Ynys Môn

THE ISLE OF Anglesey

Topic Paper 7: Climate Change

Prepared in support of the Wylfa Newydd Project: Supplementary Planning Guidance

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CYNGOR SIR
YNYS MÔN
ISLE OF ANGLESEY
COUNTY COUNCIL

@cyngormon
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1 Introduction

1.1 Purpose of this Topic Paper

1.1.1 The purpose of this topic paper is to bring together the evidence base and policy context in relation to climate change to inform the updating of the Wylfa Newydd Supplementary Planning Guidance (Wylfa Newydd SPG). It is one of 11 topic papers that have been prepared to support the:

- Identification of the key matters to be considered in drafting the revised SPG;
- Provision of guidance with respect to how the revised SPG could respond to the challenges and opportunities identified; and
- Offer further information to the public in support of consultation on a draft revised SPG.

1.1.2 **Box 1.1** provides a full list of topic papers being prepared in support of the Wylfa Newydd SPG.

Box 1.1 Topic Papers Prepared in Support of the Wylfa Newydd SPG
Topic Paper 1: Natural Environment
Topic Paper 2: Historic Environment
Topic Paper 3: Housing
Topic Paper 4: Economic Development
Topic Paper 5: Transport
Topic Paper 6: Amenity
Topic Paper 7: Climate Change
Topic Paper 8: Infrastructure
Topic Paper 9: Waste
Topic Paper 10: Population and Community
Topic Paper 11: North Anglesey

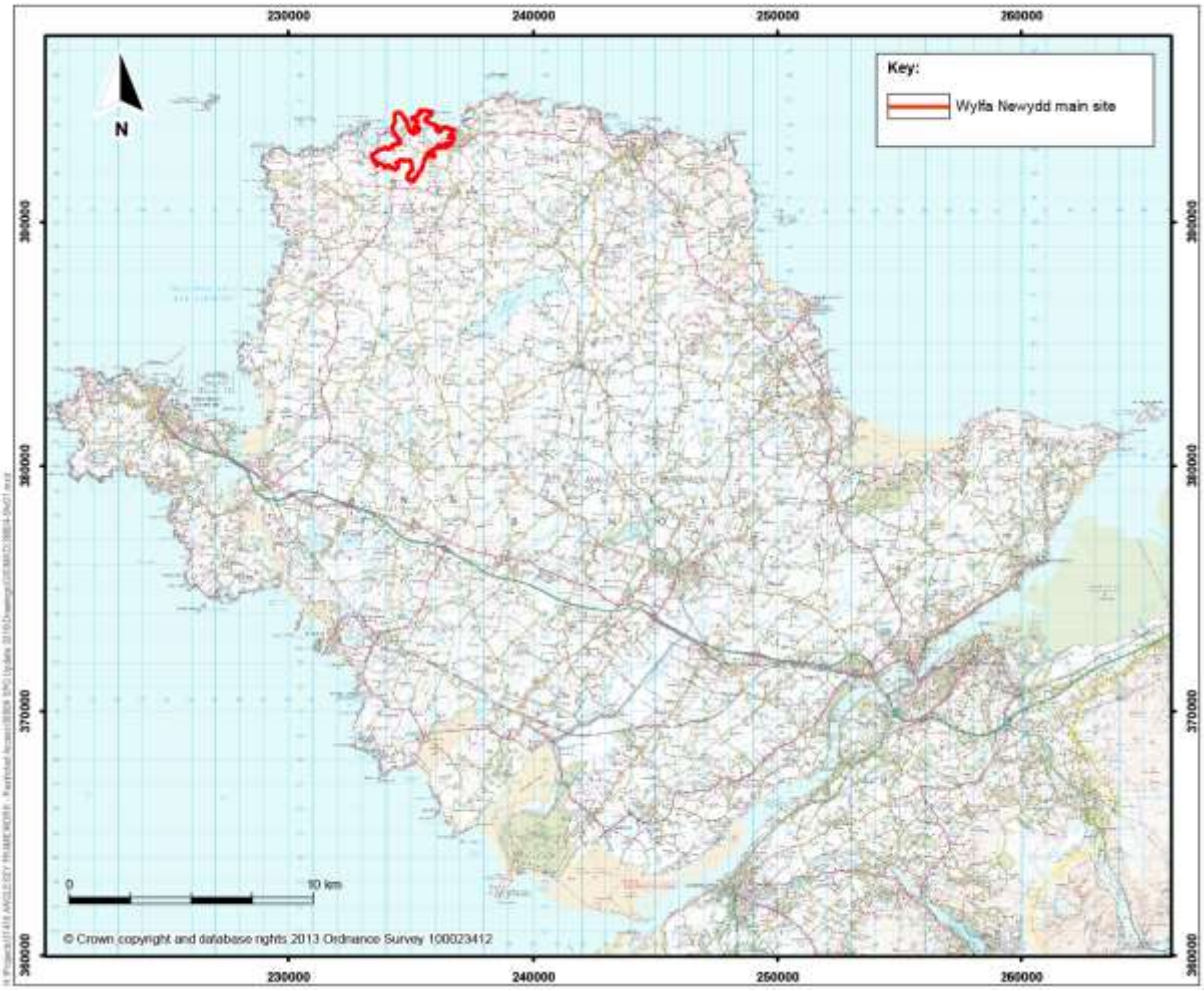
1.1.3 Ten topic papers were originally issued to support the SPG when it was first published by Isle of Anglesey County Council (the County Council) in 2014. Since that time the Anglesey and Gwynedd Joint Local Development Plan (JLDP) has been adopted which has required the topic papers to be updated in line with extant local planning policy including the drafting of an additional topic paper as indicated in **Box 1.1** above.

1.2 Context

Wylfa Newydd

1.2.1 Wylfa has been identified by the UK Government in the National Policy Statement (NPS) for Nuclear Power Generation (EN-6) as a possible site for a new nuclear power station (see Part 4 and Annex C of the NPS). Horizon Nuclear Power (Horizon) plans to deliver two Advanced Boiling Water Reactors (ABWRs), generating a minimum of 2,700MW, on the Wylfa Newydd main site. The Wylfa site is approximately 300 hectare (ha) in size and its located beside the existing Magnox nuclear power plant (which ceased electricity generation in December 2015). The project will also include associated development both on the Wylfa Newydd site and at various other off-site locations (see Figure 1.1).

Figure 1.1 Location of the Wylfa Newydd Main Site



1.2.2 Construction of the new nuclear power station is a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008. Legislation provides that projects like Wylfa Newydd are of such potential importance to the UK that a

different consenting process to the "normal" grant of planning permission by the local planning authority applies. Under this process, Horizon (the project promoter) proposes to submit an application for a Development Consent Order (DCO) for the power station to the Secretary of State for Business, Energy and Industrial Strategy (Secretary of State). The application will be made through the Planning Inspectorate who, following examination, will recommend to the Secretary of State whether development consent should be granted or not. The final decision on whether to grant or refuse development consent rests with the Secretary of State[1].

1.2.3 Although the County Council is not the consenting authority for the NSIP, it will seek to ensure that development has regard to the strategic policies and principles of the Development Plan (the Anglesey and Gwynedd Joint Local Development Plan (JLDP)), the relevant NPSs, national (Wales) planning policy and guidance, and Supplementary Planning Guidance. The JLDP is the spatial plan that gives effect to, inter alia, the Anglesey Economic Regeneration Strategy and the Energy Island Programme (EIP).

1.2.4 In addition to the proposed power station, Horizon will bring forward other projects directly related to Wylfa Newydd. These include off-site power station facilities and other facilities and works connected with the development (associated developments). In accordance with the NPS (para 2.3.4), associated development may be proposed at the main site, or may relate to works on land located off the main site. Associated development applications are now covered by the Planning Act 2008 in Wales and can, therefore, also be determined through the DCO process. Separately, third parties may bring forward development proposals indirectly related to the project. These might include, for example, sites for housing that will be occupied by construction workers. These development proposals would require consent under the Town and Country Planning Act (TCPA).

1.2.5 Since the previous version of this Topic Paper, Horizon has refined the likely off-site power station facilities and associated development required as part of the Wylfa Newydd Project. It has undertaken three stages of pre-application consultation (in 2014, 2016 and 2017) relating to the proposals and, in the third of these stages (PAC 3), it presented a series of preferred options. The off-site power station facilities are now proposed on one site in Llanfaethlu and the associated development is likely to include:

- Site preparation, clearance and enabling works for the new power station (within the Wylfa Newydd main site);

[1] Further information on the DCO application process is available via the Planning Inspectorate's website: http://infrastructure.planningportal.gov.uk/application-process/the-process/.

- Marine Off-Loading Facility (MOLF), breakwaters and Holyhead Deep, a deepwater disposal site for inert construction material;
- Off-line Highway improvements in four sections along the A5025;
- Temporary Freight Logistics Centre at Parc Cybi;
- Temporary Park and Ride facility at Dalar Hir; and
- Temporary accommodation for the construction workforce on the Site Campus (within the Wylfa Newydd main site).

1.2.6 In addition to the above associated development (that form part of the DCO application), Horizon also proposes to submit TCPA applications for site preparation and clearance works and for on-line improvements to the A5025. In this context, reference to the Wylfa Newydd Project in this document includes the proposed power station and other development on the Wylfa Newydd main site and also the off-site power station facilities and associated development proposals, including the TCPA applications. However, the Wylfa Newydd Project does not include the North Wales Connection Project (NWCP) which will connect Wylfa Newydd to the electricity transmission infrastructure (i.e. the National Grid). The NWCP is also an NSIP. It is being promoted by National Grid and will be subject to a separate DCO application process.

1.2.7 The term 'project promoter' relates to both Horizon and any other third parties proposing development in direct response to Wylfa Newydd (for example, the provision of construction worker accommodation or related employment uses).

Wylfa Newydd Supplementary Planning Guidance

1.2.8 Supplementary Planning Guidance is a means of setting out detailed thematic or site-specific guidance on the way in which development plan policies will be applied in particular circumstances or areas. The purpose of the Wylfa Newydd Supplementary Planning Guidance (Wylfa Newydd SPG) is to provide supplementary advice on important local direct or indirect matters and to set out the County Council's response to national and local policy and strategies in the context of the Wylfa Newydd Project. The SPG is supplemental to the recently adopted Anglesey and Gwynedd Joint Local Development Plan.

1.2.9 The Wylfa Newydd SPG is intended to:

- Inform the position which will be adopted by the County Council in its Local Impact Report[2] and relevant sections of the Statement of Common Ground[3];

- Provide a planning framework (alongside the Development Plan and other planning policy guidance) that helps guide the applicant(s) and influences the design and development of the Wylfa Newydd Project elements to ensure sustainable outcomes, with a focus on associated development;

- Inform pre-application discussions related to the main site and associated developments;

- Offer supplementary local level guidance, consistent with the relevant NPSs, which the Planning Inspectorate and the Secretary of State may consider both important and relevant to the decision-making process; and

- Form a material consideration in the assessment of any Wylfa Newydd Project related Town and Country planning applications submitted by Horizon or other development promoters and businesses who may have, or wish to pursue, an interest in the project.

1.3 Climate Change Overview

1.3.1 Climate change is one of the most significant threats facing the planet. Although it is a global issue, its impacts will be felt at a local level. Climate change is a result of greenhouse gas emissions, of which carbon dioxide (CO_2) is the most significant. Greenhouse gas emissions have many sources, including our energy generation, transport, industrial processes and changes in land use. Climate change is projected to bring temperature rises, changing rainfall patterns, flood risk and more extreme weather events, with associated disruption and damage to infrastructure. Action must be taken both to mitigate climate change through reducing greenhouse gas emissions, as well as adapting and increasing resilience to the expected changes arising from it.

1.3.2 Nuclear power is a low carbon energy source, which helps reduce emissions and supports ambitious national targets for reduction. There are further significant opportunities to act on climate change as part of the Wylfa Newydd project, ranging from the potential for renewable energy generation, energy efficient building design and promoting low carbon travel.

[2] As part of the Planning Act 2008 process, the County Council will be invited to submit a Local Impact Report giving details of the likely impact of the proposed Wylfa Newydd Project on Anglesey. Further information on the preparation of local impact reports is available via the Planning Inspectorate's website: http://infrastructure.planningportal.gov.uk/wp-content/uploads/2013/04/Advice-note-1v2.pdf.

[3] A statement of common ground is a written statement prepared jointly by the applicant and another party or parties such as the County Council, setting out any matters on which they agree. Statements of common ground help focus on the examination on the material differences between the main parties.

1.3.3 The Wylfa Newydd project also faces increased risk from environmental hazards due to climate change. Of particular relevance are flood risk and damage to infrastructure from rising sea levels, coastal change and heavier rainfall in the winter, although a wider range of hazards will need to be assessed. Adaptation is also key for associated developments, as they too will face risks from the environmental hazards associated with climate change.

1.3.4 This topic paper covers climate change and greenhouse gas emissions, with an emphasis on energy generation as a major contributor to climate change. Flood risk is also considered. Residential buildings and transport emissions also have a strong influence on climate change, and these are covered in more detail in Topic Papers 3 and 5.

1.4 Structure of this Topic Paper

1.4.1 The remainder of this topic paper is structured as follows:

- **Section 2**: Identifies the key messages relative to climate change arising from a review of international/European, UK, national, regional and local strategies/policies;
- **Section 3**: Presents the baseline information about climate change in the Anglesey area, drawing on the evidence base; and
- **Section 4**: Identifies the key matters related to climate change to be addressed by the Wylfa Newydd SPG and considers how the SPG could respond to each.

2 Policy Context

2.1 Introduction

2.1.1 The Wylfa Newydd SPG will influence, and be influenced by, other plans and programmes at an international/ European, UK, national, regional and local level. This section of the topic paper identifies the most relevant plans and programmes to the issue of climate change in the context of the Wylfa Newydd Project and distils the key policy messages that will need to be reflected in the SPG.

2.2 International/European Plans and Programmes

UNFCCC Kyoto Protocol and Paris Agreement

2.2.1 The global nature of climate change means that much of the framework for action is set at an international level. The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty with the aim of cooperative action to limit global temperature increases. 195 countries, including the UK, have joined the Convention since its inception in 1992. Those party to the Convention have agreed to take climate change into account in such matters as agriculture, industry, energy, natural resources and where activities involve coastal regions. The Parties also agree to develop national programmes to slow climate change.

2.2.2 191 of the Parties also ratified the Kyoto Protocol, which is an international mechanism to reduce emissions of greenhouse gases. The Kyoto Protocol was adopted in 1997, and the first commitment period expired in 2012. The Kyoto Protocol set legally binding targets for 37 industrialised countries and the European Community for reducing greenhouse gas emissions. These targets equate to an average of 5% reductions relative to 1990 levels over the five-year period 2008-2012, while the UK target was a 12.5% reduction.

2.2.3 The second Kyoto Protocol commitment period began in 2013 and will end in 2020; parties have committed to reduce carbon emissions by at least 18% below 1990 levels. The collective European Union (EU) target is to reduce carbon emissions by

20% relative to 1990 levels.[4] Furthermore, in 2014 the EU agreed to collectively reduce carbon emissions by at least 40% by 2030 compared to 1990 levels.[5]

2.2.4 In December 2015, a global climate agreement—the Paris Agreement[6]—was adopted at the 21st Conference of the Parties (COP21). The core aim of the Paris Agreement is to enhance the global response to climate change by limiting the global temperature increase this century to below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. To achieve this, the Paris Agreement additionally sets a target for net zero global carbon emissions in the second half of this century. The Paris Agreement was ratified and entered into force in November 2016.

European Union "20-20-20" Targets & EU Emissions Trading System

2.2.5 At a European level, the European Union's (EU) leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. In 2007, they committed Europe to transforming itself into a highly energy-efficient, low carbon economy. It set a series of demanding climate and energy targets to be met by 2020, known as the "20-20-20" targets. These are:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels;
- Raising the share of EU energy consumption produced from renewable resources to 20%; and
- A 20% improvement in the EU's energy efficiency.

2.2.6 The EU has indicated that it could increase the 2020 emissions reduction target to 30% if other major emitting countries followed suit. The EU also aspires to an emissions reduction of 80-95% compared to 1990 levels by 2050, and has set out a

[4] European Commission (2013) Ratification of the second commitment period of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder. Available online at: http://ec.europa.eu/clima/policies/international/negotiations/docs/com_2013_768_en.pdf

[5] European Commission (2014) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A policy framework for climate and energy in the period from 2020 to 2030. Available online at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0015&from=EN

[6] 8 United Nations (2015), Paris Agreement. Available online at: https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

low carbon roadmap for how this can be achieved[7]. This has been endorsed by EU leaders but is not yet a binding target.

2.2.7 A key policy to secure emission reductions in the EU is the EU Emissions Trading System (EU ETS). This places a price on carbon emissions and creates a market for trading, which should enable companies across Europe to meet their emissions caps through the most economic means. Emission allowances are currently freely allocated, and spare allowances can be sold by those with excess capacity to others who will exceed their emission reduction targets. Heavy fines are imposed if companies do not surrender sufficient allowances to cover all their emissions.

2.2.8 The Integrated Climate and Energy Package included a revision and strengthening of the EU ETS. A single EU-wide cap on emission allowances has applied since 2013 and is cut annually, reducing the number of allowances available to businesses by 1.74% each year until 2020, thus reducing greenhouse gas emissions. After 2020, the EU ETS will enter its fourth trading period, during which the reduction in the cap of maximum permitted carbon emissions will be changed to 2.2% in order to meet the 40% reduction in greenhouse gases that has been committed to. The EU ETS is operational in all 28 EU states as well as Liechtenstein, Norway and Iceland.

EU 7th Environmental Action Plan (EAP)

2.2.9 The EU 7th Environmental Action Plan (EAP) to 2020 reviews the significant environmental challenges and provides a framework for European environmental policy up to 2020. The four priority areas are Climate Change; Nature and Biodiversity; Environment and Health; Natural Resources and Waste. The European Commission has recently consulted on the EU environment policy priorities for 2020: Towards a 7th EU Environment Action Programme. This looks to further integrating climate and environment into other policies and instruments.

EU Renewable Energy Directive (2009/28/EC)

2.2.10 The generation of energy by renewable means could help to mitigate climate change. The Renewable Energy Directive mandates levels of renewable energy use within the EU. The Directive requires EU member states to produce a pre-agreed proportion of energy consumption from renewable sources such that the EU as a whole shall obtain at least 20% of total energy consumption from renewables by 2020. This is then apportioned across member states. The UK's legally binding commitment is for 15% of energy consumption in 2020 to be from renewable sources. Under Article 4 of the Directive each member state is also required to complete a National

[7] European Commission A Roadmap for Moving to a Competitive Low Carbon Economy in 2050 (2011)

Renewable Energy Action Plan that will set out the trajectory and measures that will enable the target to be met.

EU Floods Directive (2007/60/EC)

2.2.11 Rises in sea levels and extreme weather events which may lead to flooding are effects arising from climate change. The Floods Directive came into force on the 26th November 2007, with member states having 2 years from this date to implement its contents. The Floods Directive seeks to manage the risks posed to human health, the environment, cultural heritage and economic activity by flooding. The programme includes the production of a Preliminary Flood Risk Assessment showing the impact of historic flooding by 2011, and the generation of flood risk maps showing a range of hazard variables (water depth, extent and probability) by 2013. By 2015, management plans should have been produced which should be coordinated with river basin management plans. The Directive is transposed into Welsh law by the Flood Risk Regulations 2009.

EU Environmental Impact Assessment (EIA) Directive

2.2.12 Following the recast of the EIA Directive in 2014[8], and its transposition into UK law in 2017, new developments subject to the EIA process are now required to include climate change (adaptation and mitigation) within the assessment.

2.3 UK Plans and Programmes

Overarching National Policy Statement for Energy (EN-1) (2011)

2.3.1 This National Policy Statement (NPS) sets out the criteria by which applications for nationally significant energy infrastructure projects will be determined and the recommended focus of analysis of the accompanying Environmental Statement. EN-1 highlights that large scale deployment of renewables, new nuclear capacity and carbon capture and storage are crucial for low carbon energy generation. The impacts of climate change are also included in the NPS and it sets out generic advice on how climate change adaptation should be included in infrastructure development, such as flood risk protection, changes to water resources and coastal change.

National Policy Statement for Nuclear Power Generation EN-6 (2011)

2.3.2 This National Policy Statement (NPS), taken together with EN-1, provides the primary basis for decisions taken by the Planning Inspectorate on applications it receives for nuclear power stations. Volume I of the Statement identifies Wylfa as a

[8] Available online at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN

potentially suitable site for the deployment of a new nuclear power station. New nuclear power is identified as significantly supporting the UK's climate change objectives, and early deployment would avoid the UK being locked into a higher-carbon energy mix, thus being consistent with decarbonisation objectives. The NPS sets out that new nuclear sites must be resilient to climate change, particularly given their coastal locations and greater vulnerability to flood risk and coastal change.

Climate Change Act 2008

2.3.3 In the UK, the Climate Change Act 2008[9] introduces legislative targets for reducing the UK's impacts on climate change and the need to prepare for its impacts. The Act sets binding targets for a reduction in CO_2 emissions of 80% by 2050 compared to a 1990 baseline. A series of carbon budgets are used to set interim targets. The first five such budgets, leading to 2032, have been set in law. Meeting the fourth (2023-27) and fifth (2028–2032) carbon budgets will require that carbon emissions are reduced by 50% (by 2025) and 57% (by 2030) respectively relative to 1990 levels.

2.3.4 The Climate Change Act 2008 requires the Government, on a regular basis, to assess the risks to the UK from the impact of climate change and report to Parliament. The first Climate Change Risk Assessment was published in 2012, and was updated in 2017[10]. A National Adaptation Programme, setting out the national approach required to address the risks, follows each iteration. The first such programme was produced in 2013.[11]

2.3.5 The Climate Change Act 2008 also contains the Adaptation Reporting Power, which allows Government to ask certain organisations to produce reports on both their climate change risks and their adaptation plans. Energy UK, the trade association, responded to the second round of reporting under the Adaptation Reporting Power on behalf of all UK energy generators[12].

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[9] Available online at: Climate Change Act 2008. Her Majesty's Stationary Office, London. Available online at: http://www.legislation.gov.uk/ukpga/2008/27/contents

[10] Available online at: https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/

[11] Available online at: https://www.gov.uk/government/publications/adapting-to-climate-change-national-adaptation-programme

[12] Available online at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478938/clim-adrep-energy-uk-2015.pdf

Carbon Plan: Delivering our Low Carbon Future (2011)

2.3.6 The Carbon Plan sets out how the UK will achieve decarbonisation within the framework of energy policy: to make the transition to a low carbon economy while maintaining energy security, and minimising costs to consumers, particularly those in poorer households. It sets out policies for meeting the first four carbon budgets, and includes proposals for energy efficiency, heating, transport and industry.

UK Renewable Energy Roadmap (2011)

2.3.7 The Renewable Energy Roadmap outlines the UK's framework for delivering 15% of energy demand from renewable sources by 2020 (as mandated by the EU Renewable Energy Directive). Although starting from a low-level of renewable generation, nine technologies were identified that have the potential to generate 90% of the renewable target by 2020. These are: onshore wind, offshore wind, marine energy, biomass electricity, biomass heat, ground source and air source heat pumps, renewable transport and solar PV. The roadmap was last updated in 2013.

2.3.8 The Roadmap includes an indication from the Welsh Government that it has the potential to double the amount of renewable energy consumption by 2025, and to deliver 4GW of power from marine energy.

Energy Act (2011)

2.3.9 The Energy Act 2011 provides for some of the key elements of the Government's energy programme and including a step change in the provision of energy efficiency measures to homes and businesses. It also makes improvements to the framework for enabling and securing low carbon energy supplies and fair competition in the energy markets.

Flood and Water Management Act (2010)

2.3.10 The Flood and Water Management Act, which applies to England and Wales, makes provisions about water, including those related to water resources. The provisions include widening the list of uses of water that water companies can control during periods of water shortage; encouraging the uptake of sustainable drainage systems by removing the automatic right to connect to sewers; and providing for unitary and county councils to adopt sustainable urban drainage (SUDs) for new developments and redevelopments.

2.3.11 The Act contains provisions for regional working and co-operation such as the establishment of regional flood and coastal committees and the bringing together of lead local flood authorities, who will have a duty to cooperate, to develop local strategies for managing local flood risk. The lead local authorities must produce a

Local Food Risk Management Strategy to coordinate the response to local risks such as flooding from surface water, groundwater and streams.

2.4 National (Wales) Plans and Programmes

Environment (Wales) Act

2.4.1 The Environment (Wales) Act[13] puts in place the legislation needed to plan and manage Wales' natural resources in a sustainable manner. The Act positions Wales as a low carbon, green economy ready to adapt to climate change. Part 2 of the Act provides the Welsh Ministers with powers to put in place statutory emission reduction targets, including at least an 80% reduction in emissions by 2050 and carbon budgeting to support their delivery.

Planning Policy Wales: (9th Edition) (2016)

2.4.2 Planning Policy Wales – Edition 9 (2016) sets out the policy framework for local planning authorities' development plans. Section 4.5 deals specifically with climate change and includes aspirations to significantly reduce the carbon footprint of Wales. This is to be achieved through a move towards a low carbon economy, reducing the demand for energy, delivery of new and more sustainable forms of energy, and minimising greenhouse gas emissions. Planning Policy Wales also explicitly takes climate change adaptation into account, through the requirement to plan to address the impacts of climate change, such as damage to property, infrastructure and the economy.

2.4.3 Renewable and low carbon energy is also supported through the policy (see Section 12.8). The policy aims to "reduce energy consumption and improve energy efficiency first and maximise renewable and low carbon energy generation at every scale across Wales". Low carbon technologies are expected to feature in developments including those that:

- Are directly incorporated into the fabric of a building;
- Are stand-alone directly connected to the grid;
- Built within a new development (e.g. development scale combined heat and power);
- Provide heat for a number of buildings (e.g. district heating);

[13] Available online at: http://gov.wales/topics/environmentcountryside/consmanagement/natural-resources-management/environment-act/?lang=en

- Provide a fuel for use in transport; and
- Provide cooling.

2.4.4 Key considerations in development management for low carbon energy generation identified in Planning Policy Wales are set in **Box 2.1** below.

Box 2.1 Development Management and Renewable and Low Carbon Energy (Planning Policy Wales, para 12.10.1)

In determining applications for renewable and low carbon energy development and associated infrastructure, local planning authorities should consider:

- The contribution a proposal will play in meeting identified national, UK and European targets and potential for renewable energy, including the contribution to cutting greenhouse gas emissions;
- The wider environmental, social and economic benefits and opportunities from renewable and low carbon energy development;
- The impact on the natural heritage, the Coast and the Historic Environment;
- The need to minimise impacts on local communities to safeguard quality of life for existing and future generations;
- Ways to avoid, mitigate or compensate identified adverse impacts;
- The impacts of climate change on the location, design, build and operation of renewable and low carbon energy development. In doing so consider whether measures to adapt to climate change impacts give rise to additional impacts;
- Grid connection issues where renewable (electricity) energy developments are proposed; and
- The capacity of and effects on the transportation network relating to the construction and operation of the proposal.

2.4.5 Section 12.9 describes the approach that development plans should take to the consideration of low carbon energy, and states that local planning authorities should undertake a renewable energy opportunity assessment. It highlights the fact that sub-local authority scale renewable energy projects are applicable in all parts of Wales and should be encouraged through development plans. The potential for district heating, biomass projects, and wind power on industrial sites are all highlighted in this section.

2.4.6 Flood risk and climate change policy is set out in Section 13.2 and references a shift away from flood defences towards avoidance of development in hazard areas, such as flood plains. Developments located in high-risk areas would have to be strongly

justified. The development catchment as a whole must be considered to ensure flood risk does not increase, and should seek to decrease the risk from flooding or run-off. Section 5.8 meanwhile concerns development at the coast and stipulates that before major developments are permitted, it will be essential to demonstrate that a coastal location is required. Where development is considered to satisfy this test, it should be designed so as to be resilient to the effects of climate change over its lifetime.

2.4.7 Buildings, housing and transport and their links to climate change are also referenced in Planning Policy Wales. Section 4.12 addresses sustainable buildings, and the requirement to meet certain buildings standards. The mitigation of climate change is expected through the minimisation of greenhouse gas emissions associated with building design, construction, use and demolition, including specific reference to heating, cooling and power systems for new developments. Climate change adaptation through drainage systems and stable internal temperatures is also expected to be included in proposals. The links between housing and climate change are also identified in the policy, and plans for the provision of new housing must address the causes and consequences of climate change (Section 9.2.1).

2.4.8 Section 8 supports the avoidance of car journeys and associated greenhouse gas emissions through the promotion of walking and cycling (Section 8.2) and public transport (Section 8.3), including improved cycle routes and better public transport services.

Technical Advice Note (TAN) 8: Renewable Energy (2005)

2.4.9 TAN8 sets out that the Welsh Government has a target to produce 7TWh electricity from renewable sources per year by 2020, and that this target can be supported through the planning system. Onshore wind power is highlighted as having the greatest potential for increasing renewable energy in the short to medium term (of the activities within the Welsh planning system; with offshore wind being outside the scope on land use planning). Specific requirements for individual renewable technologies, including solar power, biomass, and hydropower, are also included in the TAN.

2.4.10 Seven 'Strategic Search Areas' (SSA) have been identified in Wales for consideration for the installation of large scale onshore wind developments. Anglesey already has some onshore wind capacity, but does not contain a SAA although the TAN specifies that there may be further opportunities outside the SSA.

2.4.11 TAN 8 also references the promotion of energy efficiency and energy conservation, in addition to renewable energy generation (although this features more heavily in TAN 12: Design and TAN 22: Planning for Sustainable Buildings).

TAN 12 Design (2016)

2.4.12 TAN 12 has superseded TAN 22 Planning for Sustainable Buildings and provides guidance on how good design should be achieved through the planning process. TAN 12 explicitly requires an appraisal of the effects of climate change over the lifetime of proposed developments within the 'Environmental Sustainability' element of what is considered 'good design'.

2.4.13 Furthermore, TAN 12 includes 'climate responsive development and sustainable buildings' as an overarching issue to be considered across the design process. This accounts for energy efficiency and water efficiency, thus helping to mitigate climate change and producing low carbon solutions in-line with the Welsh Government's aspiration of a zero carbon and nearly zero energy standard for regulated emissions (i.e. heating, cooling, lighting and ventilation).

TAN 14: Coastal Planning (1998)

2.4.13 TAN14 sets out further considerations for coastal developments, with requirements to review ground conditions, erosion and landslides, in addition to the broader coastal setting and potential implications on coastline physical processes.

TAN 15: Development and Flood Risk (2004)

2.4.14 TAN 15 includes specific guidance on the assessment of flooding consequences and controlling surface water run-off. The nature of development and justification of development locations are also set out. Five flood zone categories are set out, ranging from A (little or no risk of flooding) to C2 (areas of flood plain without significant flood defences). The zone categorisation sets out whether flood risk needs to be taken into account in planning future developments. The zones are set out in **Table 2.1**.

Table 2.1: TAN 15 Flood Zones

Description of Zone		Use within the Precautionary Framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further.
Based on Environment Agency extreme flood outline, equal to	C	Used to indicate that flooding issues should be considered as an integral part of decision making by

Description of Zone		Use within the Precautionary Framework
or greater than 0.1% (river, tidal or coastal).		the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

2.4.13 The aim is for new developments to be located away from zone C, and preferably directed towards zones A or B. Developments should only be located in zones C1 or C2 if they can be appropriately justified. Residential premises and some industrial developments such as power stations fall in the category of 'highly vulnerable development', which means that flooding is less acceptable than for other, less vulnerable, developments. TAN 15 states that these highly vulnerable developments should not be permitted in zone C2.

2.4.14 A higher risk location must be justifiable for less vulnerable developments, such as when contributing to key employment objectives or regeneration. A development can only proceed in a flood risk area if the consequences can be managed to an acceptable level. Sustainable drainage systems are required (unless demonstrated not to be effective at a site) to reduce run-off and avoid impacting adjacent areas.

CL-03-16 – Climate Change Allowances for Planning Purposes (2016)

2.4.15 Climate change allowances for flood consequence assessments in Wales are contained within 'CL-03-16 – Climate Change Allowances for Planning Purposes', produced by Welsh Government Planning Directorate.[14] A requirement for the use of these projections came into force in December 2016 and include peak river flow allowances, sea level rise allowances, extreme wave height allowances, and H++ allowances.

TAN 18: Transport (2007)

2.4.16 TAN 18 sets out how transport impacts from developments should be assessed and mitigated. Transport is a key source of greenhouse gas emissions, and transport

[14] Available online via: http://gov.wales/docs/desh/publications/160831guidance-for-flood-consequence-assessments-climate-change-allowances-en.pdf.

planning can help increase public transport usage and low carbon travel such as cycling or walking. The aim is to integrate transport into land use planning, and the document sets out the framework for how this can be achieved.

Wales Spatial Plan (2008)

2.4.17 The Wales Spatial Plan was updated to be in keeping with the One Wales, One Planet principles in 2008 and provides the context and direction of travel for local development plans and the work of local service boards. The key themes of the update are:

- Building sustainable communities;
- Promoting a sustainable economy;
- Valuing our environment;
- Achieving sustainable accessibility; and
- Respecting distinctiveness.

2.4.18 The Plan sets out that each of the six Area Groups should develop a response to climate change and the achievement of low-carbon regions. For the North-West Wales region, which includes Anglesey, it states that "supporting and developing the environmental goods and service sector including marine activities, geosciences, waste management, recycling and renewable energy" is an environmental priority. The Plan also highlights the potential impacts from rainfall pattern changes and sea level rises, particularly on the coast and in river valleys.

Climate Change Strategy for Wales (2010)

2.4.19 The policy aims in One Wales: One Planet are supported by the Climate Change Strategy for Wales, which focuses specifically on greenhouse gas emissions. The Strategy sets out the Welsh Government's commitment and approach to addressing climate change, which includes a 40% reduction in Welsh greenhouse gas emissions by 2020 against a 1990 baseline, in addition to the 3% annual target from One Wales: One Planet. These emission reductions will also contribute to UK-wide targets as part of the UK carbon budgets.

2.4.20 It should be noted that direct emissions from heavy industry and the energy generation sector are excluded from the 3% target. Energy is indirectly included as the emissions are assigned to end-use energy consumption, which contributes to the 3% target. Key areas where the Welsh Government will act to support and enable emission reductions are set out in the **Box 2.2** below. This is further supported by specific actions in delivery plans for emissions reductions and adaptation.

Box 2.2 Climate Change Strategy for Wales - Key Actions

Broad areas where the Welsh Government will act to reduce emissions within Wales include:

- Encouraging organisations in Wales to make sustainable development their central organising principle through signing up to the Sustainable Development Charter;
- Reducing energy and resource consumption and increasing energy and resource efficiency in the domestic, public, business and industrial sectors, through behaviour change initiatives, financial incentives, regulation and standards;
- Supporting a clear framework to encourage behaviour change where the Welsh Government will enable locally tailored approaches and work with partners best placed to influence people;
- Encouraging smaller scale low carbon energy generation, for example by increasing awareness of the options; driving demand through public sector investment and supporting businesses in all parts of the supply chain; providing the right skills training and accreditation, and ensuring that there is an enabling planning regime;
- Providing the right environment to encourage low carbon and resource efficient business growth and innovation;
- Working with private and public sector partners to enable the development of larger scale renewable energy generation;
- Supporting transport investment which encourages a shift to low carbon modes of transport such as walking and cycling, promotes the use of public transport, and provides advice and support that encourages more sustainable choices;
- Policies and actions on waste and resource efficiency that reduce direct and embedded emissions and energy demand;
- A land use planning system that enables low carbon development and responds to climate change impacts;
- Seeking to influence UK decisions where they are relevant to emission reduction in Wales;
- Recognising that different parts of Wales have different challenges and contributions to make and using the Wales Spatial Plan and the Low Carbon Regions work to drive regional responses across Wales;
- Policies and actions on land management and agriculture to maximise carbon sequestration, reduce loss of carbon in soils and cut other emissions from the agriculture sector.

Energy Wales: A Low Carbon Transition (2012)

2.4.21 Energy Wales is the Welsh Government's energy policy. This aims for a transition to low carbon energy, covering electricity, heating and transport. It also aims to

enhance the economic, social and environmental wellbeing of the people and communities of Wales (particularly those impacted by energy infrastructure). A combination of low carbon technology; energy efficiency improvements; the potential for carbon capture and storage in the medium to long term; and the future electrification of transport and heating are highlighted as potential paths to decarbonisation.

2.4.22 Alongside gas and bio-energy, nuclear is identified as a short-term solution to compensate for the intermittency of renewable energy supplies. A smart grid and improved energy storage are envisaged as longer-term aspirations.

2.4.23 To facilitate progress towards a low carbon Wales, proposed Welsh Government actions include:

- Streamlining the approach to planning and consenting of energy developments;
- Implementing Wales' Infrastructure Investment Plan to ensure that future investment is clearly and strategically prioritised and supports renewable energy deployment; and
- Co-ordinating and prioritising delivery through a cross-government energy programme.

2.4.24 The policy emphasises support for new nuclear power on Anglesey, as well as an ambition to maximise the benefits of the Anglesey Energy Island Programme. Energy Wales describes the Wylfa Newydd project as "a vital component of not just the Anglesey Energy Island Programme but of our wider energy future in providing a constant energy source to complement the intermittency of renewable sources".

Flooding in Wales: A National Assessment of Flood Risk (2009)

2.4.25 Flooding in Wales sets out the main findings relevant to Wales from the 2009 National Flood Risk Assessment. It describes the most common forms of flooding in Wales as river flooding; coastal flooding; surface water flooding; and sewer flooding. It also describes the number of properties at risk of flooding, as well as providing information on flood defences and risk management. Natural Resources Wales maintains flood risk maps on an online portal.[15]

National Strategy for Flood and Coastal Erosion Risk Management in Wales (2011)

2.4.26 This national strategy sets out the Welsh Government framework for flood and coastal erosion risk management. The priorities are: reducing the consequences of

[15] Available online via: https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en

flooding; raising awareness of the risks; providing an effective response to flood and coastal erosion events; and prioritising investment in highest risk communities.

Environment Strategy for Wales (2006)

2.4.27 The Environment Strategy provides a framework aimed at achieving an environment that is clean, healthy, varied and that is respected by the people of Wales. The Strategy has five environmental themes:

- Addressing climate change;
- Sustainable resource use;
- Distinctive biodiversity, landscapes and seascapes;
- Our local environment; and
- Environmental hazards.

2.4.28 For each of these topics, the Strategy explains the issues and sets out the environmental outcomes the Welsh Government wishes to achieve, along with the associated indicators and timelines for delivery. The Strategy is currently being reviewed to ensure it reflects the relevant commitments in the Natural Resource Management Programme. The Natural Resource Management Programme has been created to take forward the policy commitments proposed in the Sustaining a Living Wales consultation.

One Wales: One Planet - A New Sustainable Development Scheme for Wales Sustainable Development Scheme (2009)

2.4.29 The focus of One Wales: One Planet is the vision of a sustainable Wales, to be achieved through high-level sustainable development actions and reducing the ecological footprint of Wales. Alongside living within the environmental limits of the planet, resilience to the impacts of climate change is highlighted as part of the vision of a sustainable Wales. Climate change is also identified as one of four key themes that contribute most to Wales' ecological footprint (the others being waste, planning, and the Wales Spatial Plan). A target was set to reduce greenhouse gas emissions by 3% per year from 2011 in areas of devolved competence (against a baseline of average emissions between 2006-10), and a goal to ensure reliance to climate change. A commitment to greater emphasis on flood risk management and protection was also included as well as moving to a system based on management of all risks and consequences of flooding and coastal erosion.

2.5 Regional Plans and Programmes

West of Wales Shoreline Management Plan (SMP2) (2012)

2.5.1 The shoreline of Wales is likely to change as a result of rises in sea level due to climate change. The Welsh Government has defined a policy of Integrated Coastal Zone Management which encourages all organisations with an interest in the coastline of Wales to work together to formulate policies and plans that will lead to vibrant, economically successful and sustainable communities around the coastline of Wales. Shoreline Management Plans (SMPs), which are under revision by Coastal Groups and the Environment Agency, assess the risks to people, development, and the natural and historic environment from coastal processes. These plans (SMP2) will provide a route map for local authorities for the next 20 years, and leading up to the next 50-100 years. They will include an action plan of what is required to manage coastal processes and where, and will form the basis of decision making for such works.

2.5.2 For the West of Wales region, the SMP2 was completed in 2012, covering the coast from Cardigan Bay and Ynys Enlli to the Great Orme. Within this, Anglesey is Coastal Area G, and is subdivided into three zones due to the differing coastal natures of north, east and west Anglesey. Wylfa is located in zone PDZ18 (north coast) and there is an expected need in the plan to monitor the condition of existing flood defences, and a possible future requirement to raise the defences in line with sea level rise. This would require a policy change from the existing 'Do Nothing' management approach.

Western Wales Flood Risk Management Plan (2015)

2.5.3 Flood Management Plans provide an overview of flood risk across river catchments, and set out recommendations to manage the risks both now and across the next six years and beyond. The Western Wales Flood Risk Management Plan was adopted in 2015. In addition to setting out flood risk in the area, this also identified climate change as the main driver of future flood risk. Flood risk is fairly low for the Ynys Mon catchment, however across the Island there is localised river flooding and some evidence of surface water flooding. Tidally influenced flooding of Malltraeth Marsh from the Afon Cefni can be extensive.

2.6 Local Plans and Programmes

Joint Local Development Plan (JLDP)

2.6.1 The Anglesey and Gwynedd Joint Local Development Plan (JLDP) sets out the policy framework and strategic aims for development and land use from 2011 to 2026.

2.6.2 Climate change is identified in the JLDP as being one of the Welsh Government's key objectives, with strong references to both mitigation of climate change (reducing emissions) and adaptation to the impacts through increased resilience. The JLDP is underpinned by several strategic objectives that related to the climate change, namely:

- SO6: Minimise, adapt and mitigate the impacts of climate change. This will be achieved by:
  - Ensuring that highly vulnerable development is directed away from areas of flood risk wherever possible;
  - Reduce the need for energy and other resources in developments;
  - Promote renewable and low carbon energy production within the area;
  - Make use of suitable previously developed land and unoccupied buildings or ones that are not used to their full capacity, where available;
- Manage, protect and enhance the quality and quantity of the water environment and reduce water consumption.

2.6.3 Strategic Policy PS6 seeks to ensure that climate change is an overarching theme through development. This includes consideration of flood risk and rising sea levels, with new non-residential developments having to consider potential impacts from climate change over 75 years (see **Box 2.3**).

Box 2.3 JLDP Policy PS6: Alleviating and Adapting to the Effects of Climate Change

In order to alleviate the effects of climate change, proposals will only be permitted where it is demonstrated that they have fully taken account of and responded to the following:

1. The energy hierarchy:
   i. Reducing energy demand;
   ii. Energy efficiency;
   iii. Using low or zero carbon energy technologies wherever practical, viable and consistent with the need to engage and involve communities; protect visual amenities, the natural, built and historic environment and the landscape.
2. Reducing greenhouse gas emissions, help to reduce waste and encourage travel other than by car.

In order to adapt to the effects of climate change, proposals will only be permitted where it is demonstrated with appropriate evidence that they have fully taken account of and responded to the following:

3. Implementing sustainable water management measures in line with the objectives in

Box 2.3 JLDP Policy PS6: Alleviating and Adapting to the Effects of Climate Change

the Western Wales River Basin Management Plan;

4. Locating away from flood risk areas, and aim to reduce the overall risk of flooding within the Plan area and areas outside it, taking account of a 100 years and 75 years of flood risk in terms of residential and non-residential development, respectively, unless it can be clearly demonstrated that there is no risk or that the risk can be managed;
5. Be able to withstand the effects of climate change as much as possible because of its high standards of sustainable design, location, layout and sustainable building methods (in line with Policy PCYFF3);
6. Safeguarding the best and most versatile agricultural land, promoting allotments, support opportunities for local food production and farming in order to reduce the area's contribution to food miles;
7. Ensuring that the ability of landscapes, environments and species to adapt to the harmful effects of climate change is not affected, and that compensatory environments are provided as necessary;
8. Aim for the highest possible standard in terms of water efficiency and implement other measures to withstand drought, maintain the flow of water and maintain or improve the quality of water, including using sustainable drainage systems (in line with Policy PCYFF6).

2.6.4 Strategic Policy PS 5: Sustainable Development requires development proposals to progress towards alleviating the causes of climate change and adapting to its impacts. It also promotes reducing the need to travel, with emphasis on walking, cycling and using public transport; using renewable energy; and incorporating sustainable building principles to contribute to energy efficiency.

2.6.5 Strategic Policy PS 7: Renewable Energy Technology sets out to ensure that the Plan area, wherever feasible and viable, realises its potential as a leading area for initiatives based on renewable or low carbon energy technologies by promoting:

- Renewable energy technologies within development proposals which support energy generation from a variety of sources which include biomass, marine, waste, water, ground, solar and wind, including micro generation;
- Free-standing renewable energy technology development.

2.6.6 This policy is supported by several development management policies, namely:

- Policy ADN1 On-shore wind energy;
- Policy ADN2 PV solar energy; and

- Policy ADN3 Other Renewable Energy and Low Carbon Technologies.

2.6.7 Strategic Policy PS 9: Wylfa Newydd and Related Development indirectly supports aspirations of greenhouse gas emissions reduction through low carbon electricity generation, but does not specifically reference climate change or flooding in the proposed policy wording. It does support public transport, walking and cycling, which are low carbon methods of transport. Additionally, it specifies that the 'requirements of construction workers should be met in a way that… [does] not result in unacceptable adverse economic, social, linguistic or environmental impacts'.

2.6.8 Strategy Strategic Policy PS 8, which relates to proposals for national significant infrastructure projects and related developments more generally, stipulates that such proposals should provide flood protection measures to manage flood risk where appropriate and, where feasible, to deliver improvements locally. It also specifies that the development and associated infrastructure will contribute to a balance of positive outcomes for local communities, visitors and the environment; and that a comprehensive assessment must be provided, which includes the environmental impacts during development lifecycle, and the measures to avoid, reduce, alleviate and/or off-set any harm done.

Joint Local Development Plan Supporting Documents

2.6.9 The supporting documents for the JLDP represent background information and evidence on issues addressed in the Plan. Supporting documents that relate to climate change include Topic Paper 8: Strategic Flood Consequence Assessment (Level 1) (2013) and Background Paper: Renewable Energy Capacity Assessment for Anglesey (Gwynedd and Anglesey Joint Planning Policy Unit, 2013).

2.6.10 The Flood Consequence Assessment identifies potential flooding issues that face the JLDP for specific geographical areas. It also sets out flooding considerations to be addressed in JLDP preparation, and the background to the issues and objectives in the plan.

2.6.11 The Renewable Energy Capacity Assessment for Anglesey identifies the natural resources available for generating renewable energy on Anglesey. It considers the various sources of energy including wind, hydro, biomass and anaerobic digestion, and the appropriate areas of intervention for the JLDP.

Strengthening Communities in Anglesey and Gwynedd – A Single Integrated Plan for Anglesey and Gwynedd 2013-2017

2.6.12 The Single Integrated Plan brings together the arrangements for health, social care, community, children and safety for the next 12 years. This includes responding to the challenges of climate change and reducing carbon emissions; the opportunity to

increase awareness of energy demand and usage; and taking advantage of strategic energy investment opportunities (i.e. the Energy Island Programme). Additionally, sustainable development, which is defined in the plan as including alleviation and adaptation to the effects of climate change, is included as a key principle underpinning the Plan.

Energy Island Programme

2.6.13 The Anglesey Energy Island Programme aims to create a centre of excellence for the production, demonstration and servicing of low carbon energy. It brings together proposed low carbon energy developments ranging from new nuclear, tidal arrays, biomass and offshore wind, with large contributions to the local economy. As well as energy industry jobs, opportunities are highlighted as part of the programme to improve local transport infrastructure, housing, tourism and leisure facilities. Low carbon energy generation, which can help mitigate climate change, is therefore identified as of critical importance to the regeneration of the area through this Programme, which aims to coordinate related opportunities, training and consultations.

2.6.14 The key elements of the framework for the Energy Island are:

- Short term: Large and small-scale biomass installations and supporting energy crops, energy efficiency measures, and micro generation. Initial discussion and negotiation to maximise opportunities from Offshore wind Irish Sea Round 3 Zone;
- Medium to long term: New build at Wylfa up to 3.2 GW, implementation of tidal project at Skerries, offshore wind base at Holyhead Port and the replanting of existing onshore wind farms;
- Long term: Tidal power expansion and development of the hydrogen economy.[16]

Supplementary Planning Guidance

2.6.15 Supplementary Planning Guidance (SPG) is in place to provide additional direction and guidance on specific local matters. Climate change features in several of the Anglesey SPGs, including Guidance Note: 1 – Overview, which specifies that the following factors relating to climate change should be incorporated into decision making:

- Improve the energy efficiency of existing buildings;

[16] Energy Island: Potential Opportunities and Economic Impacts Executive Summary, IoACC, 2010

- Renewable sources of energy should be integrated into design proposals; and
- Use energy efficient construction methods and materials.

2.6.16 Guidance Note: 2 – Sustainable Design, Guidance Note: 5 – Sustainable Construction and Guidance Note: 28 – Industrial and Large Development all feature considerations of energy. Guidance Note 2 includes a requirement to use renewable energy sources where possible. Guidance Note 5 requires consideration of the energy efficiency of buildings, which is strengthened to maximise energy efficiency in industrial development buildings. Guidance Note 28 also specifies the use of sustainable drainage systems, which can help reduce flood risk.

2.6.17 There is separate, more detailed SPG for Onshore Wind Energy which details specific requirements for types of wind turbines, constraints, siting and design of turbines. Wind energy is identified in the SPG as having an important role in reducing or adapting to the effects of climate change, in addition to social and economic benefits. The SPG highlights that wind energy can also contribute towards meeting UK and Welsh Government targets for reducing greenhouse gas emissions.

Anglesey Local Flood Risk Management Strategy (2013)

2.6.18 The IoACC Local Flood Risk Management Strategy was published in 2013. The strategy sets out how the IoACC will tackle local flood risk from surface water, groundwater and ordinary watercourses. The objectives of the strategy are summarised in **Box 2.4** below.

Box 2.4 Ten Objectives for IACC (Anglesey Local Flood Risk Management Strategy (2013))

- To improve the understanding of local flood (surface water, groundwater and ordinary watercourses) and coastal risks;
- Increasing individual and community awareness and preparedness for flood and coastal erosion events and the impacts of climate change on flood risk;
- To work together (both FRMA, stakeholders and public) to reduce flood and coastal risks, sharing data and resources to the greatest benefit;
- To reduce the impact and consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- To ensure that planning decisions are properly informed by flooding issues and the impact future planning may have on flood risk management and long-term developments;
- Take a sustainable approach to flood risk management balancing economic, environmental and social benefits;
- Increase approaches that work sympathetically with natural processes;
- Ensure the development of skills required to implement effective and innovative

Box 2.4 Ten Objectives for IACC (Anglesey Local Flood Risk Management Strategy (2013))
flood risk management measures; • Encourage maintenance of privately owned flood defences and ordinary watercourses, and minimise unnecessary constrictions in watercourses; and • Work together with other Flood Risk Authorities to reduce the loading of combined sewers.

2.6.19 Whilst the strategy gives an overview of flooding impacts in Wales associated with climate change, the guidance for applying climate change to flood risk assessment has been superseded by CL-03-16 'Climate change allowances for planning purposes' on a National (Wales) level.

2.7 Key Policy Messages for the Wylfa Newydd SPG

2.7.1 Based on the review of plans and programmes in this section, several key messages relevant to climate change have been identified that will need to be considered in preparing the Wylfa Newydd SPG. These messages are summarised in **Box 2.5** below.

Box 2.5 Key Policy Messages for the Wylfa Newydd SPG: Climate Change
• Climate change is a key policy consideration, with increasing influence in frameworks and national targets, particularly with the adoption of the Environment (Wales) Act 2016 and the global commitments made through the Paris Agreement. Although climate change is a global issue, its effects will be felt at the local scale – and this is where action can be taken; • Greenhouse gas emission reduction targets are in place at an international and national level. There is a trend of increasingly stringent targets, meaning that climate change will feature with growing importance as target deadlines draw near or future targets are strengthened; • The Welsh Government has committed Wales to reducing greenhouse gas emissions by 3% year on year, in addition to a 40% reduction by 2020 and an 80% reduction by 2050 (against a 1990 baseline); • Low carbon energy is expected to feature heavily in meeting greenhouse gas emission targets, in addition to EU renewable energy consumption targets. For renewable energy in Wales, wind energy is identified as having high potential, although there is Government commitment to supporting all forms of renewables where there are not significant negative impacts; • In addition to changes in energy generation, policies place an emphasis on low

Box 2.5	Key Policy Messages for the Wylfa Newydd SPG: Climate Change
	carbon travel, energy efficiency and behavioural change to further reduce greenhouse gas emissions;
	• Climate change adaptation is highlighted in planning policy. The risk of damage to property and infrastructure should be considered, and changes in climate planned for at an early stage; • Development should be avoided in flood hazard areas. Developments should also seek to reduce the flood risk, and must not increase the risk from flooding and run-off both at the development location and elsewhere. Specific climate change allowances for flood risk assessment are in place for Wales; • There is a need to consider the cumulative impacts of the Wylfa Newydd project on climate change mitigation and adaptation in-combination with other proposals, plans and programmes. • The JLDP sets out a concise list of requirements for alleviating, and adapting to, the impacts of climate change in the development of projects such as Wylfa Newydd.

3 Baseline Information and Future Trends

3.1 Introduction

3.1.1 This section describes the existing baseline characteristics of Anglesey in respect of climate change and identifies how this baseline could change in the future, considering the proposed nuclear power station. This helps develop an understanding of the key opportunities and challenges that should be addressed by the Wylfa Newydd SPG. It draws on a range of datasets from sources including UK Climate Projections 2009 (UKCP09)[17], UK Climate Change Risk Assessment (2017), National Atmospheric Emissions Inventory Greenhouse Gas Inventories, Department for Business, Energy and Industry Strategy (BEIS) Local and Regional CO_2 Emissions Estimates, Catchment Flood and Shoreline Management Plans and Met Office data, as well as the following evidence base studies prepared in support of the JLDP:

- Topic Paper 8: Strategic Flood Consequence Assessment (Level 1) (2013); and
- Gwynedd and Anglesey Joint Planning Policy Unit Renewable Energy Capacity Assessment for Anglesey (2013).

3.2 Baseline Information

Climate and Flood Risk

3.2.1 The UK is presently influenced by predominantly westerly tracking storm systems throughout the year. Variations in temperature, precipitation and wind speeds may be partly accounted for by exposure, latitude and altitude. The surrounding seas also have a significant effect on the national and local weather conditions. The temperatures of air masses reaching the UK have been modified by the ocean such that the UK tends to experience lower summer temperatures than mainland Europe, but milder winters. For Anglesey, weather fronts move in from the Irish Sea from the south west, typically bringing mild and wet weather. Average weather conditions for Anglesey across the last 30 years are an average maximum temperature of 13.2°C and a minimum of 7.7°C, with average rainfall of 841mm across a year.[18]

3.2.2 Global average temperatures have risen by almost 1 °C since the late 19th century (as of 2016)[19], and sea-surface temperatures around the UK coast have risen over

17 UKCP09 is due to be replaced by the next generation of projections, UKCP18 in the spring of 2018.

18 Climate Period 1981-2010 for Llangefni, Met Office. Available online via: https://www.metoffice.gov.uk/public/weather/climate/llangefni#?tab=climateTables [Accessed July 2013]

19 Available online via: https://climate.nasa.gov/vital-signs/global-temperature/

the past three decades by about 0.7°C. Annual mean precipitation over England and Wales has not changed significantly since records began; however seasonal rainfall appears to be decreasing in summer and increasing in winter.[20]

3.2.3 Flooding is associated with a range of sources: river, coastal, surface water, sewer, groundwater and reservoir. Over 220,000 properties in Wales are at risk from river and sea flooding, of which 64,000 are at significant risk (greater than a one in 75 chance in any year). 97,000 of these are also at risk from surface water flooding, and a further 137,000 properties at risk from surface water only.[21] On Anglesey alone, there are 1,000-2,500 properties identified with 'significant' likelihood of flooding (defined as more than a 1 in 75 (1.3%) annual chance of flooding), and 10-20% of the Island lies within a floodplain.

3.2.4 The North-West Wales CFMP specifies that there is localised river flooding across Anglesey, with severe tidally-influenced flooding in some areas. Additionally, there is evidence of surface water and sewer flooding on the Island. In this context, Topic Paper 8: Strategic Flood Consequence Assessment (Level 1) for the JLDP was carried out in accordance with TAN 15 and assesses river, coastal and groundwater flooding within the area. It also reviews flood risk to existing allocations as well as areas that have the potential to be developed in the future. Flooding from rivers and the sea are highlighted as risks to the area. The Topic Paper provides flood maps including an overview of flood risk by settlement and identifies a range of policy considerations that should also be taken into account in developing the Wylfa Newydd SPG.

3.2.5 Anglesey has varied coastal character, ranging from rocky coast and cliffs to estuaries and dunes. The northern side of the Island, where the proposed Wylfa site is located, is identified as having limited flood risk compared to the other parts of the coast. It generally consists of rocky cliffs and curving sand or shingle bays. The Wylfa site is on the Mynnydd y Wylfa headland on the western side of Cemaes Bay. This includes a water inlet on the western side of the headland and a small cove. There are flood defences on the western frontage, which are founded to the rock. Current coastal flood risk to the local area is predominantly from waves overtopping the defended section.

3.2.6 NPS EN-6 Volume II (Annexes) provides baseline information for the Wylfa site. The site is in a Flood Zone 1, which is low probability of flooding (less than 1 in 1000 annual probability of river or sea flooding, or <0.1%), and is situated above the Extreme Sea Level. The Environment Agency Flood Risk maps identify the adjacent

20 UKCP09 Observed Trends Report Summary. Available online via: https://ukclimateprojections.defra.gov.uk/22647 [Accessed July 2013]

21Environment Agency Wales, Flooding in Wales: A National Assessment of Flood Risk (2009)

coastline as having a 'significant' flood risk (defined as a chance of flooding of greater than 1 in 75 in any year, or 1.3%).

3.2.7 Coastal erosion is occurring along Wales' coastline. Along the north Anglesey coast, this has created local bays between hard cliffs, which extend out to deeper water. At Cemaes, approximately 2 miles east of the Wylfa site, the base rate of erosion is 0.2m/year. Cemaes is also noted to have defended frontage. Cemyln, a few miles west of Wylfa, has a lower base rate of erosion of 0.05-0.1m/year. The existing flood defence is not thought to affect coastal processes such as erosion.[22]

Emissions

3.2.8 The UK greenhouse gas inventory covers the direct greenhouse gases under the Kyoto Protocol, of which CO_2 is the most significant contributor. In 2015, UK emissions of the six greenhouse gases covered by the Kyoto Protocol were estimated to be 496 million tonnes carbon dioxide equivalent ($MtCO_2e$).[23]

3.2.9 Wales has a 9% share of the total UK greenhouse gas emissions, with net emissions of 46.4 $MtCO_2e$ in 2014. This represents an 18% reduction in Wales' emissions compared to the base year of 1990. Emissions associated with the energy supply sector dominate the Welsh emission sources at 17.5 $MtCO_2e$, followed by the business sector sources, and then agriculture and transport.[24]

3.2.10 Focussing on CO_2 alone (which accounts for approximately 85% of UK greenhouse gas emissions), end-use carbon emissions by sector for Anglesey for 2005-2015 are shown in **Figure 3.1** below.[25] Industrial emissions significantly reduced over the 6-year period to 2011, since which there has been little change. Domestic emissions decreased in 2015, meaning industry and commercial emissions were greater than domestic emissions for the first time since 2009. Total carbon emissions for all of Wales were 30,162 $ktCO_2$ in 2015.

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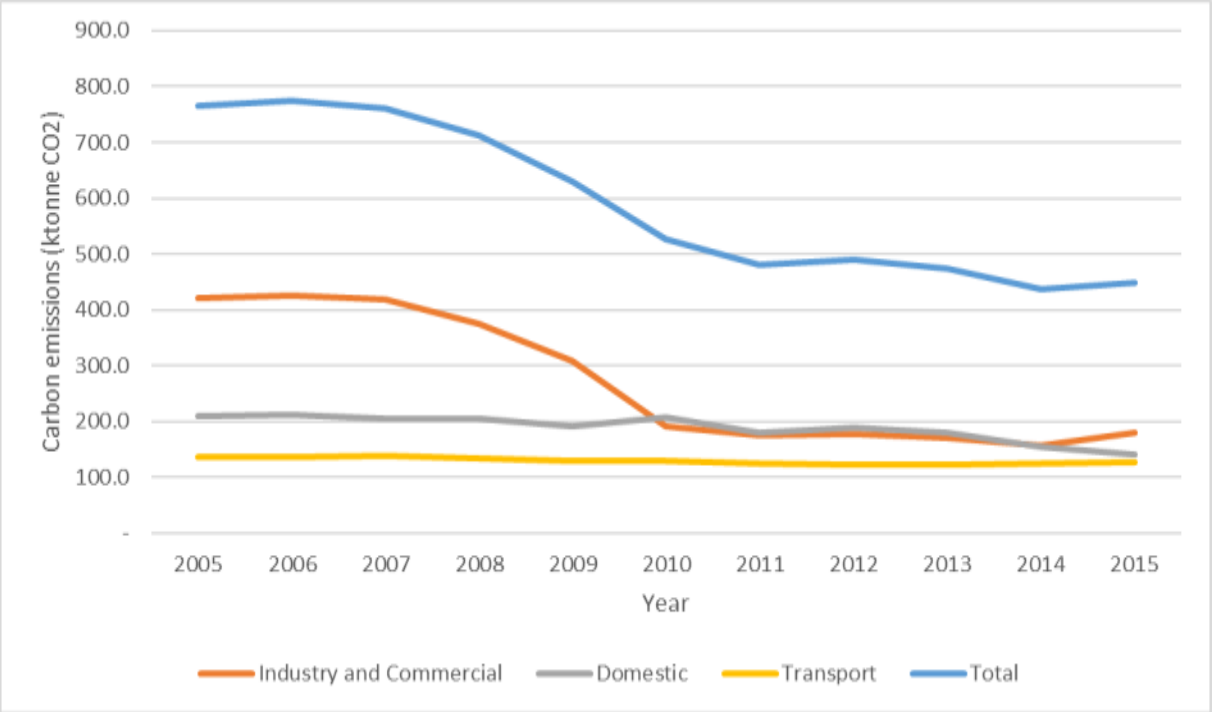
[22] West of Wales Shoreline Management Plan, Coastal Area G, PDZ18 (2011)

[23] BEIS Statistical Release https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604350/2015_Final_Emissions_statistics.pdf [Accessed September 2017]

[24] NAEI Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2014 https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1606140853_DA_GHGI_1990-2014_Report_v1.pdf [Accessed September 2017]

[25] BEIS Local and regional CO2 emissions estimates for 2005-2015 – Full dataset https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/623016/2005_to_2015_UK_local_and_regional_CO2_emissions__data_tables.xlsx [Accessed September 2017]

Figure 3.1 End-use Carbon Emissions by Sector for Anglesey (2005-2015) ($ktCO_2$)



3.2.11 Population estimates have increased slightly over the last decade, from 69,100 people in 2005 to 70,000 people in 2015. Per capita annual carbon emissions have dropped from 11.9 tonnes CO_2 in 2005 to 6.4 tonnes CO_2 in 2015. This compares to 9.7 tCO_2 per person for Wales as a whole, meaning that Anglesey emissions per capita are below average for the country. This is heavily influenced by the drop in industrial emissions in Anglesey since 2005 linked with the economic downturn and the closure of sites including, most notably, the Anglesey Aluminium site.

Energy

3.2.12 Energy generation is a major contributor to greenhouse gas emissions, and therefore to climate change for the UK. The UK total electricity generation in 2016 was 336.0TWh. The most recent electricity generation figure for Wales alone is from 2015, of 24.5TWh. That year it accounted for 7.2% of the UK total generation. For Wales, this is a drop from 35.4TWh in 2004, which is predominantly due to reduced output from coal and nuclear power plants[26].

3.2.13 In the UK, low carbon energy generation includes renewables and nuclear. Nuclear accounted for 20.7% of the total in 2015, with 70.3TWh of electricity generated.

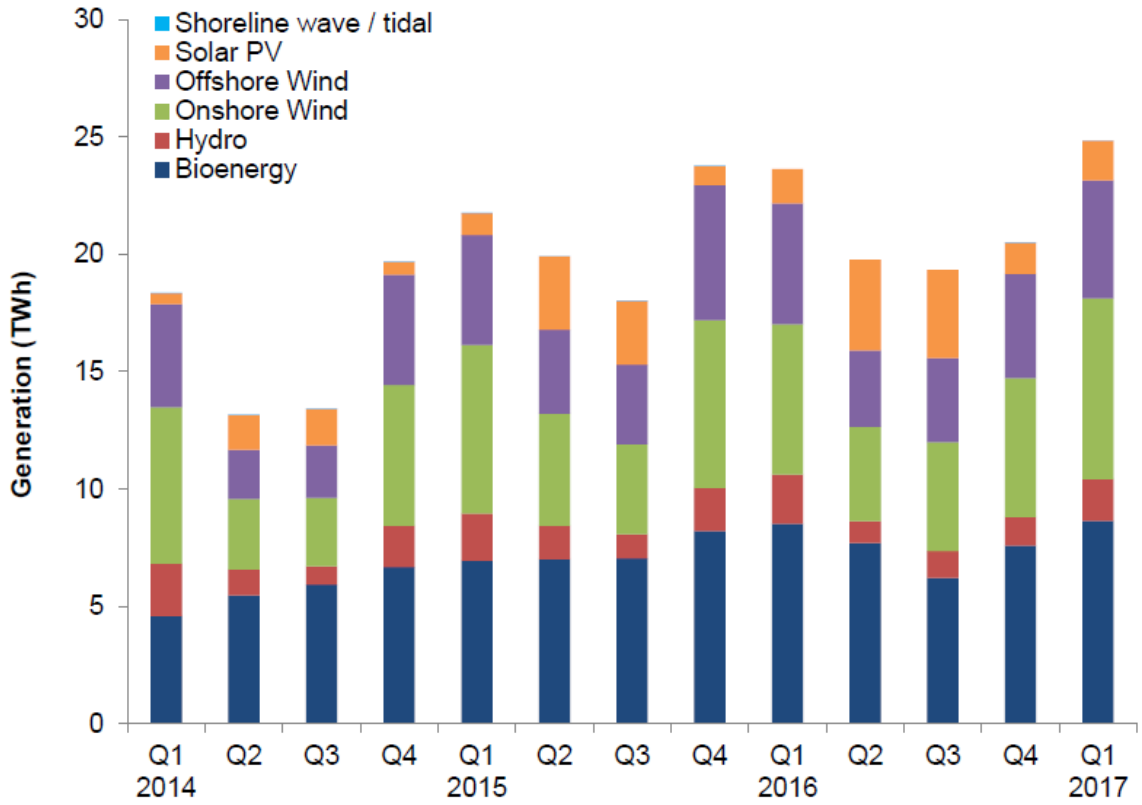
[26] BEIS Energy Trends: December 2016, special feature article – Electricity generation and supply figures for Scotland, Wales, Northern Ireland and England, 2012 to 2015 https://www.gov.uk/government/statistics/energy-trends-december-2016-special-feature-article-electricity-generation-and-supply-figures-for-scotland-wales-northern-ireland-and-england-2 [Accessed September 2017]

Renewables' share of UK electricity generation was 26.8%, with generation of 83.6TWh.

3.2.14 Wales accounts for 4.9TWh of the 2015 total UK renewable generation. The breakdown of renewable energy generation by source across the UK is shown in **Figure 3.2**[27].

[27] BEIS Energy Trends – Section 6: Renewables https://www.gov.uk/government/publications/renewables-section-6-energy-trends [Accessed September 2017]

Figure 3.2 UK Quarterly Renewable Energy Generation by Source (2014 – 2017)



3.2.15 2016 has some renewable energy generation, with an installed capacity of 67MW. This comprises wind energy, with Llanbabo Wind Farm the largest, and solar photovoltaic farms at Bryn yr Odyn, Ysgellog Farm and Bodorgan.[28]

3.3 Future Trends

3.3.1 The nature of climate change means that the exact location and nature of its effects are difficult to predict, but future trends have been identified as set out below.

Climate and Flood Risk

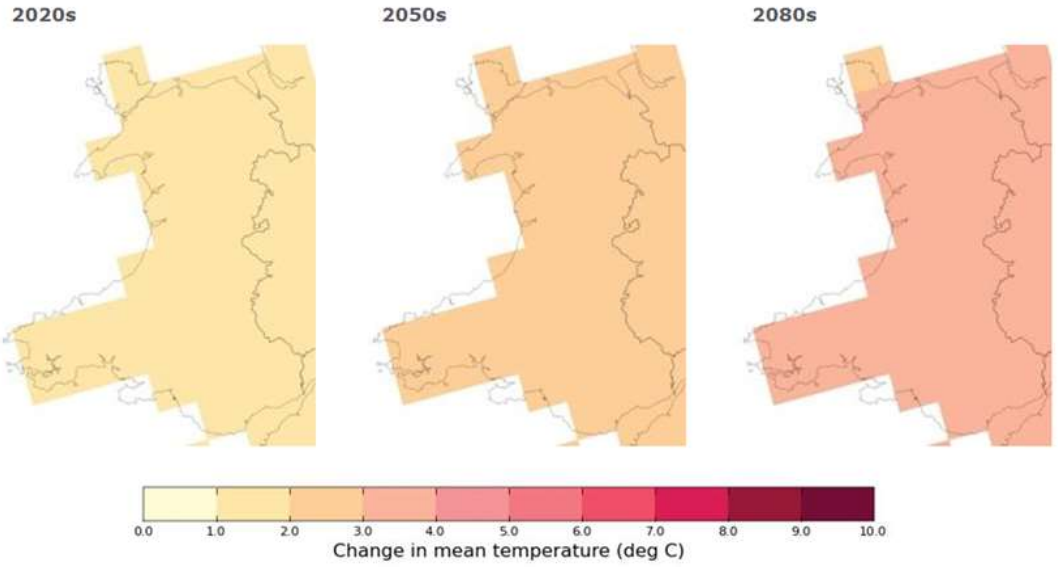
3.3.2 The main source for determining how the climate of the UK may change is the UK Climate Impacts Programme scenarios, published in 2009 and known as UKCP09. The UKCP09 findings indicate that all areas of the UK are getting warmer, and the warming is greater in summer than in winter. Within this broad rise, there would still be natural variation year on year.

[28] Anglesey & Gwynedd JLDP (2011-2026). Public Examination: Hearing Session 89 – Renewable Energy https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/Operating-Points/S8-Renewable-Energy---Action-Points-1-to-8.pdf [Accessed September 2017]

3.3.3 The central estimate projection for Wales is temperature rises of 2-2.5°C by 2050, rising to over 3°C in 2080 (see **Figure 3.3**)[29]. This could have implications for thermal comfort, hot-weather health problems and cooling energy demand during the summer. It may also cause potential changes to local tourism and the economy. During the winter, there may be lower demand for energy for heating, less transport disruption, longer crop growing seasons and less winter illness. These changing conditions have the potential to affect the local environment and biodiversity, including changes to species' habitats and ranges, as well as greater threats from invasive species that may flourish in the future conditions. This means that there may be greater importance placed on actively conserving and enhancing biodiversity in the face of a changing climate.

[29] Climate Change Strategy for Wales, Welsh Assembly Government (2010)

Figure 3.3 Wales Temperature Predictions (medium emissions scenario, central estimate – 50th percentile)



3.3.4 There is little change in the amount of precipitation (rain, hail, snow etc.) that falls annually, but more is expected to fall in the winter, with drier summers, for much of the UK including Wales. The south, east and extreme north-west of Wales are identified as having the greatest potential changes to rainfall patterns. The central estimate projection describes peaks of 30% increase in winter and 40% decrease in summer by the 2080s (see **Figure 3.4** and **Figure 3.5**)[29]. Across the country, this has the potential to impact on water shortages in the summer, and localised flood risks and pressure on sewer systems in winter.

Figure 3.4 Wales Winter Rainfall Predictions (medium emissions scenario, central estimate – 50th percentile)

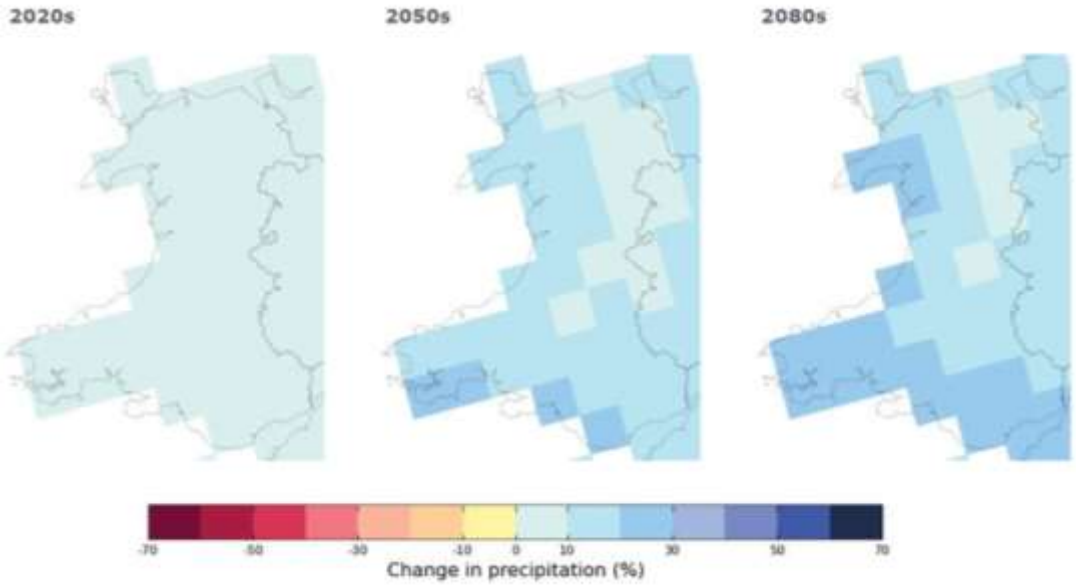
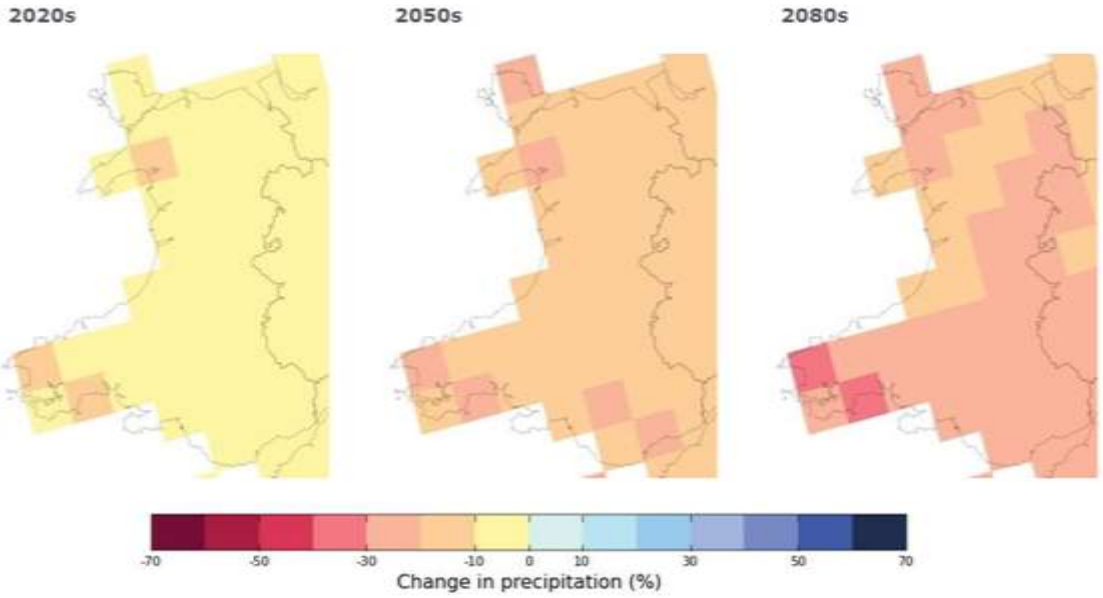


Figure 3.5 Wales Summer Rainfall Predictions (medium emissions scenario, central estimate – 50th percentile)



3.3.5 Widespread flooding events cannot be directly attributed to climate change but there is expected to be more extreme rainfall events and more severe weather systems such as storms in the future, and hence potentially more flooding as the climate changes.

3.3.6 Sea levels are also rising. The UK experienced sea level rise of approximately 1mm per year through the 20th century, with a greater rise over the last 20 years. Global

sea-level is rising at about 3mm per year on average.[30] It is expected that this trend will continue, causing further rises in sea level. By the 2080s, the sea level rise around Wales is predicted to be 36cm.

3.3.7 Across the North-West Wales region, the estimated number of properties at risk from a 1% annual exceedance probability (AEP) flood event (i.e. 1% chance of occurring in any one year) will increase from 4,500 to 5,400 by 2100 due to the effects of climate change (unless preventative action is taken). Flooding has the potential to cause damage to buildings, disrupt energy infrastructure and transport.[31]

3.3.8 NPS EN-6 Volume II includes advice from the Environment Agency regarding the flood risk at the Wylfa site due to climate change, specifying that 'it is reasonable to conclude that any potential new nuclear power station on the site could be protected against flood risk throughout its operational lifetime, including the potential effects of climate change, storm surge and tsunami, and considering potential countermeasures' due to its cliff top location. However, routes off site may be impacted by localised flooding. Development is not expected to have an adverse impact on flooding in surrounding areas.

3.3.9 The more recent West of Wales Shoreline Management Plan 2 (SMP2) specifies that the risk of overcoming the flood defences will increase with sea level rise. For Wylfa, potential overtopping of flood defences is identified as a future risk. If sea level rise is less than 2m, the defended section could be subject to limited direct flooding on extreme occasions, but this would impact only the road and an office. In contrast to the NPS EN-6 findings, the potential risk of flooding from not raising flood defences is described as exposing the power station to 'unacceptable risk', and the plan specifies that existing defences will require monitoring in the future.

3.3.10 Sea level rise may also result in enhanced coastal erosion and inundation of low-lying areas, putting coastal areas at higher risk. SMP2 indicates that the range of potential erosion in Cemaes in 100 years is 20-70 metres, and 20-45 metres in Cemlyn. Sea level rise is expected to have a greater impact on softer bays and shorelines than on the hard cliff headlands. Any additional flood protection in the areas may prevent some of the natural coastline changes. The Wylfa site is located on hard rocky cliffs so is at lower risk of erosion than softer bays, however the unconstrained scenario in SMP2 specifies that the Wylfa coast would slowly erode over time.

[30] UKCP09 Observed Trends Report Summary http://ukclimateprojections.defra.gov.uk/22647 [Accessed July 2013]

[31] UK Climate Change Risk Assessment: Government Report https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69487/pb13698-climate-risk-assessment.pdf [Accessed July 2013]

3.3.11 Associated developments in the area also face risks from sea and river flooding and coastal erosion. Developments in areas of lower, softer geology would be at greater risk of inundation and erosion than the power station on top of the headland.

3.3.12 A Strategic Flood Consequence Assessment (2013) was carried out for Anglesey and Gwynedd in accordance with TAN 15 (Development and Flood Risk) for the development of the first statutory stage of the JLDP. It outlined the potential for increased flooding from fluvial, surface water and sewer sources. However, the assessment pre-dates the updated guidance for climate change allowances in flood consequence assessments developed in 2016.

3.3.13 The 2017 UK Climate Change Risk Assessment identifies a range of risks and opportunities pertinent to the developments. As well as those related to flooding and coastal change, they include water scarcity, reduced access to capital, reduced employee productivity to infrastructure disruption and higher temperatures, disruption to supply chains, risks of cascading failures from interdependent infrastructure networks, risks to electricity generation from drought and low river flows, risks from high winds and lightning, and benefits from reduced cold weather events.

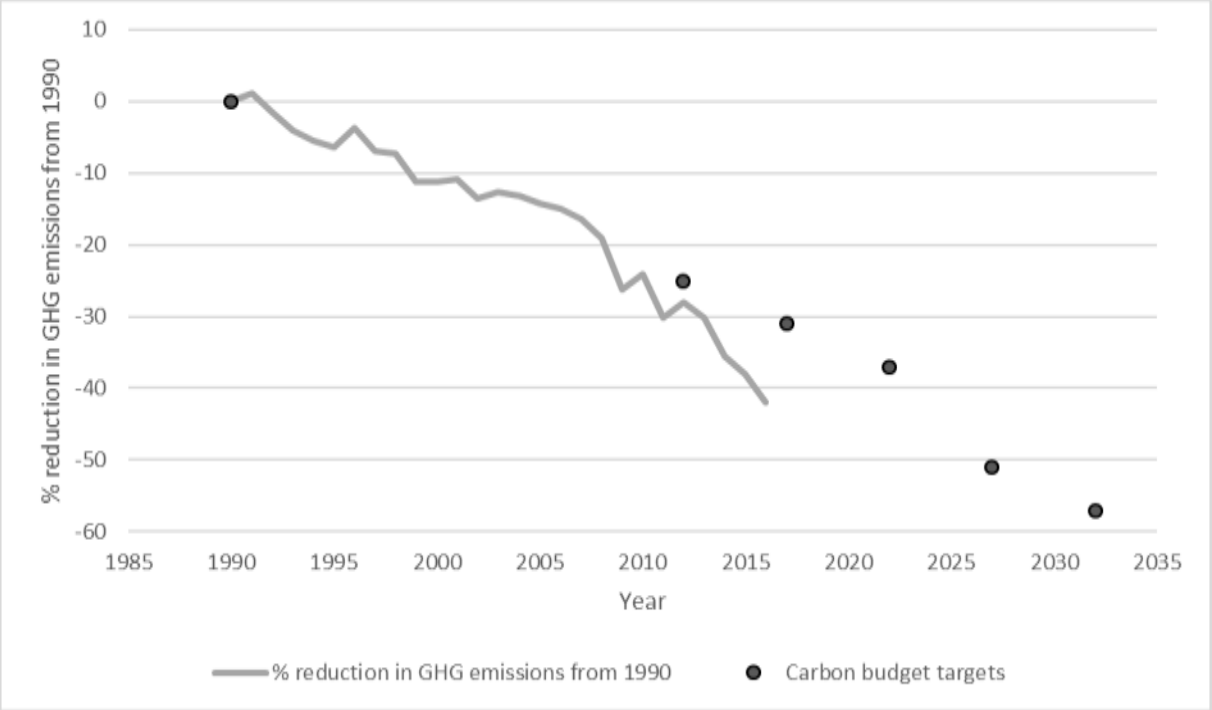
Emissions

3.3.14 Exact future greenhouse gas emission levels are difficult to predict due to the range of contributing factors which can rapidly change in response to economic, political, social and technological factors. The UK has committed to ambitious targets of reducing greenhouse gas emissions by 34% by 2020 and 80% by 2050. The path and targets to reach this are highlighted in **Figure 3.6**.[32,33] Substantial emissions cuts will be needed over the next 40 years to meet these objectives. Energy generation is a key source of emissions, so the targets are expected have subsequent effects on the types of power generation that the UK turns to, with an expected emphasis on low carbon power.

[32] BEIS Final UK greenhouse gas emissions statistics http://www.decc.gov.uk/assets/decc/11/stats/climate-change/2351-uk-greenhouse-gas-emissions-performance.pdf [Accessed September 2017]

[33] BEIS Carbon Budgets https://www.gov.uk/guidance/carbon-budgets[Accessed September 2017]

Figure 3.6 UK Progress towards Greenhouse Gas Targets



3.3.15 Although nuclear is a low carbon energy source, there would be potentially significant greenhouse gas emissions associated with the construction phase of the Wylfa development and associated developments such as housing, which would contribute to climate change. Associated greenhouse gas emissions include embedded carbon in goods and materials, as well as emissions from transport of materials to the site. The design of developments; the type of materials used and their sources; and transport of materials will therefore all affect the impact on climate change, depending on the emissions associated with each element.

3.3.16 Businesses, domestic emissions and transport are also significant emission sources. This means that in addition to a growing emphasis on low carbon energy generation, there will also be a stronger focus on: energy efficiency and reducing energy demand; energy efficient buildings; and low carbon travel (e.g. reducing vehicle use and the use of eco-friendly vehicles). These all have key roles in mitigating climate change and meeting targets.

Energy Generation

3.3.17 It is expected that the trend of rising renewable generation in both Wales and the across the UK will continue, given the role clean energy has in meeting ambitious

national targets. Policy for low carbon energy in Wales is centred on Energy Wales: A Low Carbon Transition (2012) and the associated Delivery Plan (2014)[34].

3.3.18 The Anglesey Energy Island is set out as a priority within the Delivery Plan, alongside a focus on marine energy, distributed generation, nuclear energy (particularly Wylfa Newydd). A series of offshore wind and solar developments have begun operation in Wales since the Delivery Plan was finalised (including the Bryn yr Odyn Solar Farm on Anglesey).

3.3.19 Current renewable energy generation on Anglesey is 67MW. The Gwynedd and Anglesey Joint Planning Policy Unit Renewable Energy Capacity Assessment for Anglesey (2013) identifies substantial further capacity for renewable energy in Anglesey, with tidal power as having the greatest potential at 180MW. Onshore wind (including micro-scale wind) and microgeneration (solar photovoltaic, solar thermal etc) have the next greatest potentials at 178MW and 150MW respectively, although it is highlighted that maximum capacities would be difficult to achieve. Microgeneration in new developments is identified as the area where planning policies can have the greatest level of control.

3.3.20 Documentation for the Anglesey & Gwynedd JLDP Public Examination (Hearing Session 89 – Renewable Energy) set out the renewable energy opportunities for Anglesey in 2016. Potential renewable energy capacity for electricity generation in Anglesey and Gwynedd is defined as 459.9 MW (no disaggregated information for Anglesey alone exists). This represents a downscaling of the values projected in 2013 assessment, particularly for microgeneration. Tidal power has largest potential, with 220MW (upgraded from the 180MW suggested in 2013), and would be situated on Anglesey as part of the Energy Island programme.

3.3.21 Should new nuclear start generating power on Anglesey, then the nuclear share would clearly rise again. Should both the Wylfa Newydd and the renewable potential be unlocked (particularly with regards to tidal power), Anglesey would become a significant energy generator on a national scale.

3.4 Key Issues for the Wylfa Newydd SPG

3.4.1 Based on the findings of the baseline analysis and evidence base, several key issues relevant to climate change have been identified that will need to be considered in preparing the Wylfa Newydd SPG. These issues are summarised in **Box 3.1** below.

34 Energy Wales: A Low Carbon Transition Delivery Plan March 2014
https://gov.wales/docs/desh/publications/140314energy-wales-delivery-plan-en.pdf [Accessed September 2017]

Box 3.1 Key Issues for the Wylfa Newydd SPG: Climate Change

- Wales is expected to face a number of challenges due to climate change, including:
  - Higher average temperatures;
  - Increased winter rainfall;
  - Hotter and dryer summers;
  - Rising sea levels and increasing coastal erosion; and
  - Risk of more extreme weather events such as storms and more frequent intense rainfall.
- This could have significant impacts on Anglesey, such as:
  - Increased risk of localised flash flooding, coastal flooding and increased pressure on sewer systems;
  - Increased potential for water shortages;
  - Increase in damage to infrastructure from a changing climate and extreme weather events; and
  - Increased thermal discomfort and health problems in hot weather.
- Rising sea levels due to climate change may increase flood risk and increases the potential for overtopping flood defences. The location of developments (including associated developments such as housing) would affect the level of risk. Flood defences may need to be monitored in the future to assess the risk;
- Coastal erosion is taking place and may be exacerbated by sea level rises. Wylfa's elevated location on a hard cliff means it is well protected from coastal erosion and flooding, but any lower-lying developments may be at greater risk;
- Ambitious targets are in place for reducing greenhouse gas emissions. Renewable energy's share of electricity generation is growing, but low carbon energy generation (nuclear and renewables) still must rise substantially to meet national and international targets. The design, location and materials used in developments will all affect the amount of greenhouse gases emitted; and
- Tidal power, onshore wind and microgeneration are identified as having the greatest potential renewable capacity in Anglesey.

4 Challenges and Opportunities

4.1 Introduction

4.1.1 Based on the review of plans and programmes presented in **Section 2** and analysis of the baseline and emerging evidence base in **Section 3**, this section draws together the key strengths, weaknesses, opportunities and threats related to climate change to be addressed by the Wylfa Newydd SPG. Where appropriate, it also provides guidance in respect of how the SPG could respond to the issues identified to help inform the preparation of the document.

4.2 SWOT Analysis

4.1.2 **Table 4.1** presents an analysis of the strengths, weaknesses, opportunities and threats associated with the Wylfa Newydd project during construction and operation on climate change and in the context of the Wylfa Newydd SPG.

Table 4.1 SWOT Analysis

Strengths	Weaknesses
• The Wylfa site is identified as having low flood risk, due to the natural geological protection of hard cliffs and an elevated location. • Existing Wylfa power station is a source of low carbon energy. • Significant best practice in understanding climate change risks and designing them out of major infrastructure projects at an early stage exist, as well as the requirements for alleviating and adapting to the effects of climate change in the JLDP.	• There is a risk of flooding from waves overtopping the flood defences. • Coastal locations are at higher risk from flooding, coastal change or inundation, which may particularly affect associated developments if situated at a lower elevation around the Wylfa site.

Opportunities	Threats
• Wylfa Newydd is a low carbon energy source, thus reducing greenhouse gas emissions and mitigating climate change. • Opportunity to incorporate renewable energy generation into associated developments to help mitigate climate change. • Opportunities to promote low carbon energy and complement the Anglesey Energy Island Programme. • Opportunity to design and construct energy and water efficient buildings and associated developments. • Opportunity to influence behavioural change. • Opportunity to promote low carbon travel (e.g. walking, cycling, public transport) to the area. • Opportunity to incorporate best practice climate change adaptation and resilience measures at the Wylfa site and associated developments, resulting in reduced life cycle cost and innovative approaches. • Opportunity to consider the resilience of the wider infrastructure system to climate change in collaboration with stakeholders. • Opportunity to increase the resilience of environmental receptors to climate change through the design of the developments.	• Increased costs and disruption from flood or storm damage to infrastructure, due to more extreme or more frequent events. • Potential water shortages in the future due to changes in rainfall patterns. • Increased risk of overtopping flood defences due to sea level rise. • Emissions associated with energy and materials required during construction contribute to climate change. • Potential thermal discomfort and hot-weather health impacts on future employees, due to changing climatic conditions. • Potential for increased energy consumption and greenhouse gas emissions from associated developments during project construction phase and legacy. • Potential increased costs of climate change adaptation measures if not adequately planned at the outset of design.

4.3 Summary of Key Matters to be addressed by the SPG

4.3.1 The following are key matters to be addressed by the SPG, in relation to climate change:

- The need to contribute to the reduction in greenhouse gas emissions and the achievement of national and international targets through low carbon energy generation at the nuclear plant;

- The need to contribute to the reduction in greenhouse gas emissions and the achievement of national and international targets through the promotion of renewable power at the plant and associated developments;

- The need to reduce energy use and associated greenhouse gas emissions, through improving energy efficiency of new and existing buildings and promotion of low carbon travel;

- The need to reduce water use through sustainable water management and water efficient designs;

- The need to minimise emissions of greenhouse gases from construction work at Wylfa and the associated developments through sustainable design practices;

- The need to respond to climate change impacts by incorporating climate change adaptation into all developments;

- The need to address the potential for increased risk from a range of environmental hazards, including flooding and coastal erosion, as a result of the developments. This includes the combined impact of climate change and the developments on environmental receptors; and

- The need to address the in-combination impact of the developments and climate change on environmental receptors.

4.4 How should the SPG Respond?

4.4.1 The Wylfa Newydd SPG will need to include guidance and detailed criteria which seeks to ensure that the Wylfa Newydd Project tackles and adapts to climate change. More specifically, the SPG should:

- Ensure that the developments fully consider and respond to the points laid out in 'Strategic Policy PS 6: Alleviating and Adapting to the Effects of Climate Change' within the JLDP (see Box 2.3).

- Ensure that climate change adaptation and resilience is considered from the earliest stage in all developments (including the plant and all associated developments such as housing). This should include a full climate change impact assessment (incorporating risks identified in the 2017 UK Climate Change Risk Assessment) and culminate in the embedding of climate resilience into the design of the developments (including alignment with Policy PCYFF 3);

- Ensure that the ability of environmental receptors (such as landscapes, environments and species) to adapt to climate change is not affected by the developments.

- Ensure flood risk, rising sea levels, potential breach of flood defences and coastal erosion are all considered in siting development. This should include a full and long-term assessment of flood risk using 'CL-03-16 – Climate Change

allowances for planning purposes' and subsequent consideration within the design. The guidance and any locational considerations should look to locate development away from flood risk areas wherever possible and require assessments of risk over the design life of the developments. It must be demonstrated that the new developments will not exacerbate flooding elsewhere;

- Require a high-level assessment of the impact of climate change on infrastructure interdependent to the developments (e.g. power transmission, transport etc.).

- Ensure that sustainable water management measures (including SUDs) are incorporated into new developments where practicable, including aiming for the highest possible standard of water efficiency (in line with Policy PCYFF 6);

- Require the incorporation of renewable energy in associated developments where practicable;

- Apply sustainable design and construction approaches for the site and associated developments in-line with TAN12, and require standards such as BREEAM or Code for Sustainable Homes;

- Promote low carbon travel (such as walking, cycling, public transport and eco-friendly vehicles) for Wylfa Newydd and the associated developments and ensure their support (e.g. through a travel plan);

- Consider retro-fitting to improve energy efficiency of existing buildings where appropriate;

- Ensure that a carbon management plan for the construction phase of the project is developed and agreed, including: local procurement where possible to reduce transport emissions; using materials from sustainable sources; reusing or recycling materials where possible; and tree planning to compensate for CO_2 emissions;

- Promote and enhance the Anglesey Energy Island Programme to boost low carbon energy and the local economy; and

- Safeguard the best and most versatile agricultural land in order to support local food production and reduce the area's contribution to food miles.

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