Department for
Business, Energy
& Industrial Strategy

Draft National Policy Statement for Electricity Networks Infrastructure (EN-5)

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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.

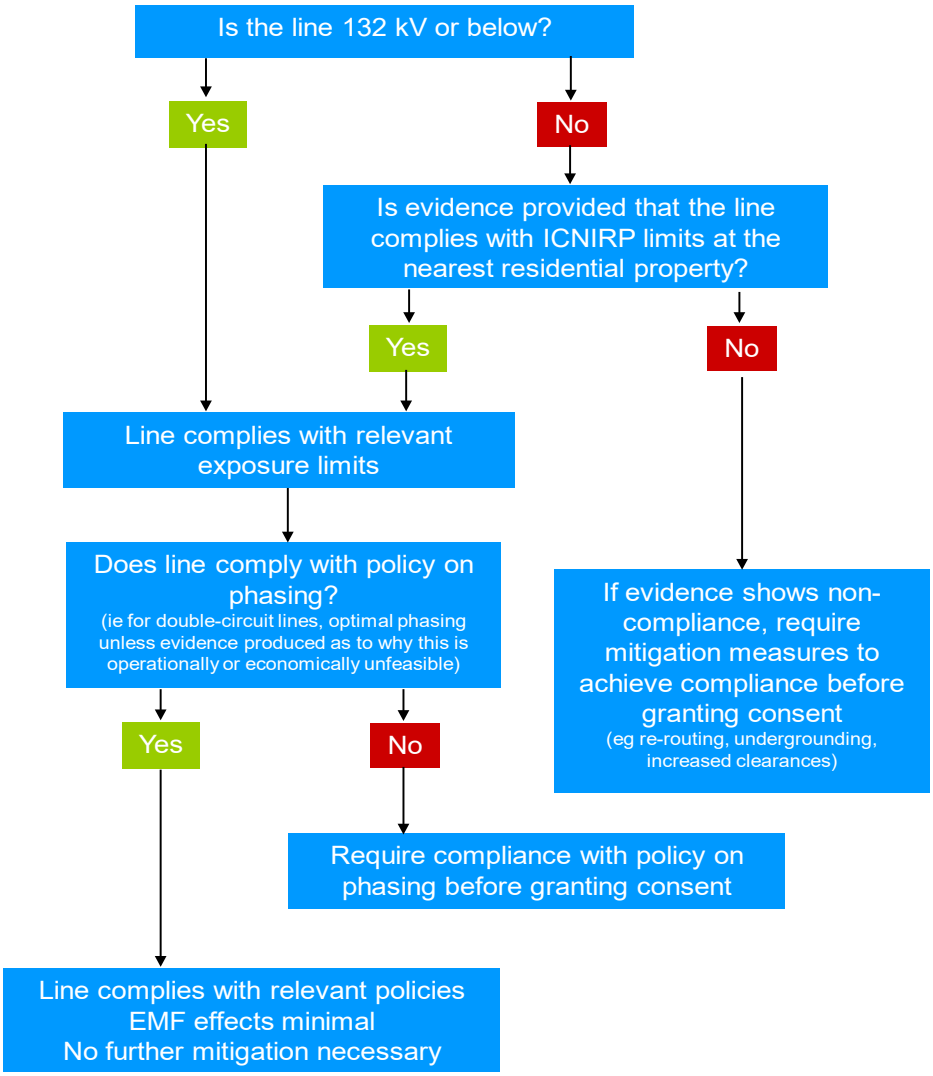
2.13.15 The diagram below shows a basic decision tree for dealing with EMFs from overhead power lines.

[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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