



UK Government

National Policy Statement for Fusion Energy Generation (EN-8)

Appraisal of Sustainability: Non-Technical
Summary



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Introduction

National Policy Statements (NPSs) set out the government's objectives and policy for the development of Nationally Significant Infrastructure Projects (NSIP) in a particular sector and provide the framework within which the Planning Inspectorate makes recommendations to the relevant Secretary of State as to whether major infrastructure development should proceed or not. At present, to be an NSIP, fusion energy infrastructure must be expected to have capacity greater than 50MW in England and 350MW in Wales.

During development of a new NPS (EN-8) for the development of fusion energy infrastructure, it is critical that consideration is made of the sustainability implications of implementing the NPS. In order to help understand this, a process known as an Appraisal of Sustainability (AoS) is being carried out as the EN-8 is developed.

The AoS fulfils the requirements of the Environmental Assessment of Plans and Programmes Regulations 2004 (as amended), known as the Strategic Environmental Assessment (SEA) Regulations, and the Planning Act 2008 requirement that NPSs must be the subject of an AoS before they are designated. The scope of such an appraisal is similar to that of an assessment of environmental effects under the SEA Regulations, but it extends the assessment to cover social and economic effects alongside environmental effects, being informed overall by the principles of sustainable development (often summarised as ensuring that development meets the needs of the present without compromising the ability of future generations to meet their own needs).

It should be noted that this new fusion NPS EN-8 is part of a suite of Energy NPSs which have been published previously. These are:

- EN-1: Overarching National Policy Statement for Energy
- EN-2: National Policy Statement for Natural Gas Generating Infrastructure
- EN-3: National Policy Statement for Renewable Electricity Generation
- EN-4: National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines
- EN-5: National Policy Statement for Electricity Networks Infrastructure
- EN-6: National Policy Statement for new Nuclear Generation greater than 1GW and deployable by 2025
- EN-7: National Policy Statement for new Nuclear Generation

AoS was carried out previously on EN-1 to EN-5 (in 2023) and EN-7 (in 2024) and this has helped to inform this assessment. Note that EN-1, EN-3 and EN-5 were updated again in 2025 and this update was also subject to AoS. As such, this AoS should be read in conjunction with the full suite of NPS and in particular with the updated Overarching NPS for Energy (EN-1) which was published on 6 January 2026, which sets out national policy on energy and energy infrastructure and planning guidance for developers of energy NSIPs.

Habitats Regulations Assessment (HRA) of EN-8 has been undertaken in parallel to the AoS and its results incorporated into the AoS as appropriate, though it has been reported separately to the AoS, in order to meet the requirements of the Habitats Regulations.

Fusion has the potential to provide an abundant source of low carbon energy by replicating the process which occurs at the centre of stars and powers the sun. At the heart of every fusion energy facility is the device where the fusion reactions occur. Different fusion technologies use different methods to initiate and confine these fusion reactions, and some use a combination of approaches. Irrespective of the method used, the fusion reactions take place in a vacuum and so all fusion energy infrastructure will include a vacuum vessel and systems to create and maintain this vacuum. Depending on the fusion technology being used, systems are also needed to support the magnets to confine the plasma for magnetic confinement or to create the high pressures for inertial confinement (e.g. lasers). All fusion energy infrastructure currently planned for deployment in the UK is expected to use deuterium and tritium as fusion fuels and to breed tritium fuel from the fusion reactions. This is typically done through use of a lithium breeder blanket. Most fusion energy infrastructure will produce thermal energy and will convert this to electricity. It is expected that this will be done using standard power conversion systems such as steam generators and turbines. These power conversion systems need to be cooled, in a very similar way to other heat-generators. In addition, fusion energy infrastructure is likely to require fuel handling and maintenance systems alongside radioactive material storage and/or processing.

For the purposes of the AoS temporal scope, consideration has been made of the construction (up to 10 years), operation (approx. 40 years) and decommissioning including an initial decay period, dismantling and possibly some continued radioactive material storage after the main decommissioning actions have been performed (approx. 100 years) phases of the fusion technologies promoted by EN-8. This is a considerable period of time, potentially lasting up to 150 years in total for each fusion energy development.

The AoS applies to the same geographical area of the NPS – namely England and Wales, although in certain circumstances elements may apply to Scotland and cross-border assessments have been made for a variety of expected sustainability effects within this geographical area.

It is important to note that the NPS does not prescribe the location for new fusion energy infrastructure projects. As such there are limitations in terms of appraising those effects that are site specific in nature.

It is to be noted that the NPS will remain in force unless withdrawn or suspended in whole or in part by the Secretary of State, with a review of the NPS taking place at least every 5 years.

The process followed for the AoS

There are 5 stages in the AoS process. The first 3 stages, as described below, have been completed thus far:

Stage 1

Identifying other plans, programmes and sustainability objectives that inform and influence the development of EN-8; establishing an understanding of the social, environmental and economic current and future baseline conditions of the UK, with particular emphasis on England and Wales; identifying key sustainability issues in England and Wales; outlining AoS Objectives against which to later assess the proposals for EN-8; and gathering consultation feedback on the proposed breadth of coverage and level of detail for the AoS as presented in the Scoping Report.

Stage 2

Initial assessment of the proposals set out in draft EN-8 (with reference to the wider NPS EN-1 and AoS-1) against the AoS Objectives and provision of recommendations to enhance their sustainability; assessing alternatives to key policy stances in draft EN-8; completing an assessment of the preferred draft EN-8; identifying the cumulative, synergistic and indirect effects likely to arise as a result of the implementation of the preferred proposals in draft EN-8; identifying appropriate mitigation to avoid or reduce predicted negative effects; and identifying a suitable monitoring programme for significant effects.

Stage 3

Preparing AoS Report to accompany the draft EN-8 for public consultation. This is the current stage.

Stage 4

Preparing revised AoS Report taking on board public consultation comments and changes to the NPS to accompany EN-8 at designation (expected in 2027).

Stage 5

Government will consider comments received during public consultation, and draft EN-8 will be subject to approval by Parliament before final designation. Upon designation of EN-8, an AoS Post Adoption Statement will be published, and this will outline how the findings of the AoS and the responses to consultation have been taken into account in the development of EN-8. It will also provide further information on how monitoring of the significant effects of implementing EN-8 will be carried out.

The process followed for the Habitats Regulation Assessment

In England and Wales, under the Conservation of Habitats and Species Regulations 2017 (as amended), as well as the Conservation of Offshore Marine Habitats and Species Regulations 2017 (together known as the 'Habitats Regulations') an 'Appropriate Assessment' is required to be undertaken on proposed plans or projects which are likely to have a significant effect on a habitat site either individually, or in combination with other plans or projects.

Habitat sites include Special Areas of Conservation (SACs), and Special Protection Areas (SPAs) for rare, vulnerable and regularly occurring migratory bird species and internationally important wetlands. As a matter of government policy listed or proposed Ramsar sites, potential SPAs (pSPA), candidate SACs (cSAC) and sites identified, or required, as compensatory measures for adverse effects on habitats sites, pSPAs, cSACs and listed or proposed Ramsar sites, are treated in the same way as Habitat sites. Hereafter, all the above sites are referred to as Habitat sites.

A HRA report has been prepared for draft EN-8 that sets out the consideration of its designation on habitat sites.

The AoS framework

The establishment of appropriate objectives and guide questions (AoS Framework) is central to the appraisal process and provides a method to enable the consistent and systematic assessment of the effects of implementing draft EN-8. Broadly, the objectives present the preferred social, economic or environmental outcome which typically involves minimising detrimental effects and enhancing positive effects where relevant. Guide questions were also developed for each of the objectives to illustrate its relevance to fusion energy infrastructure development and give more detail and focus to the appraisal process. The questions explore direct, indirect as well as cumulative and synergistic effects where appropriate for the different technologies. The table below sets out the final AoS Framework.

Table 1: AoS framework

No.	AoS objective	Guide questions
1	Consistent with the national target of reducing carbon emissions to Net Zero by 2050	Will the NPS... • Support reduction of the carbon emissions of the national portfolio of major energy infrastructure? • Support reduction of direct and indirect emissions of all greenhouse gases, including carbon dioxide, during construction, operation and decommissioning? • Support supply of energy from low carbon/renewable energy sources / use of low carbon/renewable energy? • Support the generation of heat for industrial uses? • Support use carbon removals to offset residual emissions from energy such Negative Emissions Technologies (NET) and Nature Based Solutions (NBS)? • Support creation of new carbon sinks/removals through natural sequestration including that by natural habitats, blue-green infrastructure and soils? • Support an energy system consistent with reducing carbon emissions to Net Zero by 2050 and long term emphasis on electrification of Clean Power 2030?

No.	AoS objective	Guide questions
2	Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change* <i>*Adaptation is about taking steps to live with the effects and managing the impact of climate change such as building quay walls and flood barriers or managing coasts through rollback. Resilience is the ability of a system to absorb and bounce back after an adverse event.</i>	Will the NPS... • Promote future proofing against the effects and risks of climate change (e.g. flooding, sea level rise, coastal erosion and change in weather patterns)? • Encourage design for successful adaptation to the predicted changes in weather conditions and frequency of extreme weather events (freezing, heat waves, intense storms)? • Address the climate induced risks of cascading failures from interdependent infrastructure energy networks or from the cascading failure of other infrastructure such as reservoirs? • Lead to major infrastructure development that is flood resilient over its lifetime, considering the effects of climate change, without increasing the flood risk elsewhere and identifying opportunities to reduce the risk overall? • Avoid inappropriate development in areas at risk from flooding and coastal erosion? • Manage the risks of flooding and coastal erosion, particularly through working with natural processes? • Ensure provision of appropriate compensatory measures is in place when there is no other option to land take from areas of flood plain? • Encourage the use of Nature Based Solutions to aid with climate adaptation?

No.	AoS objective	Guide questions
3	Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality	Will the NPS... • Protect and enhance nationally designated sites such as SSSIs and National Nature Reserves, Marine Conservation Zones, Marine Protection Areas and Highly Protected Marine Areas, including those of potential or candidate designation? • Protect and enhance all important and valued habitat and populations of protected/scarce species, including those on locally designated sites, including Irreplaceable Habitats, Key Wildlife Sites, Local Wildlife Sites and Local Nature Reserves? • Protect and enhance priority habitats, and the habitat of priority species? • Promote new habitat creation or restoration and linkages with existing habitats? • Help deliver the Nature Recovery Network and support the delivery of Local Nature Recovery Strategies? • Protect the structure and function/ecosystem processes, including in the marine environment? • Increase the resilience of biodiversity to the potential effects of climate change? • Reduce or avoid impacts to habitats with important roles in carbon sequestration? • Encourage sensitive or nature inclusive design in terrestrial and marine environments? • Ensure energy activities protect fish stocks and marine mammals? • Ensure energy activities do not exacerbate disturbance to bird populations? • Deliver a minimum 10% net gain in biodiversity for any new major infrastructure development? • Increase the resilience of biodiversity to the potential effects of climate change? • Prevent spread of invasive species (native and non-native), including new invasive species because of climate change? • Support delivery of the Environmental Improvement Plan including Environment Act 2021 targets (specifically the Apex target to halt the decline in species abundance by 2030 and then increase abundance by at least 10% to exceed 2022 levels by 2042) and interim targets?

No.	AoS objective	Guide questions
4	Protect and enhance sites designated for their international importance for nature conservation purposes	Will the NPS... • Avoid the direct loss of, or indirect harm to, 'Habitats Sites' (SPAs, SACs and Ramsar sites), including those of potential designation (candidate SPAs, proposed SACs, Sites of Community Importance (SCI) and proposed Ramsar sites) and compensation sites both onshore and offshore? • Support continued improvements to the condition status of the UK's national site network?
5	Protect and enhance cultural heritage assets and their settings, and the wider historic environment	Will the NPS... • Encourage early engagement by developers with statutory heritage bodies? • Where possible seek to avoid impacts on designated and non-designated heritage assets? • Conserve and enhance designated heritage assets and their settings (World Heritage Sites, Scheduled Monuments, Listed Buildings and structures, Registered Parks and Gardens, Registered Battlefields and Conservation Areas), as well as maritime assets such as protected wrecks? • Conserve and enhance non-designated and / or locally listed heritage assets (including newly discovered heritage assets and archaeology) and their settings? • Address heritage assets at risk, or protect them from further threats? • Avoid significant harm to heritage assets, for example from the generation of noise, vibration and light pollution, pollutants and visual intrusion? • Ensure appropriate archaeological assessment prior to development to establish the significance of archaeological remains and the impact of the proposed development (on the significance)? • Maintain or improve the interpretation, understanding and appreciation of the historic environment? • Increase public access to heritage assets? • Ensure adequate archaeological mitigation prior to and / or during development? (i.e. to consider if archaeological remains identified by the assessment will be impacted, damaged or disturbed by the development)?

No.	AoS objective	Guide questions
6	Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity	Will the NPS... • Avoid development in National Parks and National Landscapes (formerly AONBs) and seek to further their purpose? • Support the integrity of any areas designated for landscape value, including in conjunction with the provisions of any relevant Management Plan (e.g. National Parks, National Landscapes, Heritage Coasts and local landscape designations)? • Conserve and enhance the intrinsic character or setting of local landscapes or townscapes or waterscapes? • Minimise noise and light pollution from construction and operational activities on residential amenity and on sensitive locations, receptors and views? • Protect dark skies, particularly those areas designated as such? • Prevent reduced tranquillity and / or protect and preserve tranquillity? • Conserve, protect and enhance natural environmental assets (e.g. parks and green spaces, common land, woodland / forests etc) where they contribute to landscape and townscape quality? • Support the delivery of the Environmental Improvement Plan?

No.	AoS objective	Guide questions
7	Protect and enhance the water environment	Will the NPS... • Protect ground, surface, estuarine and coastal water quality in line with Water Framework Directive and Marine Strategy Framework requirements across all phases of construction, operation and decommissioning? • Result in changes to groundwater distribution and flow? • Safeguard the availability of water resources (surface and groundwater) across all phases of construction, operation and decommissioning? • Minimise the use of water resources / water consumption? • Protect the integrity of coastal and estuarine processes? • Reduce operational and accidental discharges to the water environment? • Protect the quality of the seabed and its sediments, and avoid significant effects on seabed morphology and sediment transport processes? • Support the delivery of the Environmental Improvement Plan?
8	Protect and enhance air quality on a local, regional, national and international scale	Will the NPS... • Minimise emissions of dust and other air pollutants that affect human health or biodiversity? • Improve air quality within AQMAs and avoid the need for new or expanded AQMAs? • Promote enhancements to green infrastructure networks to help improve air quality? • Avoid adverse air quality effects on Habitats Sites and Sites of Special Scientific Interest?

No.	AoS objective	Guide questions
9	Protect soil resources, promote use of brownfield land and avoid land contamination	Will the NPS... • Assist in facilitating the re-use of previously developed land? • Avoid development upon the best and most versatile agricultural land, or soils of high sensitivity such as peat? • Ensure the protection of soil resources and avoid soil health degradation through sustainable soil management and re-use? • Promote and enhance soil health? • Seek to remediate contaminated land? • Minimise development (hardstanding) footprint to reduce soil sealing? • Support delivery of the Environmental Improvement Plan?
10	Protect, enhance and promote geodiversity	Will the NPS... • Protect and enhance geodiversity resource? • Protect or enhance SSSIs designated for their geological interest? • Avoid the degradation and removal, wherever possible, of RIGS? • Protect geodiversity on the shoreline and marine waters? • Support access to, interpretation and understanding of geodiversity?

No.	AoS objective	Guide questions
11	Improve health and well-being and safety for all citizens and reduce inequalities in health	Will the NPS... • Protect the health of communities through prevention of accidental pollutant discharges, exposure to electric and magnetic fields or radiation? • Minimise nuisance on communities, their health, quality of life and their facilities including, noise, artificial light, odour, dust, steam, smoke and infestation of insects? • Result in loss of recreational and amenity land or loss of access? • Provide for facilities that can promote more social interaction and a more active lifestyle and enjoyment of the countryside and coasts? • Promote access to nature for people and improve local Green Infrastructure provision? • Promote initiatives that enhance safety and personal security for all? • Where possible, contribute to improvements to health and quality of life?
12	Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure	Will the NPS... • Prevent adverse changes to strategic transport infrastructure road/rail/airport? • Prevent loss or disruption to basic services and infrastructure (e.g. telecommunications, electricity, gas)? • Promote transportation of goods and people by low/zero carbon transport modes? • Reduce travel distances to work and reduce the need for out commuting?
13	Promote a strong economy with opportunities for local communities	Will the NPS... • Support enhanced security, reliability and affordability of the national energy supply? • Support creation of both temporary and permanent jobs and increase skills, particularly in areas of need? • Have wider socio-economic effects such as changes to the demographics, community services or house prices? • Delivery of infrastructure to support economic investment in the local economy?

No.	AoS objective	Guide questions
14	Promote sustainable use of resources and natural assets	Will the NPS... • Reduce consumption of materials, energy and resources? • Promote sustainable waste management practices in line with the waste hierarchy? • Encourage the use of recycled and / or secondary materials? • Encourage the development of a circular economy? • Promote the use of low carbon materials and technologies? • Produce waste by-products that require appropriate management? • Promote the use of local suppliers that use sustainably-sourced and locally produced materials? • Provide for safe and secure storage of radioactive and other wastes where necessary?

Approach to appraisal

The appraisal of draft EN-8 has been undertaken in a topic by topic manner, tested against each of the 14 AoS objectives.

The appraisal is in accordance with the criteria set out in Annex II of the ODPM guidelines. In predicting effects, changes to the baseline which would occur as a result of implementing draft EN-8 are identified. These changes are then described (where possible) in terms of their geographic scale, the timescale over which they could occur, whether the effects would be temporary or permanent, positive or negative, likely or unlikely, frequent or rare and whether or not they are secondary, cumulative or synergistic.

Quantitative information is not available to help inform the development of predictions in most cases. In such cases, the effects have been predicted based on professional judgement and by reference to relevant legislation and regulations and baseline data. Significance of likely effects was predicted according to the five categories set out in the following table:

Key to appraising significance of effect

Effect significance	Effect 'score'	Rationale for significance of effect
Significant positive effect considered likely	++	Policy is expected to address an existing sustainability problem or deliver sustainability enhancements, such as substantial environmental net gain above existing/emerging policy.
Minor positive effect considered likely	+	Policy is expected to lead to environmental net gain in line with existing or emerging government policy OR result in protection and conservation of a sustainability asset (for example, a designated biodiversity site or designated heritage asset).
No effect likely or not applicable	0	No perceptible effects expected, or the objective is not relevant to the part of the NPS being assessed.
Minor negative effect considered likely	-	Policy is expected to result in adverse effects of a lower magnitude or smaller scale, which can be mitigated through standard measures and best practice.
Significant negative effect considered likely	--	Policy is expected to result in adverse effects of a greater magnitude or larger scale, which cannot be mitigated OR will require extensive and bespoke mitigation solutions. Further studies may be required to identify appropriate solutions.

AoS of reasonable strategic alternatives for implementing the aims of draft EN-8 has also been undertaken. To maintain the AoS at a level proportionate to the level of detail within the NPS, the strategic alternatives were assessed at a higher level than the AoS Framework by using six sustainable development themes, identified through aggregating the AoS objectives into topics that better reflected the strategic characteristics of the options and in alignment with the approach in AoS-1 for overarching EN-1.

Headline SD Themes	AoS/SEA Objectives (numbers refer to AoS objectives)
Climate Change	Net Zero (1)
Security of Energy Supply	Health (11), Economy (13)
Health & Well- Being	Air Quality (8), Health (11)
The Economy	Health (11), Economy (13), Resources (14)
The Built Environment	Transport (12), Heritage (5), Adaptation and Resilience (2), Landscapes and Townscapes (6)
The Natural Environment	Adaptation and Resilience (2), Biodiversity (3 & 4), Heritage (5), Landscapes and Townscapes (6), Water (7), Soils (9), Geodiversity (10)

To draw comparison between alternatives on a broad level, the following scale was used:

Scale	Description
Large Positive	A materially different positive outcome is anticipated compared to EN-8
Positive	A more positive outcome is anticipated compared to EN-8
Neutral	This alternative is anticipated to have the same outcome as EN-8
Negative	A more adverse outcome is anticipated compared to EN-8
Large Negative	A materially different adverse outcome is anticipated compared to EN-8

Summary of key AoS findings for EN-8

Objective 1: Consistent with the national target of reducing carbon emissions to Net Zero by 2050

In respect of AoS Objective 1, significant beneficial effects are predicted in the medium to long term for draft EN-8 i.e. as fusion energy infrastructure sites become operational in the 2040s they are expected to produce very significant quantities of low carbon energy (electricity and heat) over their lifetime. The quantities of energy supplied will be critical in helping to decarbonise the energy network through providing low-carbon electricity for homes, transport and industry alongside other benefits such as providing stability and resilience to electrical grids, facilitating the wider integration of variable renewables such as wind and solar and helping provide heat to decarbonise hard-to-abate sectors such as industry.

It is considered that minor negative effects will occur in the short (construction), medium (operation) and long (decommissioning) term reflecting the residual emissions from fusion energy infrastructure associated with transportation and embodied carbon, though it is anticipated that as new approaches to construction/deconstruction such as use of low/zero carbon plant and materials and the use of low carbon electricity during operation, these emissions will become minimal. Residual emissions will also remain associated with obtaining and transporting tritium and deuterium fuels to the fusion energy infrastructure and to a lesser extent with transporting materials to final disposal. These residual emissions can be balanced by negative emissions through voluntary or sectoral arrangements as set out in EN-1 but there is no certainty at present of when these arrangements will come into place so residual emissions can still be expected to occur.

Decommissioning in the long term will likely bring temporary minor negative effects similar to those for construction but effects will eventually become neutral through the cessation of operational aspects. It is to be noted that considerations made above are for large scale fusion facilities – smaller scale fusion stations can be anticipated to result in less GHG emissions during all phases due to their much smaller size individually.

Objective 2: Maximise adaptation and resilience of built assets, communities and people as well as natural assets, habitats and species, to the multiple effects of climate change

The AoS found that Objective 2 is addressed comprehensively by the policies in draft EN-8 and EN-1. In particular, the policies set out in EN-1 ensure the latest UK Climate Projections and associated research and expert guidance will be taken into account and that impacts on and from proposed energy projects across a range of climate change scenarios are considered; and in particular demonstration of how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario.

EN-1 details climate adaptation requirements and considerations in relation to onshore energy infrastructure projects situated on the coast. It covers coastal erosion and deposition specifically, acknowledging that the impact of climate change on such processes and the need to address this. EN-8 recognises that fusion development may involve estuarine, riverine and lacustrine locations, as well as coastal locations, and extends the requirements of EN-1 to consider effects from riverine, lacustrine and estuarine erosion and deposition.

EN-1 also sets requirements for the management of other climate change risks associated with periods of limited water availability, storms, heatwaves and wildfires over the lifetime of the energy infrastructure.

EN-1 sets out that applicants should consider whether to take reasonable steps to maximise use of nature-based solutions to address the impacts of flooding and coastal erosion, including the use of SUDS alongside other conventional techniques.

It is considered that the application of requirements in EN-1 and draft EN-8 will maximise adaptation and resilience to climate change of fusion energy infrastructure. Such requirements promote future proofing against the effects and risks of climate change in coastal, estuarine and lacustrine locations, and working with natural processes to minimise such effects and risks, with significant beneficial effects predicted over the short, medium and long term.

Objective 3: Enhance biodiversity and ecological networks, deliver biodiversity net gain, protect and support ecosystem resilience and functionality

Draft EN-8 makes it clear that applicants are advised to comply with EN-1 requirements. The policies set out in EN-1 sections on Biodiversity Net Gain and Biodiversity and Geological Conservation thoroughly address AoS Objective 3 Enhance biodiversity, promote ecosystem resilience and functionality and contribute to the achievement of Biodiversity Net Gain and the delivery of the Nature Recovery Network.

EN-1 recognises that careful siting and use of appropriate technologies can help to mitigate adverse impacts on the environment and sets out an overarching principle in relation to protecting biodiversity, which is that development should at the very least aim to avoid significant harm to biodiversity interests, including through mitigation and consideration of reasonable alternatives. It is suggested that in cases where significant harm is unavoidable, then appropriate compensation measures should be sought. Where this is not possible, it is suggested that the Secretary of State gives significant weight to any residual harm.

Development proposals should seek opportunities to contribute to and enhance the natural environment by providing net gains for biodiversity where possible. To aid this, the Secretary of State will maximise opportunities for biodiversity within developments, using planning obligations. EN-1 further states that proposals should consider and seek to provide improvements to natural capital and ecosystem services (wider environmental net gain) when considering how to achieve biodiversity net gain.

Noting the Critical National Priority nature of fusion energy development, draft EN-8 adds new policy during project development, by requiring the applicant, in addition to the options for addressing the mitigation hierarchy set out in EN-1, to implement further possible mitigation or avoidance options including variations to building layout to avoid ecologically sensitive areas.

Potential adverse effects on biodiversity can be mitigated, for example through project design to avoid sensitive and high value areas and minimise footprint; habitat retention and species protection measures on site, buffer zones to avoid or minimise disturbance to habitats and wildlife, treatment of any discharges prior to release into the water environment, air and soil pollution control measures; and design of cooling water system so as to minimise modification of sedimentary and hydrodynamic processes, avoid the entrainment and impingement of aquatic organisms and promote sufficient mixing and dispersal. These mitigations will act to further reduce the significance of any negative effects on site and in the immediate vicinity, both during construction and operation.

It is therefore possible to conclude that there would generally be minor negative effects in the short and medium term to designated sites of international, national and local importance, protected species, habitats and other species of importance for the conservation of biodiversity as a result of fusion energy development coming forward under the requirements of draft EN-8. It would be only in the most exceptional circumstances, where it can be demonstrated that the benefit and need of the development outweighs the loss, harm or deterioration, that the Secretary of State would grant consent under the Critical National Priority provisions of EN-1 for any such developments with resulting significant negative effects. In those circumstances and taking a precautionary approach, effects would be considered significant adverse.

During operation, permanent structures associated with new fusion development in the coastal, estuarine and lacustrine environment have the potential to alter aquatic processes and wave regimes and affect aquatic species. Such species can also be disturbed throughout operation from noise and changes to water quality from cooling water discharge, maintenance dredging or vessel movements. On land, permanent changes to surface water and groundwater hydrology due to the presence of buildings, foundations, roads and other infrastructure would also be expected during the operational phase potentially impacting surrounding habitats. It is therefore concluded that there will likely be significant negative effects during the operational phase.

Decommissioning could bring negative effects on biodiversity through potential habitat loss and disturbance due to the type of de-construction activities involved. However, mitigation measures such as those utilised during construction can reduce adverse effects, while beneficial effects could be experienced through the cessation of operational aspects such as cooling water discharge and the potential creation of new habitats and biodiversity enhancement through returning the land to previous land uses or other compatible uses.

Significant beneficial positive effects are also anticipated in the medium and long term, through the clear approach noted in EN-1 and in draft EN-8 of using the mitigation hierarchy and biodiversity enhancement. This means that locally designated sites and other habitats areas onsite and/or offsite of a fusion energy site will be enhanced as a result of fusion energy development.

Objective 4: Protect and enhance sites designated for their international importance for nature conservation purposes

Draft EN-8 has been subject to Habitats Regulation Assessment (HRA) to determine whether the strategic plan poses a risk to habitat sites and whether it would result in likely significant effects, either alone, or in combination with other plans. Given the strategic nature of the draft EN-8 and the lack of geographically specific proposals, it allows for potential fusion energy development to take place in any part of England and Wales and territorial waters. As such, it was not possible for the HRA to conclude that there will be no effects on the integrity of Habitat Sites as a result of development coming forward under EN-8.

Therefore, there is potential for significant negative effects on Habitats Sites as a result of EN-8 implementation in the short, medium and long term. This could include on sites which are in the jurisdiction of other countries (transboundary). The effects identified are uncertain as they will depend on the specific locations and scale of development.

Objective 5: Protect and enhance cultural heritage assets and their settings, and the wider historic environment

There is the potential for minor negative effects (including cumulative effects) on heritage assets in the short, medium and long term as a result of the potential impacts on heritage assets and their settings from fusion energy development (with some uncertainty about the extent of direct effects such as disturbance and loss as these will be determined by location of any infrastructure in relation to the heritage assets). It is to be noted that some heritage assets such as shipwrecks are located offshore and may be in the legal ownership of or be of considerable historic interest to other countries (for example wrecks identified as war graves) and as such, there is a potential for transboundary effects. However, it is considered that all potential effects are addressed through the approach outlined in draft EN-8 (with clear reference made to EN-1).

Note is also made in draft EN-8 that engagement should take place with Historic England and / or Cadw, as well as relevant local authorities in respect of the historic environment and heritage and it is considered that this will help ensure full consideration of potential affects and how best to address these.

Objective 6: Protect and enhance the character and quality of the landscapes, townscapes and waterscapes and protect and enhance visual amenity

Significant negative effects for landscape, townscape and visual receptors are likely as a result of the implementation of draft EN-8 in the short, medium and long term and it is to be noted that due to the size of likely development, opportunities for mitigation will be limited and as recognised by draft EN-8, it may not be possible to completely eliminate impacts through mitigation. However, draft EN-8 (in combination with EN-1) nevertheless sets out a robust approach to addressing impacts on landscape, townscape and seascape across the relevant timeframes and there is a clear requirement that applicants should reduce the landscape impacts and visual intrusion of a project as far as reasonably practicable. Although still considered significant, there is a potential for adverse landscape effects to be reduced as decommissioning progresses.

Objective 7: Protect and enhance the water environment

There is a clear requirement (via both draft EN-8 and its reliance on EN-1) that applicants should seek to prevent pollution of water bodies (including surface and groundwater) during the construction, operation and decommissioning of any proposed fusion energy development. This could be achieved via the measures set out in EN-1 such as the appropriate use of SuDS, green infrastructure or other appropriate measures and new approaches in infrastructure drainage design to enhance water quality and reduce pollution and flood risk. Risk to all types of water bodies (not just main rivers) is to be considered during any development design.

Nevertheless, minor negative effects for water quality are likely to continue as a result of the implementation of draft EN-8 in the short term (construction) and during decommissioning (long term) as it will not be possible to avoid all negative effects on the water environment, given the nature of activities relating to these phases. More significant effects could be anticipated during operation, particularly if the cooling system requires large volumes of water. Should a dry cooling system be used adverse effects may be minor during operation, given that water won't be used as the cooling agent.

Across all timescales, there is potential for the measures outlined above, along with Environment Agency controls and compliance with international best practice to appropriately mitigate these risks, though some minor adverse effects will remain. The effects identified are uncertain as they will depend on the specific locations and scale of development.

Objective 8: Protect and enhance air quality on a local, regional, national and international scale

While EN-1 (to which draft EN-8 refers) notes a robust approach to managing effects on air quality, it is anticipated that effect on air quality is still expected to be slightly adverse, due to the potential for emissions of air pollutants at all life stages of fusion energy infrastructure. The construction of fusion energy infrastructure is likely to have some localised adverse effects on air quality in the short term, including dust and emissions from construction vehicles, heavy goods vehicles (HGVs), and traffic movements generated by the construction workforce. This has the potential to affect residential properties along local access/haul routes in the immediate surrounding area as well as ecological receptors. It is anticipated that effects on air quality can be minimised through good construction practices such as effective dust suppression, careful management of earthworks and a robust monitoring programme and the adherence to required consent/permits.

While operation of the fusion energy infrastructure itself is not anticipated to result in significant effects on air quality (as recognised in draft EN-8), there is still expected to be emissions generated from associated plant / machinery and traffic which could potentially affect properties and ecological receptors. However, mitigation measures including promotion of sustainable transport (through robust transport planning) could successfully reduce emissions to acceptable levels.

Similar effects on air quality from decommissioning to those during the construction phase are expected. However, emissions are anticipated to be lower than those during the construction phase because of expected advances in zero emissions vehicles and machinery by the time decommissioning takes place together with the need for less earth movements and less transportation of materials off the site as compared to construction. Adherence to similar mitigation measures as during the construction phase would also reduce effects.

Objective 9: Protect soil resources, promote use of brownfield land and avoid land contamination

Direct, short term effects on soil resources from draft EN-8, through loss or contamination, are likely to occur from the construction of developments for fusion energy generation and associated infrastructure, especially given that such developments will often be located on greenfield land, although they may also be located in brownfield land where soil resources may be of a lesser value. There is potential for contamination of soil resources to occur in the short to long term as a result of air and water pollution arising from construction or the operations of energy generating infrastructure or potentially from spills during the operation of such developments.

Draft EN-8 sets out that fusion energy infrastructure may also include facilities for the storage of radioactive materials. Such facilities could also result in contamination to the surrounding environment should they not be contained adequately. As noted by draft EN-8, EN-1 sets out the principles for management of hazardous and non-hazardous waste generated by large infrastructure projects. Furthermore, both draft EN-8 and EN-1 note the requirements for 'Good Design' of all energy infrastructure.

The decommissioning stage of fusion energy infrastructure may also cause direct negative effects on soil resources due to spills and contaminated waste left on-site but also offer potential for the remediation of land. Similarly, delivery of fusion energy infrastructure on previously developed land may create opportunities to deliver local regeneration. Cumulative negative effects on soil resources may occur where there is a cluster or concentration of energy infrastructure development, including fusion energy infrastructure. The significance of any effects will be dependent on the locations and scales of development.

Minor negative effects on soil resources are likely from implementation of draft EN-8 in the short, medium and long term due to the potential for loss of agricultural land and contamination of soil, potentially from spills of oil or chemicals used in the construction, operation and decommissioning of energy related infrastructure. The effects identified are uncertain as they will depend on the specific nature, location and scale of development.

The mitigation and approach outlined in EN-1 (referred to by draft EN-8) has the potential to ensure that energy generating development enabled through draft EN-8 will avoid the best and most versatile agricultural land, where possible. Additionally, the requirement that development should not be given consent unless they have been considered by relevant pollution authorities is likely to minimise the potential for land contamination.

Objective 10: Protect, enhance and promote geodiversity

There is potential for negative effects on geodiversity due to draft EN-8 implementation in the short, medium and long term, through loss of land / seabed, changes to coastal processes etc., particularly during construction. However, due to the potential for enhancement of geological features (or increasing access etc.) outlined in EN-1 (to which draft EN-8 cross references), there is also potential for minor positive effects in the medium to long term.

Nevertheless, it is important to note that the significance of any effects on geodiversity remains uncertain, and the effectiveness of the mitigation possibilities proposed will depend on the individual sensitivities of the receiving sites, in the context of specific details of the development design, layout and operation.

Objective 11: Improve health and well-being and safety for all citizens and reduce inequalities in health

Reliable energy supplies nationally will contribute to positive effects generally on the economy and skills with indirect positive effects for health and well-being in the medium to longer term through helping to secure affordable supplies of energy and minimising fuel poverty. Opportunities for employment (across the short, medium and long term) are also likely, with consequent beneficial effects on wellbeing.

EN-1, to which draft EN-8 refers, also provides clear recognition of the need to identify potential adverse health impacts, including on vulnerable groups (or those with protected characteristics) within society and notes that opportunities should be taken to mitigate direct impacts by promoting local improvements to encourage health and wellbeing. Beneficial effects will likely be from the short through to the long term.

Objective 12: Promote sustainable transport and minimise detrimental impacts on strategic transport network and disruption to basic services and infrastructure

Draft EN-8, supported by EN-1, provides for a robust approach to promoting sustainable transport, as well as minimising detrimental impacts on the strategic transport network and disruption to services and infrastructure. It also describes the need to undertake transport assessment and include Travel Plans and this would help to ensure that all aspects of effect on the transport network (strategic and local) can be addressed. As such, while it is anticipated that uncertain effects may be experienced in the short (construction) term, benefits should be experienced across the later timescale of the development, particularly as Good design principles should be considered (as required by draft EN-8) – this is anticipated to include transport infrastructure.

Objective 13: Promote a strong economy with opportunities for local communities

Development of fusion energy infrastructure will support the security, reliability and affordability of the national energy supply and lead to the provision of jobs in local areas to the development and further afield. Some of these jobs are likely to be specialist in nature, but others will be lower skilled, or suitable for apprenticeships or will provide opportunities to further develop skills. It is anticipated that most jobs would be during the construction phase, with significantly less jobs during operation and then an increase during the decommissioning phase. A significant increase in workers can lead to stress on local housing and labour markets (particularly in more rural areas / smaller towns), however, draft EN-8, via the requirements set out in EN-1, will ensure a clear approach to addressing such issues. As such, some slight adverse effects are anticipated in the short term, but overall, there should be significant benefits in local areas during construction, with ongoing benefits through the medium to long term.

It is also important to note that draft EN-8 will help to provide a robust and secure national supply of energy. This will have significant benefits across the wider economy, through for example allowing people and businesses to make long term investment decisions and could be expected to provide significant benefits through to the long term.

Objective 14: Promote sustainable use of resources and natural assets

Draft EN-8, supported by EN-1, provides a robust approach to promoting sustainable use of resources and natural assets and notes how good design can reduce the requirement for consumption of materials and applying this to a project at as early a stage as possible will act to reduce consumption. Clear note is made (in EN-1) of a number of key aspects such as the waste hierarchy, and the requirement to set out the arrangements that are proposed for managing any waste produced, as well as ensuring proposals align with circular economy objectives. While there will be a high level of consumption of sources in the short term (construction phases), including virgin materials, this will reduce during the operational phase and techniques such as the use of Building Information Management tools (or similar) will provide opportunities in the long term for realising the recovery and reuse of materials used at the construction stage.

It is also considered that draft EN-8 (supported by EN-1) will help reduce the consumption of fossil fuels by the economy by helping to promote a shift to more sustainable forms of energy generation and transport such as active modes like cycling and walking, as well as Low and Zero Emission Vehicles by helping to provide / enable the appropriate infrastructure in new development areas.

Draft EN-8 sets out how radioactive material produced during operation of the fusion energy infrastructure will need to be managed. It also notes that it is likely that some radioactive material will need to be stored at the site of the fusion energy infrastructure prior to disposal. This storage could occur during operation and decommissioning.

Assessment of reasonable alternatives

As required by the SEA Directive, the AoS of draft EN-8 also includes an assessment of reasonable alternatives to the policies set out at a strategic level. Three reasonable alternatives were considered against headline sustainable development themes. The alternatives were:

- NPS provides full protection to highest priority designated habitats (SAC, SPA, MCZ, RAMSAR) – fusion energy infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites.
- NPS provides full protection to highest priority designated landscapes and cultural sites (national landscapes and heritage sites) – fusion energy infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites.
- NPS specifies the use of alternative cooling technologies to mitigate the environmental impact of cooling water abstraction and discharge on receiving waters from fusion energy infrastructure, and the visual impact of natural draft cooling towers and steam plumes on surrounding landscapes.

An overview of the consideration of each alternative is as follows:

Alternative 1

In relation to the highest priority designated habitats (SAC, SPA, MCZ, Ramsar), the approach taken by draft EN-8 means that DCO may be granted under Critical National Priority even though there is significant residual harm to those Habitat sites. Alternative 1 would provide full protection in relation to the same sites from residual harm through not allowing derogations.

In respect of climate change, it is considered this alternative would allow for better protection of Habitats sites than draft EN-8, including those which would have particular importance for sequestration of carbon (e.g. peat bogs, forests, grasslands, parts of the marine environment etc.). As such, it is considered selection of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets.

However, in terms of security of energy supply, it is considered that an alternative that provides full protection in respect of Habitats sites could potentially reduce the availability of otherwise suitable fusion generation sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity, as compared to draft EN-8. Restricting the potential for development could also reduce the overall economic output of the UK. As such, it is considered selection of this alternative would have a Negative effect in respect of security of energy supply.

Positive benefits could be anticipated from this alternative in respect of health and wellbeing as compared to draft EN-8. Such Habitats sites protect and maintain areas of the most valuable habitat, which, in addition to being of critical importance to biodiversity, are recognised as having health and wellbeing benefits to people through allowing access to nature and performing air and water pollution cleansing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential fusion energy infrastructure development as compared to draft EN-8. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of fusion energy infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered selection of this alternative would have a Negative effect in respect of the economy.

It is considered that this alternative would have no strategic implications for the built environment – the Habitat sites noted in this alternative relate to those sites designated at the highest level (European / International) for nature conservation. As such, it is considered selection of this alternative would have a Neutral effect in respect of the built environment in comparison to draft EN-8.

This alternative would provide for better protection for the Habitats sites (natural environment) as fusion energy infrastructure development will not be granted DCO where it will inevitably (i.e. after reasonably practicable mitigations) cause residual harm to those sites. As such, by protecting such areas (and by not allowing derogations), it is considered selection of this alternative would have a Positive effect in respect of the natural environment in comparison to draft EN-8.

Table 2: Consideration of Alternative 1 in comparison to EN-8

Sustainable development theme	Alternative 1
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative
The built environment	Neutral
The natural environment	Positive

Alternative 2

In relation to the highest priority designated landscapes and cultural sites (national landscapes and heritage sites), the approach taken by draft EN-8 means that DCO may be granted where it will inevitably (i.e. after reasonably practicable mitigations) cause harm to the visual character and cultural and/or historical significance of those sites. Alternative 2 would provide full protection in relation to the same landscapes and cultural sites.

In relation to climate change, it is considered that this alternative allows for better protection for sites that, in addition to being National Landscapes, could include areas of importance for sequestration of carbon (e.g. peat bogs, forests, grasslands). As such, it is considered selection of this alternative would have a Positive effect in respect of Climate change (Net Zero) targets in comparison to draft EN-8.

However, this alternative could result in areas being excluded from potential fusion energy infrastructure development. This could potentially reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. Restricting the potential for development could also reduce the overall economic output of the UK. As such, it is considered selection of this alternative would have a Negative effect in respect of security of energy supply as compared to draft EN-8.

In respect of health and wellbeing, it is considered that this alternative could result in protection of sites which would have benefits in terms of health and wellbeing. In short, such designated sites protect and maintain areas / features that can provide a 'sense of place' for people, as well as a connection to their heritage – this is widely recognised as having positive wellbeing effects. As such, it is considered that this alternative would have a Positive effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in areas being excluded from potential fusion energy infrastructure development. This could potentially reduce the availability of otherwise suitable sites. Such areas could lose out on economic benefits that would be anticipated from the development of fusion energy infrastructure (well paid job opportunities, opportunities for suppliers etc.). As such, it is considered selection of this alternative would have a Negative effect in respect of the economy in comparison to draft EN-8.

The built environment plays a key role in landscape and cultural sites. As such, an alternative which results in removing the potential for fusion energy infrastructure development in those areas considered highest priority designated landscapes, or cultural sites would likely be beneficial in ensuring that the quality and setting of such features is maintained. As such, it is considered selection of this alternative would have a Positive effect on the built environment as compared to draft EN-8.

This alternative is focused on highest priority designated landscapes (national landscapes) and cultural sites and it is to be recognised that such areas play an important role in maintaining the natural environment, by restricting development that is not appropriate to the scale or context of the area. As such, by protecting such areas, it is considered selection of this alternative would have a Positive effect in respect of the natural environment as compared to draft EN-8.

Table 3: Consideration of Alternative 2 in comparison to EN-8

Sustainable development theme	Alternative 2
Climate Change (Net Zero)	Positive
Security of Energy Supply	Negative
Health and Wellbeing	Positive
The economy	Negative
The built environment	Positive
The natural environment	Positive

Alternative 3

Draft EN-8 promotes a range of cooling technologies which include direct (or once through) wet cooling, indirect (or recirculating) wet cooling, dry cooling and hybrid cooling. Alternative 3 excludes direct and indirect wet cooling from the mix of cooling technologies.

In terms of climate change, it is considered that this alternative would have no implications in comparison to draft EN-8. It is anticipated that all fusion energy infrastructure will produce energy in line with net zero targets and use such energy in their cooling facilities, no matter the specific technical detail of how they are cooled. As such, it is considered selection of this alternative would have a Neutral effect in respect of climate change.

It is also considered that this alternative would not allow the full range of potential sites as set out in draft EN-8 to be utilised, with areas near water bodies being effectively excluded from potential fusion energy infrastructure development, if wet cooling is the technology of choice, and as such would reduce the availability of otherwise suitable sites and reduce the likelihood of the UK meeting targets related to domestic low carbon energy generating capacity. As such, it is considered this alternative would have no implications in comparison to draft EN-8 and this alternative would have a Negative effect in respect of security of energy supply.

In terms of health and wellbeing, it is considered that this alternative would have no implications – it is anticipated that all cooling technologies will be operated in a manner which protects health of the local and wider population. As such, it is considered selection of this alternative would have a Neutral effect in respect of health and wellbeing.

In economic terms, it is considered that this alternative could result in less sites being potentially viable for the development of fusion energy infrastructure with a result that some areas could lose out on economic benefits that would be anticipated from such development. As such, it is considered selection of this alternative would have a Negative effect on the economy in comparison to draft EN-8.

A range of alternative dry and hybrid cooling technologies would potentially allow for consideration of greater / more effective mitigation of effects on those areas of landscape value – i.e. some cooling technologies would allow for the removal (or reduction in size) of cooling towers, with beneficial effects on landscape. Similarly, this could better protect the setting of some cultural heritage assets. As such, it is considered selection of this alternative would have a Positive effect on the built environment.

Use of alternative dry and hybrid cooling technologies would allow for a greater range of locations to be considered for the development of fusion energy infrastructure, including areas which may have less environmental features of interest and thus lead to lower impacts. It could also mean that some pressures on the natural environment can be reduced or avoided. Such cooling technologies would have less requirement, or no requirement, to abstract or discharge large volumes of water therefore resulting in less or no impacts on receiving waters quantity and quality and on aquatic biodiversity. As such, it is considered that the use of alternative dry cooling technologies would allow for potential Positive effects on the natural environment to be realised.

Table 4: Consideration of Alternative 3 in comparison to EN-8

Sustainable development theme	Alternative 3
Climate Change (Net Zero)	Neutral
Security of Energy Supply	Negative
Health and Wellbeing	Neutral
The economy	Negative
The built environment	Positive

Sustainable development theme	Alternative 3
The natural environment	Positive

Given that the limited restrictions in locating fusion energy infrastructure near population areas as determined by Government will likely result in a large number of potentially suitable sites for this type of infrastructure, including brownfield sites and industrial sites, the assessment concluded that there will likely be limited reliance on developing priority designated habitats sites or highest priority designated landscapes and cultural sites. On balance, the three alternatives are as good (i.e. not materially different) as the proposals set out in draft EN-8. The Government's preferred option is thus to take forward draft EN-8 which will ensure positive outcomes for 'Security of Energy Supply'. The British Energy Security Strategy¹ emphasises the importance of addressing underlying vulnerability to international energy prices by reducing dependence on imported oil and gas and accelerating deployment of a range of energy technologies and related network infrastructure. Draft EN-8 is part of a suite of approaches that reflect these wider requirements by introducing greater flexibility in energy infrastructure provision at the national level and recognise that there is a 'Critical National Priority' for low carbon energy infrastructure.

Cumulative effects, including with other plans and programmes

Cumulative effects on the environment, communities and their economies may arise where the effects of several fusion energy infrastructure derived from the NPS interact, or arise due to effects from a fusion energy infrastructure development interacting with effects from other plans and policies.

Cumulative effects between EN-8 NSIP are considered similar to those identified for the suite of energy NSIP set out in EN-1, which include fusion energy generation.

A fundamental element in terms of cumulative effects is the need for low carbon energy generation and transmission, reducing GHG emissions in order to meet Government commitments to Net Zero and ultimately address the causes of climate change. The development of fusion energy generation would be aligned with this approach to low carbon energy generation (notwithstanding issues relating to embodied carbon in infrastructure construction) and result in positive cumulative effects on GHG emissions, both individually and in combination with other low carbon energy generation.

The issue of clustering of installations was also addressed as part of the consideration of EN-1 and it was noted that there could be both beneficial and negative effects with this aspect. An example was given of how if there were a number of projects being developed within a region and in a similar timeframe, it can affect local economies and labour supply markets, as well as drive up demand for housing and accommodation and local services. This could also lead to a shortage of skilled workers in a local area. On the other hand, it was considered that beneficial

¹ Department for Business, Energy and Industrial Strategy (2022) '[British Energy Security Strategy](#)'

cumulative effects could be accrued through increased spend in the local area, as well as increased opportunities for secure and well paid employment and development of skills / training, with potentially beneficial indirect effects on health. Such cumulative effects are more likely to be more pronounced in rural areas. It is considered the case that, due to the anticipated scale of fusion energy infrastructure (either large scale 'standalone', or through co-location of smaller scale facilities), these issues would also be relevant to the development of new fusion energy infrastructure.

It is also to be noted that the development of fusion energy infrastructure will represent further diversification of the energy supply network (along with wider energy NSIP development) and as such would provide cumulative benefit to the population as a whole by helping to ensure certainty of investment and security of energy supplies.

There are also likely to be cumulative effects on the environment and these can be anticipated to be cumulatively greatest and more significant when infrastructure (fusion energy infrastructure or otherwise) is co-located. As with all effects set out across draft EN-8, the particular significance would depend on precise location, scale, technology to be deployed / infrastructure required and the environmental context of the area. In specific relation to fusion energy infrastructure, it is anticipated that areas of coastline, that may have wide and expansive views, may be favoured due to the readily accessible source of cooling water, with a consequent effect on landscape, though smaller scale fusion facilities (or fusion facilities using different technologies) could allow such effects to be reduced, or for a greater range of locations to be considered. However, 'smaller' facilities may also allow for multiple fusion devices to be placed in one area, with potential for other cumulative effects. Aspects such as these are set out in detail in EN-1 which notes a range of potential impacts of multiple devices and the need for consideration of cumulative effects.

It is the case with any application for Development Consent, cumulative impacts will be taken into account where relevant. However, it can be anticipated that cumulative effects are likely from the development of energy generation and transmission infrastructure. Across all energy technologies it was considered that cumulative effects of construction (e.g. air quality, dust, noise, visual, traffic, socio- economic etc.) may arise and may be difficult to mitigate (again depending on precise scheme parameters). As such, the NPS suite as a whole (including EN-8) places a careful emphasis for decision makers to balance such competing issues. It also places a strong emphasis on the need for further consideration of all issues and effects (including cumulative effects) through applicable assessment types such as EIA, or through socio-economic assessment.

In short therefore, while the lack of clarity relating to location of infrastructure means it is not possible to be precise as to cumulative, synergistic and indirect effects, it is possible to conclude that the significance and nature of cumulative effects may vary with the precise infrastructure project proposed and the sensitivity of the receiving communities and environment. Draft EN-8 (supported by EN-1) though sets out a series of approaches such as the need for more detailed assessment and liaison with appropriate bodies, that will address and manage these issues.

Nevertheless, it is important to recognise that the declaration of a project as being of Critical National Priority, could lead to a potential for cumulative, synergistic or indirect effects, in relation to those residual effects which it has not been possible to address through application of the NPS. This is particularly likely if a group of developments, all considered to be of Critical National Priority and with potentially the same residual effects, are located in proximity to each other, or where there are clear pathways of effect.

Cumulative effects can also arise due to effects from the fusion energy development combining with effects from other projects, plans and policies (PPPs) in various sectors. However, due to the strategic and high level nature of draft EN-8 and the lack of any locational and specific detail on any fusion energy generation developments that are likely to be brought forward, as well as that inevitably there is going to be a delay between the adoption of EN-8 and any subsequent fusion generation development, it is not possible to know when (or indeed if) any subsequent project proposal will come forward and it is not therefore possible to predict what other plans and projects will be relevant to future project assessments.

Such in-combination effects are more likely to arise when multiple projects have similar impacts; due to effects exceeding the limit of what the relevant sustainability parameters can tolerate and becoming significant effects. Note that projects that are not fusion energy generation or general energy infrastructure development, as well as smaller scale development, that is not an NSIP can also lead to cumulative or in-combination effects and should be considered at the appropriate point. In-combination effects can be by virtue of proximity, connectivity and/or timing. The most common combined effects include additive air quality, water quality/quantity and habitat/species disturbance impacts. Effects could also take place at all phases – construction, operation and decommissioning.

Application of the approach to Critical National Priority could also result in cumulative effects with other projects, plans and policies, though again the scale and nature of such effects cannot be known at this stage.

In summary, in order to fully understand the potential for and likely extent of cumulative effects, details of when fusion energy infrastructure NSIPs will be developed, as well as details of the precise scale, location and technology to be used / infrastructure requirements, would need to be known for both the proposed fusion energy infrastructure, as well as other developments. Note that EN-1 requires the undertaking of Environmental Impact Assessment for relevant energy infrastructure schemes. Consideration of cumulative effects is a requirement of EIA and as such, the potential for cumulative effects (in light of the particular circumstances of the development) would be considered through that mechanism. Similarly, other development types (potentially outside the energy sector) would also be subject to the EIA Regulations and would, as a matter of course, consider the potential for cumulative effects between that development and any energy infrastructure.

Transboundary effects

Potential transboundary effects from the implementation of draft EN-8 have been approached in a similar way to other cumulative effects, only that the assessment looks at effects that originate within the UK but have the ability to extend across national borders. Transboundary effects are addressed through Regulation 14 of the SEA Regulations, which requires notification to Member States of the European Union of any Plan or Programme which is considered likely to have significant effect on the environment of that Member State.

Unintended releases of radiation from fusion energy infrastructure are very unlikely to result in any transboundary effects. The safety characteristics of fusion and compliance with the UK's robust legislative and regulatory regime means that the risk of radiological health detriment posed by fusion energy infrastructure (both during normal operation and as a result of an unplanned release) is extremely small.

Radioactive releases from all radiological sites are strictly controlled. The established regulatory system ensures that permitted radioactive discharges are within authorised limits. These releases are likely to remain sufficiently localised so as not to impact significantly on neighbouring countries.

It is worth noting that draft EN-8 considers the potential for transboundary and cross-border effects. In the case of cross border effects, applicants should make early contact with relevant statutory bodies in Scotland and Northern Ireland where there is the potential for cross-border effects on a range of topics. The cross-border effects that this refers to are non-radiological.

It is also worth noting that EN-1 (to which draft EN-8 refers) places a strong emphasis on the need for applicants to undertake an Environmental Impact Assessment. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations'), require transboundary effects to be considered from any development subject to these regulations.

As such, it is possible that Ireland, France, Belgium, Germany, Denmark, Sweden and the Netherlands would need to be consulted in the unlikely circumstances that there is potential for significant environmental effect from fusion energy infrastructure that falls under draft EN-8 and is subject to the EIA Regulations (in England and Wales). The particular nation state(s) (or other territories) to be consulted would be dependent on the proposed development, location and nature and significance of predicted transboundary effects.

Monitoring

Monitoring helps to examine the effects predicted through the AoS process against the actual effects of EN-8 when implemented. It is also a requirement of the SEA Regulations to describe the measures envisaged concerning how significant effects of implementing EN-8 will be monitored – Section 17 (1) notes “the responsible authority shall monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action”. As ODPM Guidance² advises, it is not necessary to monitor everything, or monitor an effect indefinitely, but rather monitoring needs to be focused on significant sustainability effects. Monitoring should therefore ideally focus upon significant effects that may give rise to irreversible damage, with a view to identifying trends before such damage is caused, and significant effects where there was uncertainty in the AoS and where monitoring would enable preventative or mitigation measures to be undertaken.

While significant effects have not been identified in relation to all Objectives and it is considered that in many instances the text within draft EN-8 (bolstered by that within EN-1 and the wider NPS suite) provides robust policy to address issues, the non-specific spatial nature of draft EN-8 does mean that there is in some instances a degree of uncertainty in findings and as such a potential for unforeseen individual or cumulative effects to arise. Therefore, it was considered important to take a precautionary approach to monitoring.

The sustainability effects of EN-8 may be monitored through the monitoring frameworks already carried out by the environmental regulators and the local authorities, including those set out in respect of the monitoring of EN-1. Pollution control and environmental management monitoring, including status of water quality and resources, protected habitats and species, is carried out by the environmental agencies; human health protection is the responsibility of the health authorities and bodies such as UK Health Security Agency and Office for Health Improvement and Disparities.

Local Planning Authorities monitor the effectiveness of their spatial plans, including indicators such as employment and access to community facilities and services. Nationally, Government assesses and reports annually on progress against sustainable development indicators (including greenhouse gas and carbon dioxide emissions), energy use (including renewables), and resources (including water).

It is also the case that fusion energy facilities will be monitored through the relevant permitting, consenting, licensing or authorisation process. Draft EN-8 explains that fusion energy facilities are principally regulated by the Health and Safety Executive (HSE) and the Environment Agency (EA) or Natural Resources Wales (NRW).

² Office of the Deputy Prime Minister (2005) '[Practical Guide to the Strategic Environmental Assessment Directive](#)'

As such, there is a large body of evidence that can be drawn upon to inform implementation of EN-8 and help inform any future review. As discussed, note should also be made of the monitoring set out in the AoS Report of EN-1 as this sets out a comprehensive approach to monitoring across all energy infrastructure and therefore would include monitoring relevant to new fusion energy infrastructure.

This publication is available from:

www.gov.uk/government/consultations/draft-national-policy-statement-for-fusion-energy-generation-en-8

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