receptor

2.11.17 Note that, as set out in Section 2.3 above, where landscape schemes and/or screening mitigation of the kind described above is required, rights over the land necessary for such measures may be compulsorily acquired as part of the DCO.

2.11.18 Also note that since long-term management of the selected mitigation schemes is essential to their mitigating function, a management plan, developed at least in outline at the conclusion of the examination, should secure the integrity and benefit of these schemes and uphold the landscape commitments made to achieve consent, alongside any pertinent commitments to environmental and biodiversity net gain.

Secretary of State's Decision Making

2.11.19 The Secretary of State should be satisfied that the development, so far as is reasonably possible, complies with the Holford and Horlock Rules or any updates to them. The Secretary of State should also be satisfied that all pertinent options for mitigation – including the rationalisation, reconfiguration, or undergrounding of existing electricity networks infrastructure, have been considered and evaluated appropriately.

2.11.20 The Secretary of State should also have special regard to nationally designated landscapes, where the general presumption in favour of overhead lines should be inverted to favour undergrounding. Away from these protected landscapes, and where there is a high potential for widespread and significant landscape and/or visual impacts, the Secretary of State should also consider whether undergrounding may be appropriate, now on a case-by-case basis, weighing the considerations outlined above.

2.12 Noise and Vibration

Introduction

2.12.1 Generic noise effects are covered in Section 5.12 of EN-1. In addition, there are specific considerations which apply to electricity networks infrastructure as set out below.

2.12.2 All high voltage transmission lines have the potential to generate noise under certain conditions.

2.12.3 Line noise is generated when the conductor surface electric stress exceeds the inception level for corona discharge[12] activity which is released as acoustic energy and radiates into the air as sound. Transmission line conductors are designed to operate below this threshold. I, surface contamination on a conductor or accidental damage during transport or installation can cause local enhancement of electric stress and initiate discharge activity leading to the generation of noise.

2.12.4 The highest noise levels generated by a line generally occur during rain. Water droplets may collect on the surface of the conductor and initiate corona discharges with noise levels being dependent on the level of rainfall. Fog may also give rise to increased noise levels, although these levels are lower than those during rain.

2.12.5 After a prolonged spell of dry weather without rain to wash the conductors, contamination may accumulate at sufficient levels to result in increased noise. After heavy rain, these discharge sources are washed away and the line will be quiet again. Surface grease on conductors can also give rise to audible noise effects as grease is able to move slowly under the influence of an electric field, tending to form points which then initiate discharge activity. Surface grease is likely to occur along the entire length of a conductor. Hence there may be many potential discharge sources and, consequently, a high noise level. This will only occur if substandard grease has been used during manufacture or if the conductor has been overheated by carrying excessive electrical load. This can be mitigated through good design, or by conductor cleaning or replacement.

2.12.6 Transmission line audible noise is generally categorised as ‘crackle’ or ‘hum’, according to its tonal content. Crackle may occur alone, but hum will usually occur only in conjunction with crackle. Hum is only likely to occur during rain when rates of rainfall exceed 1mm/hr. Crackle is a sound containing a random mixture of frequencies over a wide range, typically 1kHz to 10kHz. No individual pure tone can be identified for any significant duration. Crackle has a generally similar spectral content to the sound of rainfall. Hum is a sound consisting of a single pure tone or tones. Noise may also arise

[12] Corona discharge is an electrical discharge brought on by the ionization of a fluid surrounding a conductor, which occurs when the strength of the electric field exceeds a certain value, but conditions are insufficient to cause complete electrical breakdown or arcing.

from discharges on overhead line fittings such as spacers, insulators and clamps. Such noise should be mitigated through good design.

2.12.7 Audible noise effects can also arise from substation equipment such as transformers, quadrature boosters and mechanically switched capacitors. Transformers are installed at many substations, and generate low frequency hum. Whether the noise can be heard outside a substation depends on a number of factors, including transformer type and the level of noise attenuation present (either engineered intentionally or provided by other structures).

Applicant's Assessment

2.12.8 For the assessment of noise from substations, standard methods of assessment and interpretation using the principles of the relevant British Standards[13] are satisfactory.

2.12.9 For the assessment of noise from overhead lines, the Applicant must use an appropriate method to determine the sound level produced by the line in both dry and wet weather conditions, in addition to assessing the impact on noise-sensitive receptors. For instance, the Applicant may use an appropriate noise modelling tool or tools for the prediction of overhead line noise and its propagation over distance. When assessing the impact of noise generated by overhead lines in wet weather relative to existing background sound levels, the Applicant should consider the effect of varying background sound levels due to rainfall. The Secretary of State is likely to regard it as acceptable for the Applicant to use a methodology that demonstrably addresses these criteria.

Mitigation

2.12.10 Applicants must consider the following measures:

- the positioning of lines to help mitigate noise
- ensuring that the appropriately sized conductor arrangement is used to minimise potential noise
- quality assurance through manufacturing and transportation to avoid damage to overhead line conductors which can increase potential noise effects
- ensuring that conductors are kept clean and free of surface contaminants during stringing/installation
- the selection of the quietest cost-effective plant available

2.12.11 In addition, the ES should include information on planned maintenance arrangements. Where detail is not included, the Secretary of State should consider stipulating

[13] For example BS4142.

appropriate maintenance arrangements by way of requirements attached to any grant of development consent.

Secretary of State's Decision Making

2.12.12 The Secretary of State should ensure that appropriate assessment methodologies have been used in the evidence presented to it, and that the appropriate mitigation options have been considered and adopted. Where the Applicant can demonstrate that appropriate mitigation measures will be put in place, the residual noise impacts are unlikely to be significant.

2.12.13 Consequently, noise from overhead lines is unlikely to lead to the Secretary of State refusing an application, but it may need to consider the use of appropriate requirements in the DCO to ensure noise is minimised as far as is practicable.

2.13 Electric and Magnetic Fields (EMFs)

Introduction

2.13.1 Power frequency Electric and Magnetic Fields (EMFs) arise from generation, transmission, distribution and use of electricity and will occur around power lines and electric cables and around domestic, office or industrial equipment that uses electricity. EMFs comprise electric and magnetic fields. Electric fields are the result of voltages applied to electrical conductors and equipment. Fences, shrubs and buildings easily block electric fields. Magnetic fields are produced by the flow of electric current; however, unlike electric fields, most materials do not readily block magnetic fields. The intensity of both electric fields and magnetic fields diminishes with increasing distance from the source.

2.13.2 All overhead power lines produce EMFs. These tend to be highest directly under a line, and decrease to the sides at increasing distance. Although putting cables underground eliminates the electric field, they still produce magnetic fields, which are highest directly above the cable. EMFs can have both direct and indirect effects on human health. The direct effects occur in terms of impacts on the central nervous system resulting in its normal functioning being affected. Indirect effects occur through electric charges building up on the surface of the body producing a microshock on contact with a grounded object, or vice versa, which, depending on the field strength and other exposure factors, can range from barely perceptible to being an annoyance or even painful.

2.13.3 To prevent these known effects, the International Commission on Non-Ionizing Radiation Protection (ICNIRP[14]) developed health protection guidelines in 1998 for both public and occupational exposure. These are expressed in terms of the induced

[14] http://www.icnirp.de/

current density in affected tissues of the body, 'basic restrictions', and in terms of measurable 'reference levels' of electric field strength (for electric fields), and magnetic flux density (for magnetic fields). The relationship between the (measurable) electric field strength or magnetic flux density and induced current density in body tissues requires complex dosimetric modelling. The reference levels are such that compliance with them will ensure that the basic restrictions are not reached or exceeded. I, exceeding the reference levels does not necessarily mean that the basic restrictions will not be met; this would be a trigger for further investigation into the specific circumstances. For protecting against indirect effects, the ICNIRP 1998 guidelines give an electric field reference of 5kV m-1 for the general public, and keeping electric fields below this level would reduce the occurrence of adverse indirect effects for most individuals to acceptable levels. When this level is exceeded, there is a suite of measures that may be called upon in particular situations, including provision of information, earthing and screening, alongside limiting the field. In some situations there may be no reasonable way of eliminating indirect effects.

2.13.4 The levels of EMFs produced by power lines in normal operation are usually considerably lower than the ICNIRP 1998 reference levels. For electricity substations, the EMFs close to the sites tend to be dictated by the overhead lines and cables entering the installation, not the equipment within the site. The Stakeholder Advisory Group on extremely low frequency electric and magnetic fields (ELF EMFs) (SAGE) was set up to provide advice to government on possible precautionary measures that might be needed to limit public exposure to electric and magnetic fields associated with electricity supply. The government response to recommendations made in SAGE's first interim assessment sets out those measures that will be taken as a result of the recommendations[15].

2.13.5 The National Institute for Health Protection's (NIHP) Centre for Radiation, Chemical and Environmental Hazards (CRCE) provides advice on standards of protection for exposure to non-ionizing radiation, including the ELF EMFs arising from the transmission and use of electricity. In March 2004, the National Radiological Protection Board (NRPB) (now part of NIHP CRCE), published advice on limiting public exposure to electromagnetic fields. The advice recommended the adoption in the UK of the EMF exposure guidelines published by ICNIRP in 1998. These guidelines also form the basis of theControl of Electromagnetic Fields at Work Regulations 2016. Resulting from these recommendations, government policy is that exposure of the public should comply with the ICNIRP (1998) guidelines. The electricity industry has agreed to follow this policy. Applications should show evidence of this compliance as specified in 2.10.9 below.

2.13.6 The balance of scientific evidence over several decades of research has not proven a causal link between EMFs and cancer or any other disease. The NIHP CRCE keeps under review emerging scientific research and/or studies that may link EMF exposure

[15] http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_107123.pdf

with various health problems and provides advice to the Department of Health and Social Care on the possible need for introducing further precautionary measures.

2.13.7 The Department of Health and Social Care's Medicines and Healthcare Products Regulatory Agency (MHRA) does not consider that transmission line EMFs constitute a significant hazard to the operation of pacemakers.

2.13.8 There is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequences.

Mitigation

2.13.9 The Applicant should have considered the following factors:

- height, position, insulation and protection (electrical or mechanical as appropriate) measures subject to ensuring compliance with the Electricity Safety, Quality and Continuity Regulations 2002
- that optimal phasing of high voltage overhead power lines is introduced wherever possible and practicable in accordance with the Code of Practice to minimise effects of EMFs
- any new advice emerging from the Department of Health and Social Care relating to government policy for EMF exposure guidelines.

Where it can be shown that the line will comply with the current public exposure guidelines and the policy on phasing, no further mitigation should be necessary.

2.13.10 Where EMF exposure is within the relevant public exposure guidelines, re-routeing a proposed overhead line purely on the basis of EMF exposure, or undergrounding a line solely to further reduce the level of EMF exposure are unlikely to be proportionate mitigation measures.

Secretary of State's Decision Making

2.13.11 This NPS does not repeat the detail of the ICNIRP 1998 guidelines on restrictions or reference levels. Government has developed with the electricity industry a Code of Practice, 'Power Lines: Demonstrating compliance with EMF public exposure guidelines – a voluntary Code of Practice', published in February 2011 that specifies the evidence acceptable to show compliance with ICNIRP (1998) guidelines. Before granting consent to an overhead line application, the Secretary of State should be satisfied that the proposal is in accordance with the guidelines, considering the evidence provided by the Applicant and any other relevant evidence. It may also need to take expert advice from the Department of Health and Social Care.

2.13.12 Industry currently applies optimal phasing[16] to 275kV and 400kV overhead lines voluntarily wherever operationally possible, which helps to minimise the effects of EMF. The government has developed with industry a voluntary Code of Practice, 'Optimum Phasing of high voltage double-circuit Power Lines – A Voluntary Code of Practice'[17], published in March 2012, that defines the circumstances where industry can and will optimally phase lines with a voltage of 132kV and above. Where the Applicant cannot demonstrate that the line will be compliant with the Electricity Safety, Quality and Continuity Regulations 2002, with the exposure guidelines as specified in the Code of Practice on compliance, and with the policy on phasing as specified in the Code of Practice on optimal phasing then the Secretary of State should not grant consent.

2.13.13 Undergrounding of a line would reduce the level of EMFs experienced, but high magnetic field levels may still occur immediately above the cable. It is not the government's policy that power lines should be undergrounded solely for the purpose of reducing exposure to EMFs.

2.13.14 In order to avoid unacceptable adverse impacts of EMFs from electricity network infrastructure on aviation, the Secretary of State will take account of statutory technical safeguarding zones defined in accordance with Planning Circular 01/03[18], or any successor, when considering recommendations for DCO applications. More detail on this issue can be found in Section 5.5 of EN-1. Where a statutory consultee on the safeguarding of technical facilities identifies a risk that the EMF effect of electricity network infrastructure would compromise the effective and safe operation of such facilities, the potential impact and siting and design alternatives will need to have been fully considered as part of the application.

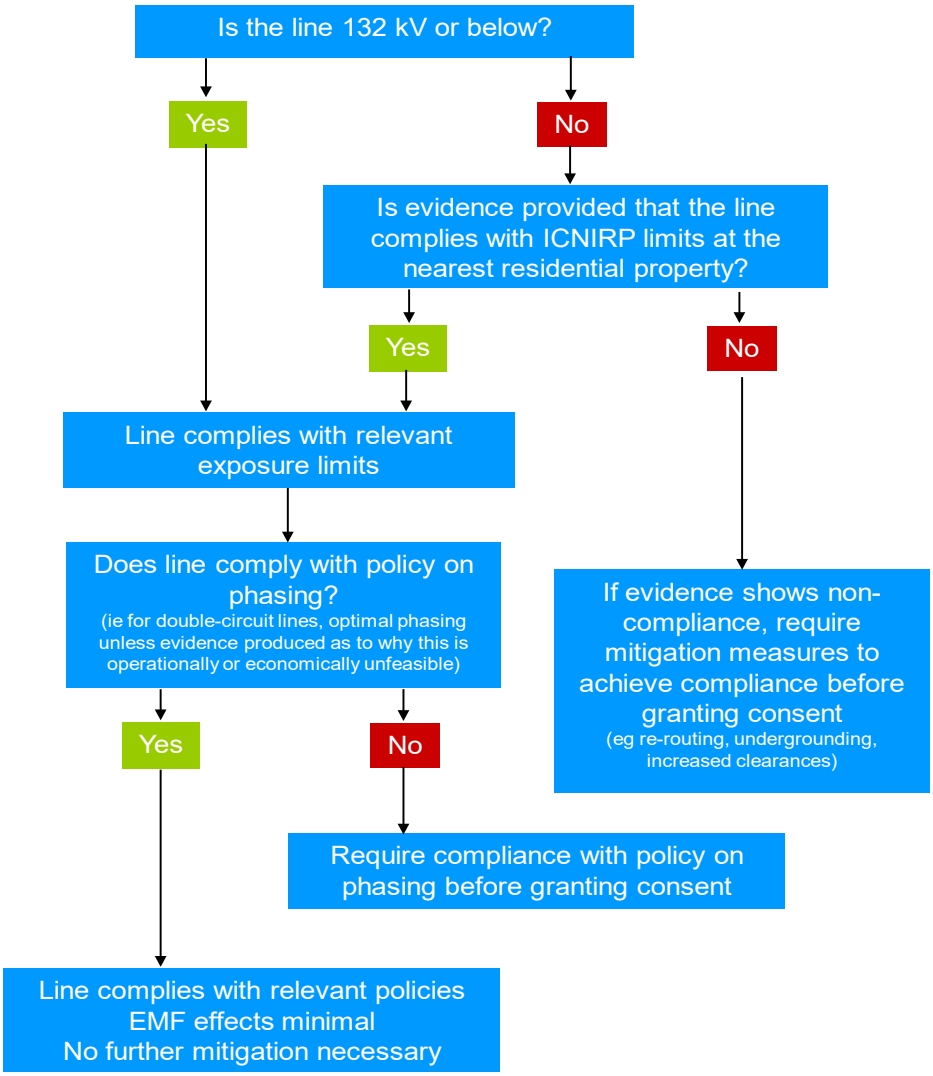
2.13.15 The diagram below shows a basic decision tree for dealing with EMFs from overhead power lines.

[16] Many overhead power lines have two circuits, each consisting of three conductor bundles or 'phases' carried on the same pylons. Each circuit produces an electro-magnetic field, and the cumulative field depends on the relative order of the three phases of each circuit. This is referred to as 'phasing' and the lowest magnetic fields to the sides of the line are produced by an arrangement called 'transposed phasing'.

[17] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48309/1255-code-practice-optimum-phasing-power-lines.pdf

[18] Safeguarding Aerodromes, Technical Sites and Military Explosive Storage Areas - https://www.gov.uk/government/publications/safeguarding-aerodromes-technical-sites-and-military-explosives-storage-areas

Simplified Route Map for dealing with EMFs



2.14 Sulphur Hexafluoride

Introduction

2.14.1 Sulphur Hexafluoride (SF6) is an insulating and arc-suppressant gas used in high-voltage switchgear for electricity networks. It is also an extraordinarily potent greenhouse gas, and fugitive emissions from electricity networks infrastructure are an object of increasing environmental concern, especially in light of the UK's commitment to net zero by 2050.

Mitigation

2.14.2 The climate-warming potential of SF6 is such that applicants should, as a rule, avoid the use of SF6 in new developments. Where no proven SF6-free alternative is commercially available, and where the cost of procuring a bespoke alternative is grossly disproportionate, the continued use of SF6 is acceptable, provided that emissions monitoring and control measures compliant with the F-gas Regulation and/or its successors are in place.

Applicant's Assessment

2.14.3 Applicants should at the design phase of the process consider carefully whether the proposed development could be reconceived to avoid the use of SF6-reliant assets.

2.14.4 Where the development cannot be so conceived, the applicant must provide evidence of their reasoning on this point. Such evidence will include, for instance, an explanation of the alternatives considered, and a case why these alternatives are technically infeasible or require bespoke components that are grossly disproportionate in terms of cost. In particular, an accounting of the cost differential between the SF6-reliant asset and the appropriate SF6-free alternative should be provided.

2.14.5 Where Applicants, having followed the above procedure, do propose to put new SF6-reliant assets onto the electricity system, they should design a plan for the monitoring and control of fugitive SF6 emissions consistent with the F-gas Regulation and its successors. Applicants must provide evidence of this plan, and its compliance with the aforementioned regulatory prescriptions, to the Examining Authority.

Secretary of State's Decision Making

2.14.6 The Secretary of State should grant consent for an electricity networks development only if the applicant has demonstrated either that i) the development will not use SF6; or ii(a)) that there is no proven commercially available alternative to the use of SF6, and ii(b)) that a bespoke SF6-free alternative would be grossly disproportionate in terms of cost, and ii(c)) that emissions monitoring and control measures compliant with the F-gas Regulation and/or its successors are in place.

3 Glossary

This glossary sets out the most frequently used terms in this NPS. There is a glossary in each of the energy NPSs. The glossary set out in EN-1 may also be useful when reading this NPS.

Abbreviation	Definition
AC	Alternating current
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
AoS	Appraisal of Sustainability
Associated infrastructure	Development associated with the NSIP as defined in Section 115 of the Planning Act
CRCE	Centre for Radiation, Chemical and Environmental Hazards
DC	Direct current
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
ELF EMFs	Extremely low frequency electric and magnetic fields
EMFs	Electric and magnetic fields
EN-1	Overarching NPS for Energy
ES	Environmental Statement
Generic impacts	Potential impacts of any energy infrastructure projects, the general policy for consideration of which is set out in Part 5 of EN-1
HRA	Habitats Regulations Assessment
HRA site	One of the sites set out in paragraph 5.4.8 of EN-1 for which an HRA will assess the implications of a plan or project
ICNIRP	The International Commission on Non-Ionizing Radiation Protection
kV	Kilovolts – 1000 volts
LPA	Local planning authority
MHCLG	Ministry for Housing, Communities and Local Government
MHRA	Department of Health and Social Care's Medicines and Healthcare Products Regulatory Agency
MMO	Marine Maritime Organisation: set up under the Marine and Coastal Access Act 2009
MPI	Multi-purpose interconnector
MPS	Marine Policy Statement

Abbreviation	Definition
NDC	Nationally Determined Contribution
Network reinforcement	Uprating/upgrading and improving or replacement of existing lines
NIHP	National Institute for Health Protection
NPS	National Policy Statement
NRPB	National Radiological Protection Board
NSIP	Nationally significant infrastructure project
OHL	Overhead line carried on poles or pylons/transmission towers
OTNR	Offshore Transmission Network Review
SAGE	Stakeholder Advisory Group on extremely low frequency electric and magnetic fields
SEA	Strategic Environmental Assessment (under the Environmental Assessment of Plans and Programmes Regulations 2004)
SF6	Sulphur hexafluoride
Substation	An assembly of equipment in an electric power system through which electric energy is passed for transmission, transformation, distribution, or switching

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