UWF Grid Connection EIA Report (2019)

Volume C2: EIAR Main Report

Chapter 13: Climate

October 2019

Topic **Climate**

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Glossary of Terms

Term	Definition
Embodied emissions / embodied energy	These are defined as the energy consumed by all of the processes associated with the production of a development, from the mining and processing of natural resources to manufacturing, transport and product delivery
CO_2eq	This is defined as the 'carbon dioxide equivalent'. It is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO_2eq signifies the amount of CO_2 which would have the equivalent global warming impact
Capacity Factor	Is how much electricity a power plant actually produces compared to how much it would produce if it operated at full nameplate capacity 100% of the time. Expressed as a % of full nameplate capacity.
EU ETS	The EU Emissions Trading System which is part of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost-effectively. It is the world's first major carbon market and remains the biggest one
Mt	Mt refers to Megatonne values. 1 Mt = 1 Million Tonnes
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.

List of Abbreviations

Abbreviation	Description
IPCC	Intergovernmental Panel on Climate Change is the United Nations body for assessing the science related to climate change.
EPA	The Irish Environmental Protection Agency which produces national greenhouse gas emission projections on an annual basis. The EPA has been designated by Government with the responsibility to develop, prepare and publish periodic projections of greenhouse gas emissions for Ireland, and acts as the national entity with overall responsibility for the preparation and reporting of emissions projections.

Executive Summary of the Climate Chapter

Baseline Environment:

Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects.

Addressing climate change requires two types of responses: mitigation and adaptation. As part of Ireland's mitigation response, the Irish government is committed to several emissions targets, including a 20% reduction by 2020 of non-ETS emissions (i.e. agriculture, transport, residential, commercial, non-energy intensive industry, and waste) on 2005 levels; with annual binding limits set for each year over the period 2013-2020; 30% reduction of emissions by 2030 compared to 2005 levels, with a longer term policy position of at least 80% reduction of emissions by 2050 (compared to 1990 levels).

Targets have also been set for electricity from renewable sources: the National Renewable Energy Action Plan sets a target of 40% electricity generation to come from renewable sources by 2020, and the White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' which aims to transform Ireland to a low carbon economy, sets a target of 70% electricity generation to come from renewable sources by 2030.

The latest published figures (2019) from the EPA in relation to Ireland's mitigation response, indicate that Ireland will breach its annual obligations up to 2020 (based on projected figures). EPA also project that this breach of obligations will continue into the future from 2021 to 2030. Ireland needs to reduce its use of fossil fuels considerably and urgently in order to influence these EPA projections.

To avoid the risk of long-lasting or irreversible changes to the climate system, it is clear that we must make rapid, far-reaching and unprecedented changes across all aspects of society. The transition to clean energy is an essential part of this.

Windfarms help in achieving Ireland's targets by supplying renewable energy to the national electricity system thus reducing the harmful emission content of electricity production. For example in 2018 wind energy met 29% of Ireland's electricity demand. This set a record, for Ireland in relation to the highest % in Europe of electricity demand being supplied by on-shore wind, thus impacting Ireland's mitigation response to Climate Change in a positive way. In addition to this for the first time ever recorded, wind energy provided more electricity than gas over a full month in January 2018.

The Development: While the UWF Grid Connection development will not directly impact Climate, it will cause positive indirect impacts through enabling the supply of electricity to the National Grid that is generated from renewable sources (wind generation at Upperchurch Windfarm).

Potential effects on Climate through Change remediation: Windfarms will help in achieving Ireland's targets by supplying renewable electricity to the national electricity system and indirectly reducing the use of fossil fuels for electricity production. Increased deployment of Renewable Energy electricity generation avoids CO^2 emissions from fossil fuel generated electricity, and contributes towards meeting Irelands Climate targets.

Summary of the Significance of the indirect Impact: The UWF Grid Connection itself will not generate renewable electricity and therefore will not contribute *in itself* to Climate Change mitigation action. However, UWF Grid Connection will **indirectly cause positive effects** to climate as the purpose of UWF Grid Connection is to transport the renewable electricity produced by Upperchurch Windfarm to the National Grid. An indirect **Significant Positive Impact is evaluated** by the authors for the development because Upperchurch Windfarm will generate approximately 220million kWh of renewable energy per annum, which will avoid the emission of 106,216 tonnes of greenhouse gases per annum which would have

resulted from generating the same amount of electricity by fossil fuel plant. 220 million kWh is enough to supply 52,381 houses (equivalent to 40% of the houses in Counties Tipperary and Limerick combined) with green, emission free electricity.

Cumulative Impact: According to the SEAI Energy in Ireland Report (2018), the average generating capacity factor of Irish windfarms was 28% in 2017. Based on this capacity factor, and the total generating capacity of 3,700MW, windfarms in Ireland avoid the emission of 4.38 million tonnes of CO^2 eq or 7.2% of Ireland's 2017 total national emissions. Therefore the cumulative impact of Upperchurch Windfarm in addition to **all other operational windfarms in the Irish State** will also be a **Significant Positive Impact**.

Conclusion: The UWF Grid Connection will cause indirect significant positive effects to Climate

It should be noted that this **Significant Positive Impact on Climate is the only significant impact (positive or negative) from the development**, as assessed by the topic experts in this EIA Report.

Topic: **Climate**

13 Environmental Factor: Climate

13.1 Introduction to the Climate Chapter

13.1.1 What is Climate?

Climate is defined as the average weather over a period of time.

Climate change means a significant change in the measures of climate, such as temperature, rainfall, or wind, lasting for an extended period – decades or longer. The Earth's climate has changed many times during the planet's history, with events ranging from ice ages to long periods of warmth. What's different about this period of the earth's history is that human activities are significantly contributing to natural climate change through our emissions of greenhouse gases. This interference is resulting in increased air and ocean temperatures, drought, melting ice and snow, rising sea levels, increased rainfall, flooding and other influences.

Climate Action is taking urgent action to tackle climate change and its impacts; this includes Climate Mitigation which is about reducing our emissions of greenhouse gases to limit the amount of warming that happens over the coming decades. Ultimately, mitigation means reducing our dependence on fossil fuels in all aspects of our lives[1].

13.1.2 Overview of Climate in the Environment

The scientific community and governments across the world are in agreement - the climate is changing.

Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects[2].

Addressing climate change requires two types of responses: mitigation and adaptation. As part of Ireland's mitigation response, the Irish government is committed to several emissions targets:

- **Ireland's 2020 target is to achieve a 20% reduction of non-ETS emissions** (i.e. agriculture, transport, residential, commercial, non-energy intensive industry, and waste) on 2005 levels; with annual binding limits set for each year over the period 2013-2020;
- National Renewable Energy Action Plan (NREAP) which sets **a target of 40% electricity generation to come from renewable sources by 2020**. The Irish Governments strategy document 'Strategy for Renewable Energy 2012 – 2020' aims to achieve Ireland's 2020 targets at a minimum.
- **Irelands 2030 target** under the European Council Effort Sharing Regulation is a **30% reduction of emissions compared to 2005 levels by 2030**;
- The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' aims to transform Ireland to a low carbon economy, with **a target of 70% electricity generation to come from renewable sources by 2030**.
- The Government of Ireland's Climate Action Plan 2019: Over the longer-term Ireland's National Policy Position on Climate change has set a target of an aggregate r**eduction in carbon dioxide (CO^2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built**

[1] EPA (2019) Research Report *Irish Climate Futures: Data for Decision-making*
[2] https://www.seai.ie/publications/2019-04_SEAI2019ProjectionsReport_Final.pdf

environment and transport sectors. The long-term vision of low-carbon transition is also based on, in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

In order to meet these emission targets, Ireland needs to reduce its use of fossil fuels considerably.

Irelands Compliance with Climate Obligations: In the latest published figures from the EPA on Ireland's mitigation response, projections show that **Ireland will breach the annual obligations up to 2020, and over the period 2021 to 2030**, and therefore reduction measures are required in all sectors.

13.1.3 Sensitive Aspects of the Climate Environment included for further evaluation

Any sensitive receptor in the local environment which could be impacted by the project is a Sensitive Aspect. The following Sensitive Aspect is **included in this topic chapter** as it could be potentially impacted:

Sensitive Aspect No. 1	Climate Change	Section 13.2

The above listed Sensitive Aspect is evaluated in Section 13.2 of this Chapter.

To help readers navigate, the colour code for the Sensitive Aspect used above is also used in the Sensitive Aspect Section 13.2. The colour-code has been applied to the section headings, tables and on side-tabs on the edge of the pages.

13.1.4 Sensitive Aspects excluded from further evaluation

No Sensitive Aspects were excluded from this topic chapter.

13.1.5 Overview of the Subject Development

The UWF Grid Connection is the subject development, being the subject of a current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 13-1 below.

Table 13-1: Subject Development – UWF Grid Connection

Project ID	The Subject Development	Composition of the Subject Development
Element 1	The Subject Development UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Ancillary Works at Mountphilips Substation site

Note: The UWF Grid Connection is 'Element 1' of the Whole UWF Project.

A description of the location, size and design, life-cycle stages, use of natural resources, emissions and wastes, and the vulnerability to major accidents and natural disasters is provided in Chapter 5: Description of the Development – UWF Grid Connection (Volume C2 EIAR Main Report).

This EIA Report is also available on www.upperchurchwindfarmgridconnection.ie.

13.1.5.1 Changes to the development from the 2018 Application

This is the 2nd Application for UWF Grid Connection (2019 Application). The previous application (2018 Application) was refused by An Bord Pleanála in December 2018. There are changes in this 2019 UWF Grid Connection Application from the 2018 Application. These comprise;

- In this 2019 Application, the route of the 110kV UGC from Mountphilips Substation Site entrance to the Consented UWF Substation site is wholly under the public road (except for 700m under a private paved road at the Consented UWF Substation end) and is 30.5km in length. By comparison, the 2018 Application 110kV UGC route was through agricultural and forestry tracks and lands with some public road crossings and 27.5km in length.
- Mountphilips Substation is at the same location, but the footprint of the Substation Compound is increased by 15% (from 8930m^2 to 10290m^2) and the footprint of the control building is increased from 205m^2 to 375m^2. ***Note***: Details of the changes/no changes to the Mountphilips Substation Site as a result of the increased dimensions are listed in Chapter 5: Description of the Development: Section 5.1.1.1.

13.1.6 The Author of the Climate Chapter

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13.1.7 Sources of Baseline Information

The information sources outlined in Table 13-2 were reviewed during desktop studies and confirmed during fieldwork in order to gather information on the baseline environment. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 13-2: Sources of Baseline Information for Climate

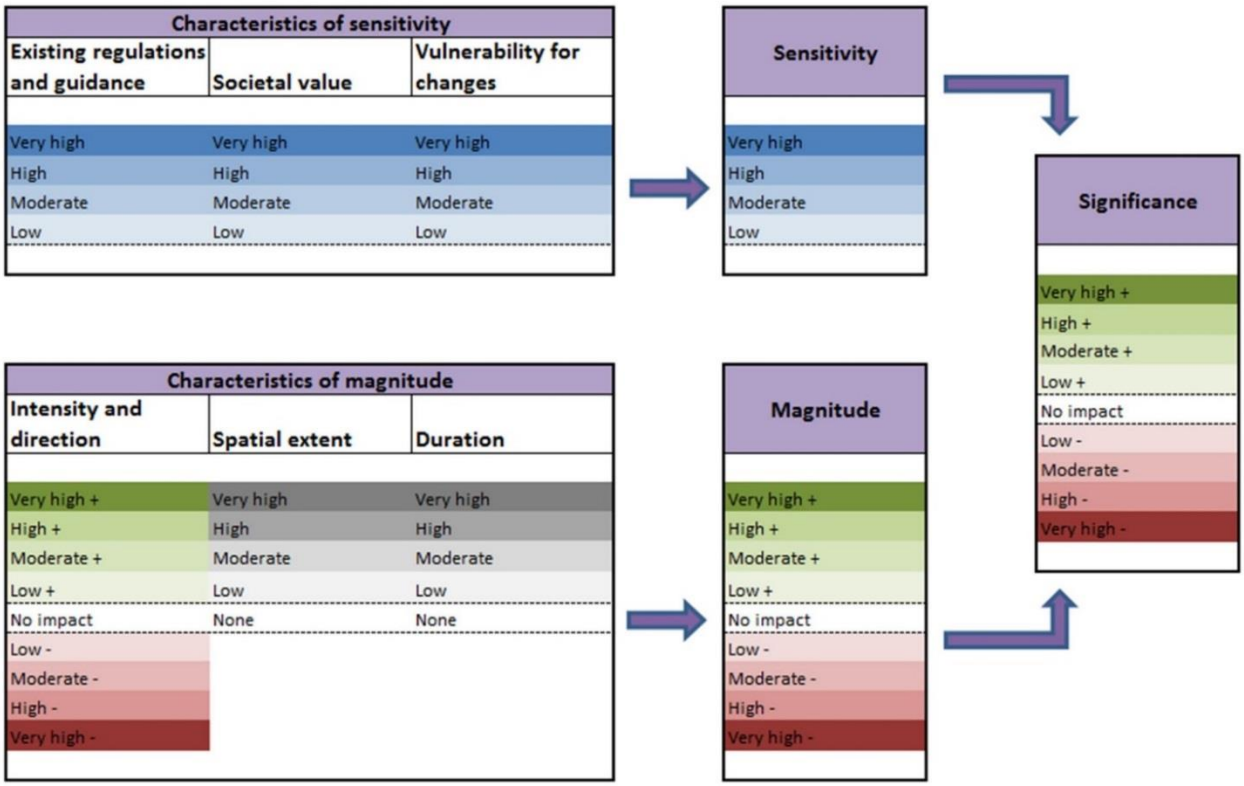
Type	Source
Consultation	No feedback was received from consultees • See Chapter 3: The Scoping Consultations, and Appendices for further details.
Legislation, Regulation, Policy	• EU Renewable Energy Directive 2009/28/EC • National Climate Policy Position (Government of Ireland 01/01/2013) • EU Effort Sharing Decision (Decision No 406/2009/EC) • National Renewable Energy Action Plan (NREAP) 2010 • NREAP Ireland's Fourth Progress Report submitted under Article 22 of Directive 2009/28/EC (December 2017) • The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' • Government of Ireland's Climate Action Plan 2019 • Mid-West Regional Planning Guidelines 2010-2022 • North Tipperary County Development Plan 2010 (as varied)
Guidelines	• UK Environment Agency carbon calculator for construction sites (Version 3.6, 2014)
Desktop	• EPA (2019) GHG Emissions Projections Report • EPA (2019) Research Report *Irish Climate Futures: Data for Decision-making* • SEAI (2019) National Energy Projections 2019 • SEAI (2019) National Projections Report • SEAI (2018) Energy Related Emissions In Ireland 2005 – 2016 • IPCC (2019) Special Report on the Ocean and Cryosphere in a Changing Climate In co-ordination with and by review of the other EIA Report Chapters as follows: • Chapter 9: Land • Chapter 10: Soils • Chapter 15: Material Assets – Roads • Review of planning/ environmental information documents for the Other Elements of the Whole UWF Project as contained in Volume F of the planning application
Fieldwork	• No fieldwork was required

13.1.8 Methodology used to Describe the Baseline and to Evaluating Effects

There are no specific guidelines on the evaluation of effects to Climate for an EIA Report. The methodology for evaluating impacts to the environmental factor Climate is based on a standard methodology – using the IMPERIA methodology. The IMPERIA methodology is described below.

13.1.8.1 Overview of the IMPERIA Methodology

In the framework developed under the EC LIFE project - IMPERIA, the evaluation of impact significance uses a replicable, multi-criteria decision analysis, where the sensitivity of the receptor (i.e. the sensitivity of a Sensitive Aspect of the environment) and the magnitude of the change caused by a project are rated using sub-criteria or scales, and then the overall significance is evaluated using a matrix.



The criteria for determining the overall sensitivity of a receptor and magnitude of the change (impact) to the receptor, is provided in the tables below. The matrix for determining the significance of the impact to the receptor is provided after these tables.

13.1.8.1.1 Criteria for Evaluating the Sensitivity of a Receptor

Sensitivity of the receptor is a description of the characteristics of the receptor or aspect of the environment which will be affected by the development. It is a measure of 1) existing regulations and guidance, 2) societal value and 3) vulnerability for the change. The sensitivity of a receptor is estimated in its current state prior to any change implied by the project.

Existing regulations and guidance describes whether there are any such objects in the impact area, which have some level of protection by law or other regulations (e.g. prohibition against polluting groundwater and Natura areas), or whose conservation value is increased by programs or recommendations (e.g. landscapes designated as nationally valuable).

Societal value describes the value of the receptor to the society and depending on the type of impact may be related to economic values (e.g. water supply), social values (e.g. landscape or recreation) or environmental values (e.g. natural habitat). Societal value measures general appreciation from the point of view of the society. When relevant, the number of people impacted is taken into account.

Vulnerability for the change describes how liable the receptor is to be influenced or harmed by changes to its environment.

Sensitivity	Criteria Existing regulations/guidance	Criteria Societal value	Criteria Vulnerability to change
Low	Few or no recommendations which add to the conservation value of the impact area, and no regulations restricting use of the area (e.g. zoning plans).	The receptor is of small value or uniqueness. The number of people impacted is small.	Even a large external change would not have substantial impact on the status of the receptor. There are only few or none vulnerable receptors in the area.
Moderate	Regulation sets recommendations or reference values for an object in the impact area, or the project may impact an area conserved by a national or an international program.	The receptor is valuable and locally significant but not very unique. The number of people impacted is moderate.	At least moderate changes are needed to substantially change the status of the receptor. There are some vulnerable receptors in the area.
High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas).	The receptor is unique and valuable to society. It may be deemed nationally significant and valuable. The number of people impacted is large.	Even a small external change could substantially change the status of the receptor. There are many vulnerable receptors in the area.
Very High	The impact area includes an object that is protected by national law or an EU directive (e.g. Natura 2000 areas).	The receptor is highly unique, very valuable to society and possibly irreplaceable. It may be deemed internationally significant and valuable. The number of people affected is very large.	Even a very small external change could substantially change the status of the receptor. There are very many vulnerable receptors in the area.

The **overall sensitivity of a receptor** is assessed by the competent expert on the basis on his/her assessment of the components of sensitivity. A general guide for deriving the overall sensitivity is to pick the maximum of existing regulations and guidance and societal value and then adjust that value depending on the level of vulnerability.

Determining the Overall Sensitivity of a Receptor	
Low	The receptor has minor social value, low vulnerability for the change and no existing regulations and guidance. Even a receptor which has major or moderate social value may have low sensitivity if it's not liable to be influenced by the development.
Moderate	The receptor has moderate value to society, its vulnerability for the change is moderate, regulation may set reference values or recommendations, and it may be in a conservation program. Even a receptor which has major social value may have moderate sensitivity if it has low vulnerability, and vice versa.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the development.
Very High	Legislation strictly conserves the receptor, or it is irreplaceable to society, or extremely liable to be harmed by the development. Even minor influence by the proposed development is likely to make the development unfeasible.

13.1.8.1.2 Criteria for Evaluating the Magnitude of an Impact

Magnitude of the impact describes the characteristics of the changes or effects that the planned project is likely to cause. Magnitude is a combination of 1) intensity and direction, 2) spatial extent, and 3) duration. Assessment of magnitude evaluates the likely changes affecting the receptor *without* taking into account the receptors sensitivity to those changes.

Intensity describes the physical dimension of a development. The direction of the change/effect is either positive (green) or negative (red).

Magnitude	**Criteria – Intensity & Direction**
Very High	The proposal has an extremely beneficial effect on nature or environmental load. A social change benefits substantially people's daily lives.
High	The proposal has a large beneficial effect on nature or environmental load. A social change clearly benefits people's daily lives.
Moderate	The proposal has a clearly observable positive effect on nature or environmental load. A social change has an observable effect on people's daily lives.
Low	An effect is **positive** and observable, but the change to environmental conditions or on people is small.
No impact	An effect so small that it has no practical implication. Any benefit or harm is negligible.
Low	An effect is **negative** and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has a clearly observable negative effect on nature or environmental load. A social change has an observable effect on people's daily lives and may impact daily routines.
High	The proposal has a large detrimental effect on nature or environmental load. A social change clearly hinders people's daily lives.
Very High	The proposal has an extremely harmful effect on nature or environmental load. A social change substantially hinders people's daily lives.

Spatial extent describes the geographical reach of, or the range within which, an effect is observable.

Duration describes the length of time during which an impact is observable and it also takes other related issues such as timing and periodicity into account. These are relevant for impacts which aren't observable all the time such as periodic impacts.

Magnitude	Criteria Spatial Extent	Criteria Duration
Low	Impact extends only to the immediate vicinity of a source. Typical range is < 1 km.	An impact whose duration is at most one year, for instance during construction and not operation. A moderate-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance.
Moderate	Impact extends over one municipality. Typical range is 1-10 km.	An impact lasts from one to a number of years. A long-term impact may fall into this category if it's not constant and occurs only at periods causing the least possible disturbance.
High	Impact extends over one region. Typical range is 10-100 km.	An impact lasts several years. The impact area will recover after the project is decommissioned.
Very High	Impact extends over several regions and may cross national borders. Typical range is > 100 km.	An impact is permanent. The impact area won't recover even after the project is decommissioned.

Deriving the overall magnitude of the change from components of magnitude

Magnitude of the change is a comprehensive synthesis of its component factors. In a case, where intensity, spatial case and duration all get the same value, the magnitude would also be given this value. In other cases, intensity should be taken as a starting point, and the assessment should be adjusted based on spatial extent and duration to obtain an overall estimate. The aim is that the overall assessment should capture the characteristics of an effect. The table below describes some example descriptions of different categories for the magnitude of the change.

Determining the Overall Magnitude of the Change/Effect	
Very High	The proposal has beneficial effects of very high intensity and the extent and the duration of the effects are at least high.
High	The proposal has beneficial effects of high intensity and the extent and the duration of the effects are high.
Moderate	The proposal has clearly observable positive effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
Low	An effect is positive and observable, but the change to environmental conditions or on people is small.
No impact	No change is noticeable in practice. Any benefit or harm is negligible.
Low	An effect is negative and observable, but the change to environmental conditions or on people is small.
Moderate	The proposal has clearly observable negative effects on nature or people's daily lives, and the extent and the duration of the effects are moderate.
High	The proposal has harmful effects of high intensity and the extent and the duration of the effects are high.
Very High	The proposal has harmful effects of very high intensity and the extent and the duration of the effects are at least high.

13.1.8.2 Assessing the significance of an impact

The **assessment of the overall significance uses the matrix below,** where positive impacts are in green and negative in red. The matrix is based on the **magnitude of the change** affecting a receptor and on the **sensitivity of the receptor** to those changes.

The values obtained from the table are indicative because the most relevant dimensions for characterising an impact are dependent on the type of impact. Thus, some discretion from the expert is required, in particular in cases, where the one component is low and the other one high or very high.

Determining the Overall Significance of an Impact

Impact Significance		Magnitude of change								
		Very High	High	Moderate	Low	No Change	Low	Moderate	High	Very High
Receptor Sensitivity	Low	Significant*	Moderate*	Slight	Imperceptible	Neutral	Imperceptible	Slight	Moderate*	Significant*
	Moderate	Significant	Significant	Moderate	Slight	Neutral	Slight	Moderate	Significant	Significant
	High	Profound	Significant	Significant	Moderate*	Neutral	Moderate*	Significant	Significant	Profound
	Very High	Profound	Profound	Significant	Significant*	Neutral	Significant*	Significant	Profound	Profound

* Especially in these cases, significance might get a lower estimate, if sensitivity or magnitude is near the lower bound of the classification

Note on Terms used in 'Determining the Overall Significance of an Impact' Table: *The Significance rating ascribed in the Table above have been refined from the ARVI tool, to provide a more nuanced understanding of the significance and also to be compatible with the terms used throughout this EIA Report, which have been informed by the EPA Guidelines on Information to be contained in EIAR (2017) for description of effects.*

In the above Table - Low has been refined as Slight or Imperceptible depending on context; High has been renamed as Significant; Very High has been renamed as Profound; No Impact is understood to also mean Neutral effect, which is defined in the EPA Guidelines as 'no effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error'.

13.1.9 Certainty and Sufficiency of the Evaluation/Information

Information on the Baseline Environment has been complied based on available information from the EPA. Data on Ireland's GHG emissions from 1990 to 2017 have been reviewed in order to identify the projected trends in the baseline and receiving environments. The EPA has published finalised data for Ireland's GHG emissions up to 2017 and provisional data for 2018 levels of GHG emissions.

In relation to Climate, there were no limitations or difficulties encountered in compiling the details of the baseline environment or evaluating the impacts of the UWF Grid Connection and of the Whole UWF Project.

13.2 Sensitive Aspect No.1: Climate Change

This Section 13.2 provides a description of the baseline environment and an evaluation of the likely impacts of UWF Grid Connection, both alone and cumulatively, on **Climate Change**.

13.2.1 BASELINE CHARACTERISTICS for Climate Change

This Section 13.2.1 comprises the identification of the Study Area for direct or indirect effects and a description of the context, character, importance and sensitivity of the Climate Change in the area. Trends or changes in the baseline environment are also identified.

13.2.1.1 STUDY AREA for Climate Change

The study area for Climate Change in relation to the UWF Grid Connection is described in Table 13-3.

Table 13-3: UWF Grid Connection Study Area for Climate Change

Study Area for Climate Change	Justification for the Study Area Extents
Irish State	While climate change is global, the study area for this report relates to the Irish State, as any emissions or emission offsets of the project, if significant, have the potential to impact Ireland's commitments and targets under various EU Climate Agreements and other international agreements

13.2.1.2 Baseline Context & Character of Climate Change in the UWF Grid Connection Study Area

Context

According to the SEAI 2019 National Projections Report[3], 'Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects. In September 2018 the G7 noted that "*Today the effects of climate change are no longer a distant threat – they are real and present*". Four of the hottest years on record occurred post-2010. At the United Nation Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP) 24, held in December 2018, it was highlighted that "*there is no doubt about the urgency of the situation, and the priority that tackling climate change needs to have for the international community*", that "*the reality is proving to be worse than scientists had foreseen*" and "*climate change is running faster than we are*".

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. According to the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate[4] (September 2019): 'global warming has already reached 1°C above the pre-industrial level, due to past and current greenhouse gas emissions. There is overwhelming evidence that this is resulting in profound consequences for ecosystems and people. The ocean is warmer, more acidic and less productive. Melting glaciers and ice sheets are causing sea level rise, and coastal extreme events are becoming more severe'.

According to the United Nations, without action, the world's average surface temperature is likely to surpass 3°C this century. The poorest and most vulnerable people are being affected the most.

[3] https://www.seai.ie/publications/2019-04_SEAI2019ProjectionsReport_Final.pdf
[4] https://www.ipcc.ch/srocc/home/

Climate Change Mitigation

Addressing climate change requires two types of responses: mitigation (defined as an anthropogenic intervention to reduce anthropogenic forcing of the climate system) and adaptation (defined as: the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects that moderates harm or exploits beneficial opportunities".

As part of Ireland's mitigation response, the Irish government is committed to several emissions targets:

- Ireland's **2020 target** is to achieve a **20% reduction of non-ETS emissions** (i.e. agriculture, transport, residential, commercial, non-energy intensive industry, and waste) on 2005 levels; with annual binding limits set for each year over the period 2013-2020;
- National Renewable Energy Action Plan (NREAP) which sets a target of **40% electricity generation to come from renewable sources by 2020**. The Irish Governments strategy document 'Strategy for Renewable Energy 2012 – 2020' aims to achieve Ireland's 2020 targets at a minimum.
- Irelands **2030 target** under the European Council Effort Sharing Regulation is a **30% reduction of emissions** compared to 2005 levels by 2030;
- The White Paper 'Ireland's Transition to a Low Carbon Energy Future 2015 – 2030' aims to transform Ireland to a low carbon economy, with a target of **70% electricity generation to come from renewable sources by 2030;**
- Over the longer-term Ireland's National Policy Position on Climate change has set a target of an aggregate **reduction in** carbon dioxide (CO2) **emissions** of **at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors**. The long-term vision of low-carbon transition is also based on, in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

Mitigation is about reducing our emissions of greenhouse gases to limit the amount of warming that happens over the coming decades. Ultimately, mitigation means reducing our dependence on fossil fuels in all aspects of our lives. All actors, from individuals, households, businesses and governments to the international community and international corporations, have an important role to play in mitigation[5].

The IPCC Report (2019) outlines the benefits of limiting global warming to the lowest possible level, in line with the goal that governments set themselves in the Paris Agreement[6] - urgently reducing greenhouse gas emissions limits the scale of ocean and cryosphere changes; the ecosystems and the livelihoods that depend on them can be preserved.

To avoid the risk of long-lasting or irreversible changes to the climate system, it is clear that we must make rapid, far-reaching and unprecedented changes across all aspects of society. The transition to clean energy is an essential part of this. In 2018 wind energy met a record 29% of Ireland's electricity demand – the highest % in Europe of electricity demand supplied by on-shore wind. In January 2018, for the first time, wind energy provided more electricity than gas over a full month.

[5] EPA (2019) Research Report *Irish Climate Futures: Data for Decision-making*
[6] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

13.2.1.3 IMPORTANCE of Climate Change

According to the SEAI 2019 National Projections Report[7], 'Climate change is now recognised as the biggest threat to life on earth, and it is now urgent that we take immediate action to reduce anthropogenic emissions of greenhouse gases to limit its damaging effects.'

Using the IMPERIA methodology set out in Section 13.1.8, Climate Change is considered to have a **Very High Sensitivity** due to the national and international regulations and targets, and a **Very High value for biodiversity and human wellbeing**.

13.2.1.4 SENSITIVITY of Climate Change

Climate change is a result of increased levels of carbon dioxide and other greenhouse gases in the atmosphere causing the heat trapping potential of the atmosphere to increase. The release of carbon dioxide from the burning of fossil fuels is a major cause of climate change. Greenhouse gases can be emitted from vehicles and embodied energy (or embodied emissions) associated with materials used in the construction of a development. Greenhouse gases can be offset by the generation of electricity from renewable sources rather than from fossil fuel sources.

According to the 2019 EPA Research Report *Irish Climate Futures: Data for Decision-making*: 'That the world has warmed since the 19th century is unequivocal. Evidence for warming includes changes in surface, atmospheric and oceanic temperatures; glaciers; snow cover; sea ice; and sea level and atmospheric water vapour. We know that humans have been the main cause of this warming through emissions of greenhouse gases. We also know that continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system, and at all scales from local to global. **How much warming will be experienced over the course of this century depends on future emissions of greenhouse gases**. If we continue on a business as-usual course, Earth's average temperature is likely to increase by between 2.6°C and 4.8°C above today's levels, with associated increases in extreme events and sea level rise. For Ireland, such changes would probably mean more frequent wet winters, dry summers and hot summers, which would pose challenges for water and flood risk management, agriculture and tourism. Recent national-scale extreme events, from the winter storms of 2013/14 to the flooding of the Shannon and other catchments associated with Storm Desmond, serve to highlight Ireland's vulnerability to extreme events. Much work has been completed by different research groups from Irish universities and Met Éireann on exploring future impacts. These works show that we are likely to experience wetter winters, drier summers and more frequent extreme weather events, with associated implications across multiple sectors.

[7] https://www.seai.ie/publications/2019-04_SEAI2019ProjectionsReport_Final.pdf

13.2.1.5 TRENDS for Climate Change in the Baseline Environment

SEAI National Projections Report 2019

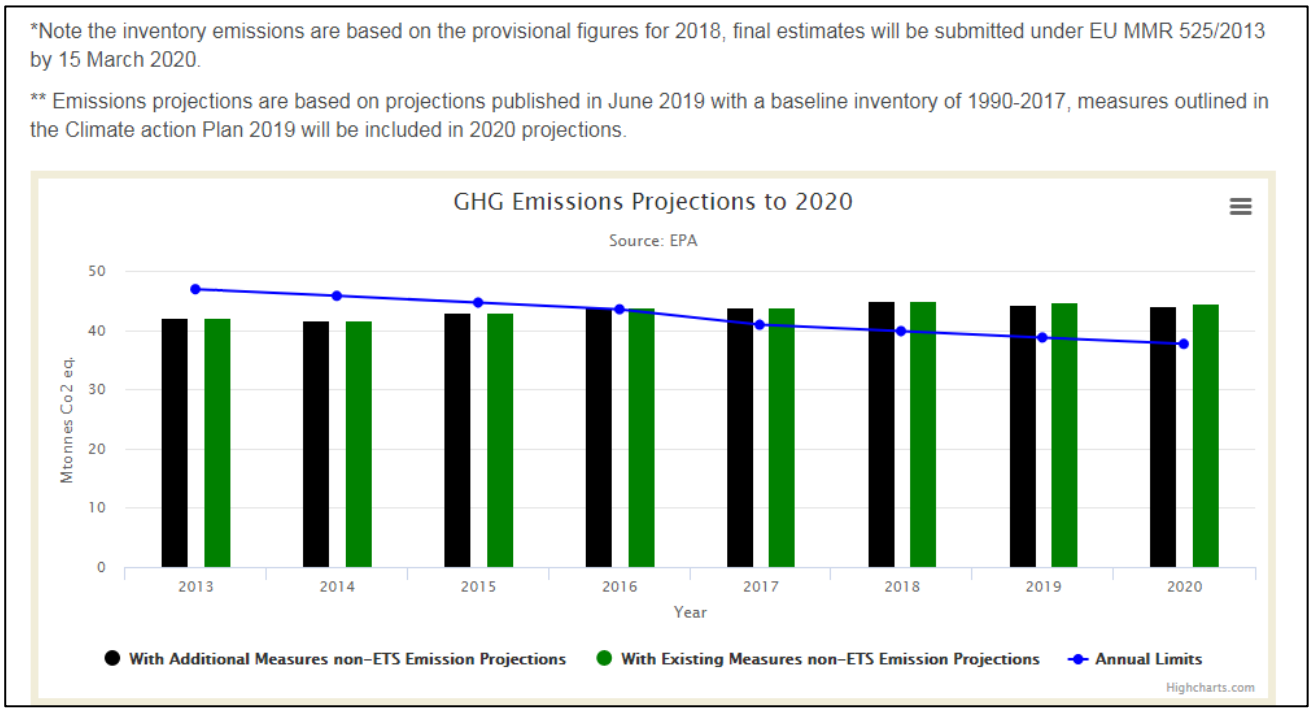
Different levels of achievement are anticipated by 2020 for renewable energy targets for transport, electricity and heat:

- The transport sector will likely meet the EU mandated 2020 target of 10% (but only when multipliers for sustainable biofuels are included as permissible under the renewable energy directive).
- A small gap of less than three percentage points is anticipated for the electricity target of 40% by 2020.
- The gap for the heat target is larger and could be three to four percentage points short of the 2020 target of 12%.

When these are taken together, **it is expected that Ireland will fall short of its mandatory European target for an overall 16% renewable energy share by 2020**, with overall achievement approximately 13% (see Figure 13.2.1). This shortfall will require Ireland to purchase statistical transfers, as per the Renewable Energy Directive 2009/28/EU.

On the current trajectory, **Ireland's energy efficiency achievement in 2020 is likely to be 16%, compared to the binding 20% energy savings target**. **Non-ETS emissions are anticipated to be between 0% and 1% below 2005 levels by 2020 compared to the target of 20% below**, which was mandated in the European Council Effort Sharing Decision (Decision No 406/2009/EC). The emissions target shortfall will also require compliance purchasing.

Figure 13.2.1: Extract from EPA GHG Emissions Projections to 2020[8]



[8] http://www.epa.ie/irelandsenvironment/environmentalindicators/#climate

13.2.1.5.1 Trends in the move towards electricity

We are heading towards an increasingly electrified world 'the deployment of electric cars and electric heating in buildings will drive power demand growth in the short term, while some segments of heavy-duty transport and heavy industry could also switch to electricity by mid-century'[9]. The recently published Climate Action Plan[10] envisages the installation of 400,000 domestic heat pumps and almost a million electric cars on our roads by 2030. Demand for electricity will therefore increase substantially during a period of time when Ireland is committed to reducing its non-ETs emissions. To address this demand, the Climate Action Plan also sets a target of 70 per cent of electricity coming from renewable sources by 2030, up from around 30 per cent today.

13.2.1.5.2 The 'Do Nothing Scenario' (the Environment if the Development is not carried out)

Climate change represents a serious threat to the environment. The very high impact of Climate Change to biodiversity and to our human wellbeing, is reflected in the Irish Oireachtas declaring a climate and biodiversity emergency on the 9th May 2019.

If the UWF Grid Connection does not proceed, the renewable generation for Upperchurch Windfarm will not be transported to the National Grid and the subsequent benefits of GHG offsets will not occur. In the 'do-nothing' alternative, **not developing the Upperchurch Windfarm project means that** there will be a consequential loss of the carbon offset potential and **the emission of 106,216 tonnes of greenhouse gases every year from the generation of electricity by fossil fuel plant would not be avoided**.

13.2.1.6 Description of the RECEIVING ENVIRONMENT for Climate Change

The receiving environment is the likely state of the baseline environment at the time of construction/operation/decommissioning as relevant i.e. baseline + trends.

According to the Government of Ireland's Climate Action Plan 2019 Ireland will miss the target set for the period 2013 to 2020 for renewables by about one eighth and for cumulative emissions by a little under 5%. However, more worrying is the expectation that recent growth in emissions, particularly from Industry, Agriculture, and Transport will put us on a trajectory to be over 25% above the 2030 targets.

[9] https://newclimateeconomy.report/2018/energy/
[10] https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

13.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

13.2.2.1 Cumulative Evaluation Study Areas

13.2.2.1.1 UWF Grid Connection Cumulative Evaluation Study Area

The UWF Grid Connection was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Grid Connection Cumulative Evaluation Study Area for Climate Change	Justification for the Study Area Extents
Irish State	While climate change is global, the study area for this report relates to the Irish State, as any emissions or emission offsets of the project, if significant, have the potential to impact Ireland's commitments and targets under various EU Climate Agreements and other international agreements

13.2.2.1.2 Whole Project Cumulative Evaluation Study Area

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to show the totality of the project.

A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4 EIAR Appendices. Scoping of these Other Elements is presented in Section 13.2.2.2.1 below.

The Whole Project Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 13-5.

Table 13-4: Whole Project Cumulative Evaluation Study Area for Local Soils, Subsoils & Bedrock

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	Irish State	While climate change is global, the study area for this report relates to the Irish State, as any emissions or emission offsets of the project, if significant, have the potential to impact Ireland's commitments and targets under various EU Climate Agreements and other international agreements
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

13.2.2.2 Scoping for Other Projects or Activities & Potential for Impacts

The evaluation of cumulative impacts to Climate Change also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Climate Change with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.1: Scoping of Other Projects or Activities for the Cumulative Evaluations (Section A2.1.4.26).

The results of this scoping exercise are that: operational Windfarms in the Republic of Ireland and Bunkimalta Windfarm (potential future windfarm) and Castlewaller Windfarm (consented future windfarm) have been scoped in for evaluation of cumulative effects.

13.2.2.2.1 Potential for Other Elements or Other Projects to cause Impacts to Climate Change

An evaluation was carried out by the topic author of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects to cause cumulative effects to the Sensitive Aspect Climate Change. The results of this evaluation are included in Table 13-6.

Table 13-5: Results of the Evaluation of the Other Elements and Other Projects

Other Elements of the Whole UWF Project	
Element 2: UWF Related Works	Evaluated as excluded: No potential for effects/Neutral effects due to • No potential to positively *directly* impact Climate Change through increasing renewable energy production - the UWF Related Works will not themselves generate renewable electricity, though their purpose is to support the construction of the renewable generator, the consented Upperchurch Windfarm • Neutral impacts to Climate Change due to increases in GHG emissions as the volume of embodied emissions from construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO2, • Neutral impacts to Climate Change due to forestry felling, as the loss of forested land results in the loss of an area capable of uptaking 6.5 tonnes of CO2/yr which is equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO2. • Neutral impacts to Climate Change due to increased GHG emissions during the operational stage, due to the infrequent nature and very small scale of any maintenance works required the increase in GHG emissions from maintenance vehicles can be considered negligible, • There will be a Neutral impact to Climate Change as a result of decommissioning activities due to the low volume of machinery and vehicles required.
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects/Neutral effects due to • No potential to positively *directly* impact Climate Change through increasing renewable energy production - the UWF Replacement Forestry will not produce renewable electricity • Neutral impact to Climate Change as a result of the planting of trees, as the new native woodland will result in an area capable of uptaking 9.2 tonnes CO2/yr which would offset substantially less than 1% of Ireland's 2017 national GHG emissions and will have a Neutral impact on Climate Change.

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	• Neutral impact to Climate Change due to the use of vehicles or equipment during planting or maintenance works at the afforestation lands, as any GHG emissions from vehicles or equipment associated with the UWF Replacement Forestry will be of a very low magnitude due to the relatively small scale of the works and the avoidance of the use of large machinery during planting works.
Element 4: Upperchurch Windfarm (UWF)	**Included for the evaluation** of cumulative effects in relation to **Increasing Renewable Energy Production** Evaluated as excluded in relation to adverse effects from increases in GHG emissions and reductions in the carbon sink potential of the UWF lands due to: • Neutral impacts to Climate Change due to increases in GHG emissions as the volume of embodied emissions from construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, as the emissions have been calculated at substantially less than 1% of Ireland's 2020 national emission ceiling for CO2, • Neutral impacts to Climate Change due to forestry felling, as the loss of forested land results in the loss of an area capable of uptaking 95 tonnes of CO2/yr which is equivalent to substantially less than 1% of Ireland's 2020 national emission ceiling for CO2. • Neutral impacts to Climate Change due to increased GHG emissions during the operational stage, due to the infrequent nature and very small scale of any maintenance works required the increase in GHG emissions from maintenance vehicles can be considered negligible, • There will be a Neutral impact to Climate Change as a result of decommissioning activities due to the low volume of machinery and vehicles required.
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects/No measureable effects due to: • No potential to positively *directly* impact Climate Change through increasing renewable energy production - the UWF Other Activities will not produce renewable electricity • Neutral impact to Climate Change as a result of the planting of trees, as new hedgerows and trees will result in an area capable of uptaking 3.4 tonnes CO2/yr which would offset substantially less than 1% of Ireland's 2017 national GHG emissions and will have a Neutral impact on Climate Change. • Neutral impact to Climate Change due to the use of vehicles or equipment as activities will be very small scale, with minor volumes of equipment and machinery required.
Other Projects or Activities	
Operational Windfarms in the Republic of Ireland Potential future Bunkimalta Windfarm Consented future Castlewaller Windfarm	Yes, included for the evaluation of cumulative effects Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project (in particular Upperchurch Windfarm). There is no potential for cumulative effects with the UWF Grid Connection.

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13.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

13.2.2.3.1 Element 2: UWF Related Works

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.3 Element 4: Already Consented Upperchurch Windfarm

Every unit (kWh) of electricity generated by clean renewable sources replaces a unit of electricity generated by fossil fuel sources and thereby offsets the pollution (expressed in CO_2e) that would be emitted by fossil fuel generation. Upperchurch Windfarm will generate electricity from the clean renewable wind resource, and replace generation from fossil fuel sources, as outlined in Table 13-7.

Table 13-6: Upperchurch Windfarm contribution to Climate Change mitigation

Value	Unit	Source
220,000,000 kWh	Kilowatt hours of electricity per annum which will be generated by Upperchurch Windfarm	Predicted production from the 22 Wind Turbines at Upperchurch Windfarm
52,381 houses	houses/per annum that will be supplied with electricity from Upperchurch Windfarm	Based on CRU Figures of 4,200 kilowatt hours of average use per annum per household in Ireland (August 2017). *Review of Typical Domestic Consumption Values for Electricity and Gas Customers (CER 17/003)*
40%	% of all Households in County Tipperary and County Limerick combined, that could be supplied with all of their electricity consumption from Upperchurch Windfarm	
CO_2e offsets: Upperchurch Windfarm will generate 220,000,000 kWh every year without emitting greenhouse gases (GHG) or ash pollution and this will avoid an equal amount of electricity being generated from gas, coal or oil, which do emit GHG. The gases in a GHG bundle (carbon dioxide, methane, nitrous oxide and ozone) are represented by the term CO_2e (Carbon Dioxide equivalent) when discussing offsets. The following section sets out the CO_2e that is emitted by cars and dairy cows and compares those emissions to the savings or offsets in CO_2e from Upperchurch Windfarm (CO_2e offsets) production. It also sets out the amount of forestry that would be required (forestry sequestration or CO_2e absorption) for the same CO_2e offsets contribution, as Upperchurch Windfarm.		
106,216 tonnes CO_2e offset	(Greenhouse Gases) CO_2e tonnes per annum that would otherwise be emitted if the 220,000,000 kWh to be generated by Upperchurch Windfarm, was instead generated by gas, coal and oil.	Based on the energy intensity of the Irish electricity generation mix *of 482.8g CO_2e/kWh (Source: Energy-related CO_2 Emissions in Ireland 2005-2016 (SEAI, 2018))*

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Value	Unit	Source
44,629 cars	Number of cars that would emit the equivalent amount of CO_2e (106,216 tonnes) per annum	Based on Irish Motor Industry June 2018 (2.38 tonnes/per annum CO_2e per car) and Cartell.ie March 2018 (average per car in Ireland 21,025 km/per annum)
2,079,345 cars	Number of cars in Ireland	CSO 2017
2.15%	% of the cars in Ireland that can be offset by Upperchurch Windfarm production	
5 tonnes	tonnes of CO_2e emitted per cow per annum	Average annual production from a cow (6,000 litre milk) on grass based diet in Ireland results in 5 tonnes of CO_2e emissions per annum. Teagasc (Environment Knowledge Transfer Department 2019)
21,243 cows	Number of cows that would emit the equivalent amount of CO_2e (34,037 tonnes) that can be offsets from Upperchurch Windfarm production	
164,245 cows	Dairy cows in Tipperary	Irish Cattle Breeding Federation numbers for 2017 *(https://www.icbf.com/wp/?p=10601)*
13%	% of the Tipperary dairy cow herd that can be offset by Upperchurch Windfarm production	
8,614 hectares forestry	Equivalent hectares of forestry that would be required if the same amount of CO_2 that Upperchurch Windfarm would avoid, was to be absorbed by growing forest (forestry sequestration)	COFORD estimate that Irish forests on average sequester 3.36 tonnes of carbon per hectare per annum. (Carbon Sequestration in Irish Forests (COFORD 2009). 1 tonne of Carbon = 3.67 tonnes of CO_2. Therefore 1 hectare of Irish forest sequesters 12.33 tonnes per annum of CO_2 The COFORD Council is a body appointed by the Minister for Agriculture, Food and the Marine to advise the Minister and his Department on issues related to the development of the forest sector in Ireland.

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Consideration of the Passage of Time: The passage of time was considered during a review of the sources of information. There have been changes in the baseline environment since 2013, these changes involve commitments made by Ireland to reduce greenhouse gas emissions, and also include the compliance and projected compliance with these targets out to 2050. In summary Ireland is not currently on track to achieve its emissions targets, and reductions in the use of fossil fuel are required in all sectors. These changes have been considered, where relevant, in the cumulative evaluations in this EIAR.

13.2.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 13.2.2.2.1

13.2.2.3.5 Other Projects or Activities

There are currently over 250 windfarms in the Republic of Ireland which have an installed capacity of 3,700MW[11]. Together, these windfarms have the ability to off-set approximately 4.38 million tonnes of CO_2 generated annually by fossil fuels (assuming a typical CO_2 emission factor of 482.8 gCO_2/kWh (2016 data)[12]) assuming an average capacity factor of 28%.

There is some possibility that the potential future Bunkimalta Windfarm and potential future Castlewaller Windfarm could be operational during the same period as UWF Grid Connection and Upperchurch Windfarm. Bunkimalta is a potential 34MW wind farm and Castlewaller Windfarm would be of similar size.

[11] IWEA (2019) Facts & Stats (https://www.iwea.com/about-wind/facts-stats)
[12] SEAI (2018) Energy Related Emissions In Ireland 2005 - 2016

13.2.3 PROJECT DESIGN MEASURES for Climate Change

There are no Project Design Environmental Protection Measures specific to Climate Change

13.2.4 EVALUATION OF IMPACTS to Climate Change

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Climate Change.

As a result of the exercise, some impacts were included and some were excluded.

Table 13-7: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Increase in Renewable Energy Production (operational stage)	*Increases in GHG emissions (construction stage)*
	Increases in GHG emissions (operational stage)
	Decommissioning Effects

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section – Section 13.2.4.1.

The impacts which were excluded are evaluated in Section 13.2.4.2.

13.2.4.1 Impact Evaluation Table: Increase in Renewable Energy Production

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: None for UWF Grid Connection
Cumulative Impact Source: Renewable energy production by Upperchurch Windfarm
Impact Pathway: Air/National and European Policy

Impact Description: UWF Grid Connection does not have the potential to directly impact Climate Change through increasing renewable energy production - the UWF Grid Connection itself will not generate renewable electricity, however its purpose is to transport renewable electricity from the consented Upperchurch Windfarm to the National Grid. **This impact is evaluated at the end of this table as the whole project impact**.

Impact Quality: Positive

Evaluation of the Subject Development Impact – Excavation & Relocation of soils, subsoil and bedrock

Element 1: UWF Grid Connection – direct/indirect impact

Impact Magnitude: No direct impact. The indirect impact of UWF Grid Connection – i.e. facilitating the development of Upperchurch Windfarm is examined as the 'whole project' impact below.

Significance of the Impact: No Direct Impact

Rationale for Impact Evaluation:

- The UWF Grid Connection itself will not generate renewable electricity and therefore will not positively contribute in itself to Climate Change mitigation.

Element 1: UWF Grid Connection – cumulative impact

Cumulative Impact Magnitude: No direct impact. The indirect impact of UWF Grid Connection – i.e. facilitating the development of Upperchurch Windfarm is examined as the 'whole project' impact below.

Significance of the Cumulative Impact: No Cumulative Impact

Rationale for Cumulative Impact Evaluation:

- The UWF Grid Connection itself will not generate renewable electricity and therefore will not positively contribute in itself, or cumulatively, to Climate Change mitigation.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works – *N/A, evaluated as excluded, see Section 13.2.2.2.1*

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 13.2.2.2.1*

Element 4: Consented Upperchurch Windfarm

Impact Magnitude:
The 22 No. turbines of the consented Upperchurch Windfarm will avoid the emission of 106,216 tonnes of greenhouse gases per annum which would have resulted from generating the same amount of electricity by fossil fuel plant. 220 million kWh is enough to supply 52,381 houses (equivalent to 40% of the houses in County Tipperary and County Limerick combined) with green, emission free electricity.

Significance of the Impact: **Significant (positive)**

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Rationale for Impact Evaluation:

- The increased availability of renewable electricity sources will reduce GHG emissions from fossil fuel burning for energy production every year for the lifetime of the Upperchurch Windfarm.
- Climate change is considered to have a **Very High Sensitivity** due to the national and international regulations and targets, and a **Very High value for biodiversity and human wellbeing**.
- The renewable energy produced by Upperchurch Windfarm is considered to be Low Magnitude in the context of the total amount of energy required in the Irish State.
- The impact of Upperchurch Windfarm will therefore be a **positive and significant Impact** due to the Very High sensitivity of Climate Change, combined with a Low Magnitude of impact (calculated using the IMPERIA methodology outlined in Section 13.1.8).
- Upperchurch Windfarm will support Ireland's renewable energy target of 40% electricity production from renewables by 2020, and 70% by 2030.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 13.2.2.2.1*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Operational Windfarms in the Republic of Ireland and the potential future Castlewaller Windfarm and potential future Bunkimalta Windfarm

Impact Magnitude: According to the Irish Wind Energy Association there are currently over 250 wind farms in the Republic of Ireland, with a total generating capacity of 3,700MW[13]. According to the SEAI Energy in Ireland Report (2018)[14], the average generating capacity factor of Irish windfarms was 28% in 2017. Based on this capacity factor, and the total generating capacity of 3,700MW, windfarm in Ireland avoid the emission of 4.38 million tonnes of CO_2 eq or 7.2% of Ireland's 2017 total national emissions.

There is some possibility that potential future Bunkimalta Windfarm and potential future Castlewaller Windfarm could be operational during the same period as UWF Grid Connection and Upperchurch Windfarm. Together these two windfarm could produce enough electricity for c.32% of the houses in County Tipperary and County Limerick combined, and would avoid the emission of c.90,000 tonnes of greenhouse gasses per annum.

Significance of the Impact: **Significant (positive)**

Rationale for Impact Evaluation:

- The increased availability of renewable electricity sources will reduce GHG emissions from fossil fuel burning for energy production every year for the lifetime of the Upperchurch Windfarm.
- Climate Change is considered to have a **Very High Sensitivity** due to the national and international regulations and targets, and a **Very High value for biodiversity and human wellbeing**.
- Ireland is more likely to meet its renewable energy target of 40% electricity production from renewables by 2020, and 70% by 2030.

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Evaluation of Other Cumulative Impacts – Increase in Renewable Energy Production

Whole UWF Project Effect

Magnitude: While UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities will not individually produce renewable electricity, they will facilitate the construction and/or operation of the Upperchurch Windfarm, and therefore will indirectly cause positive effects to Climate

[13] https://www.iwea.com/about-wind/facts-stats, accessed 14th June 2019
[14] https://www.seai.ie/resources/publications/Energy-in-Ireland-2018.pdf

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The 22 No. turbines of the **consented Upperchurch Windfarm will generate approximately 220 million kilowatt hours of renewable energy per annum** which will **avoid the emission of 106,216 tonnes of greenhouse gases per annum** which would have resulted from generating the same amount of electricity by fossil fuel plant. 220 million kWh is enough to supply **52,381 houses** (equivalent to 40% of the houses in County Tipperary and County Limerick) with green, emission free electricity.

The inclusion of the Upperchurch Windfarm project will increase Ireland's overall emissions saving to 4.5 million tonnes of CO_2 eq, or 7.5% of Ireland's 2017 total national emissions.

Significance of the Whole Project Effect: Significant (positive)

Rationale for Impact Evaluation:

- The increased availability of renewable electricity sources will reduce GHG emissions from fossil fuel burning for energy production every year for the lifetime of the Upperchurch Windfarm.
- Climate Change is considered to have a **Very High Sensitivity** due to the national and international regulations and targets, and a **Very High societal value for human wellbeing**.
- The renewable energy produced by Upperchurch Windfarm is considered to be Low Magnitude in the context of the total amount of energy required in the Irish State.
- The impact will be **positive and significant** due to the Very High sensitivity of Climate Change, combined with a Low Magnitude of impact (calculated using the IMPERIA methodology outlined in Section 13.1.8).
- Upperchurch Windfarm and the proposed facilitating UWF Grid Connection, and facilitating Other Elements will support Ireland's renewable energy target of 40% electricity production from renewables by 2020, and 70% by 2030.

All Elements of the Whole UWF Project with Other Projects or Activities

Cumulative Impact Magnitude: The operational windfarms in Ireland, together with the Upperchurch Windfarm, and potential future Bunkimalta Windfarm and Castlewaller Windfarm can constribute overall emissions saving to 4.6 million tonnes of CO_2 eq per annum.

Significance of the Cumulative Impact: Significant (positive)

Rationale for Cumulative Impact Evaluation:

- The increased availability of renewable electricity sources will reduce GHG emissions from fossil fuel burning for energy production every year for the lifetime of the Upperchurch Windfarm.
- Climate Change is considered to have a **Very High Sensitivity** due to the national and international regulations and targets, and a **Very High societal value for human wellbeing**.
- Windfarms support Ireland's renewable energy target of 40% electricity production from renewables by 2020, and 70% by 2030.

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13.2.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 13-9 below.

Table 13-8: Description and Rationale for Excluded Impacts to Climate Change

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Trench and Foundation excavations, use of machinery and vehicles	1 *(all Other Elements have been excluded)*	Air, policy	Increases in GHG emissions	Rationale for Excluding: Neutral impact, The volume of embodied emissions from UWF Grid Connection construction materials and from excavated or hardstand areas and emissions from vehicles, machinery or equipment such as mobile generators, (either for UWF Grid Connection alone or cumulatively) will be substantially less than 1% of Ireland's 2020 national emission ceiling for CO_2.
Operational/Growth Stage				
Use of vehicles, machinery	1	Air, policy	Increased GHG emissions	Rationale for Excluding: Neutral impact, Due to the infrequent nature and very small scale of any potential maintenance/repair works required for UWF Grid Connection the increase in GHG emissions from maintenance vehicles can be considered negligible.
Decommissioning Stage				
Rationale for Excluding: No potential for impacts: UWF Grid Connection will remain part of the National Grid, therefore no impacts can occur.				

13.2.5 Mitigation Measures for Impacts to Climate Change

Mitigation measures are not relevant as **UWF Grid Connection will not cause adverse impacts** to Climate Change. UWF Grid Connection will support the development of Upperchurch Windfarm, and therefore will cause an indirect **significant positive impact on Climate Change**.

13.2.6 Evaluation of Residual Impacts to Climate Change

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Grid Connection (Section 13.2.4), i.e. **indirect Significant Positive impact.**

13.2.7 Application of Best Practice and the EMP for Climate Change

The UWF Grid Connection Environmental Management Plan also includes Best Practice Measures (BPM), which although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measure has been developed, for the protection of **Climate Change,** by the authors of this topic chapter, using industry best practice. The production of the Upperchurch Windfarm element will be recorded during the operational stage to monitor the actual levels of production against the levels in this EIA Report:

GC-BPM-11	Measuring Operational Electricity Production

This Best Practice Measure forms part of the UWF Grid Connection Environmental Management Plan, which is appended to this EIA Report as Volume D.

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13.2.8 Summary of Impacts to Climate Change

A summary of the Impact to Climate Change is presented in Table 13-10.

Table 13-9: Summary of the impacts to Climate Change

Impact to Climate Change:	**Increase in Renewable Energy Production**
Evaluation Impact Table	*Section 13.2.4.1*
Project Life-Cycle Stage	Operational Stage
UWF Grid Connection *(direct/indirect impact)*	**No Direct Impact** *(indirect impact is the whole project impact)*
UWF Grid Connection *(cumulative Impact)*	**No Cumulative Impact**
Element 2: UWF Related Works	No Direct Impact
Element 3: UWF Replacement Forestry	No Direct Impact
Element 4: Upperchurch Windfarm	**Significant (positive)**
Element 5: UWF Other Activities	No Direct Impact
Cumulative Impact: *(for Other Elements only)*	
Whole UWF Project Effect *(due to Upperchurch Windfarm)*	**Significant (positive)**
All Other Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities: Operational Windfarms in the Republic of Ireland potential future Bunkimalta Windfarm potential future Castlewaller Windfarm	**Significant (positive)**

Climate

Topic

13.3 Reference List

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