Environmental Impact Assessment Report

Keerglen Wind Farm, Co. Mayo

Volume 2 Main Report

ABO Energy Ireland Ltd.

August 2024

Note:
The EIAR comprises five volumes. Volume 1 of this EIAR contains a Non-Technical Summary, which gives a brief non-specialist outline of the project. Volume 2 of the EIAR and contains the main text of the EIAR. Volume 3 contains the figures associated with the various sections in Volume 1 and 2, these should be referred to where noted. Volume 5 contains landscape photomontages associated with Chapter 9. The appendices are contained in Volume 4.

Cover Photograph: MacroWorks (2024) *Montage of proposed Keerglen Wind Farm*

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*Note: Submission of the Environmental Impact Assessment Report to Mayo County Council is made via the Local Government Ireland Planning System. The system has a 20MB size limit for each document and as a result the EIAR is submitted with documents in each Volume of the EIAR separated where necessary to comply with size limit requirements for the Local Government Ireland Planning System.

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1. Introduction

1.1 Environmental Impact Assessment Report Context

This EIAR has been prepared to accompany a planning application by ABO Energy Ireland Ltd, hereafter referred to as *'the Applicant'*, to Mayo County Council. The applicant is applying for a ten-year permission for the development of a Windfarm at Keerglen, near Ballycastle, Co. Mayo. The proposed development (fully described in Chapter 3 of this EIAR) is being brought forward in response to local, national, regional and European policy regarding Ireland's transition to a low carbon economy, associated climate change policy objectives and to reduce Ireland's dependence on imported fossil fuels for the production of electricity.

For the purposes of the planning application the proposed development will consist of:

- Construction of up to 8 No. wind turbines with a maximum overall tip height of between 176-180m, comprising rotor diameters ranging between 133-150m and hub heights ranging between 105-112m high;
- Associated Wind Turbine foundations and hard stand areas at each turbine;
- 1 No. 38kV electrical substation building, compound and associated infrastructure works;
- 1 No. temporary welfare site compound and associated works;
- 20kV underground cables facilitating the connection of turbines to 38kV electrical substation and all associated infrastructure and works;
- Provision of a new temporary roadway connecting the R315 and the L51723 in the townland of Ballinglen to facilitate the delivery of turbine components and other abnormal loads;
- Widening and ancillary works to sections of the L51723 in the townlands of of Keerglen and Ballykinlettragh;
- Provision of new permanent site access of the L51723;
- Upgrading of existing agricultural tracks and drainage infrastructure, and construction of new internal site tracks and all associated works as required;
- Construction of a clear-span bridge crossing the Keerglen River within the development area;
- 1 no. borrow pit;
- Designated peat storage areas alongside internal side roads;
- Site drainage;
- Ancillary forestry felling to facilitate construction and operation of the proposed development;
- All associated infrastructure and site development works.

For the purposes of the EIA Directive[1], the EIAR further considers:

- Temporary minor off-site works along the turbine delivery route;
- Approximately c. 22.8km of 38kV underground electricity export connection works and associated works along public roads and private lands to include horizontal directional drilling at bridge locations;
- Temporary met mast of between 100-112m in height and all associated infrastructure and works;

The proposed wind energy project, to be known as *'Keerglen Wind Farm'*, is located in the townlands of: Keerglen, Ballykinlettragh and Ballinglen County Mayo. The site location is illustrated in more detail in the Drawing Pack submitted as part of the planning application. The main study area for the EIAR is illustrated in Figure 1.1 and Figure 1.2.

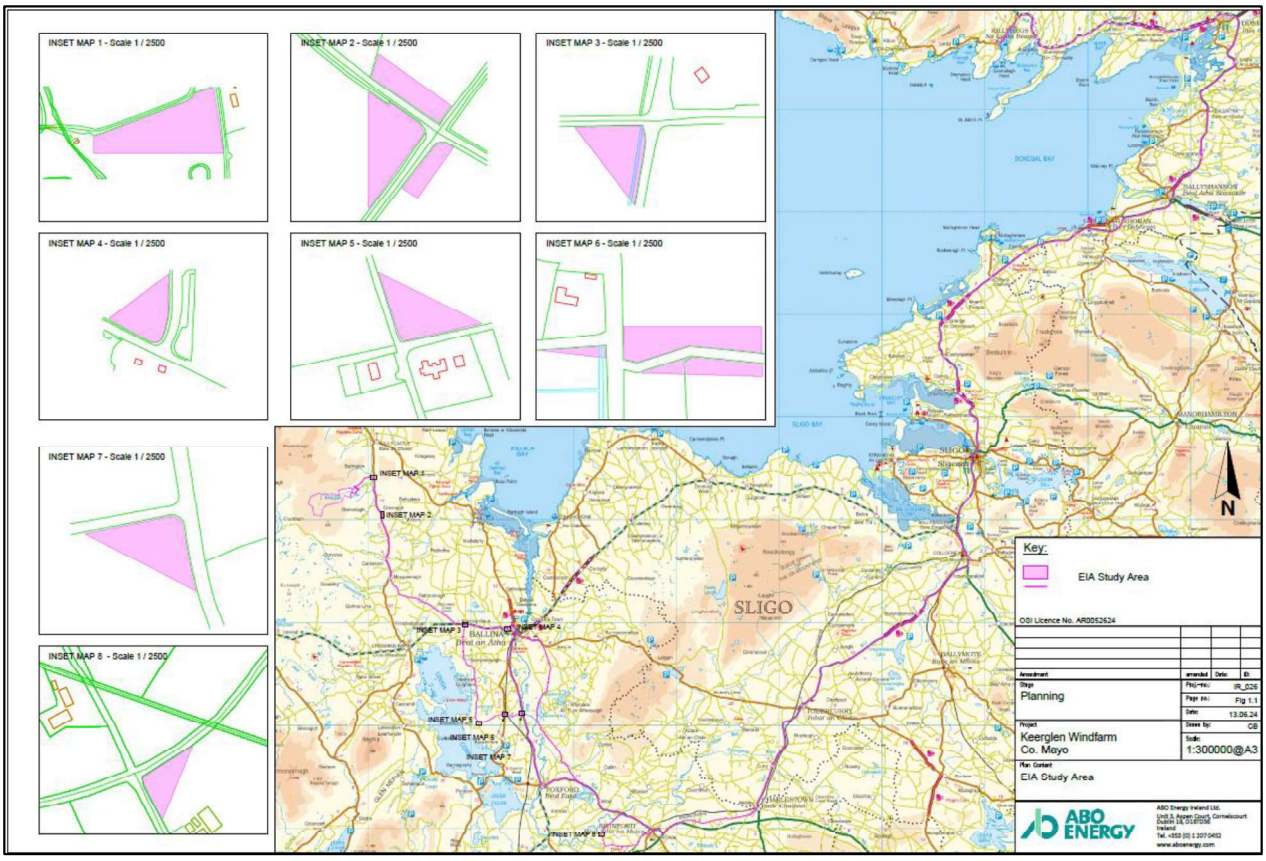

Figure 1.1: EIA Study Area

This EIAR accompanies the planning application for the proposed development submitted to Mayo County Council. The planning application is also accompanied by an Appropriate Assessment Screening Report and Natura Impact Statement (NIS).

[1] Please note there are differences in what is being applied for under Part III of the *Planning and Development Act 2000, as amended* and what is being presented under Part X of the same statute.

For the purposes of the EIA Directive, this EIAR screens the turbine delivery route and works required along the same between Killybegs Port to the proposed wind farm site, underground electricity export connection works intended to connect the proposed development to the national electricity grid via a 110kV underground cable to the existing Tawnaghmore ESB Substation or to a Large Energy User at Killala Business Park, located c.22.8km southeast of the intended on-site 110kV substation, in the townland of Tawnaghmore Upper, Co. Mayo, and temporary meteorological mast of between 100-112m in height to be sited centrally on the Keerglen Wind Farm site. Neither the underground electricity export connection works, the temporary minor off-site works along the turbine delivery route or the temporary meteorological mast form part of the planning application, however, they are assessed in this EIAR. Each element listed being screened into the EIA but not forming part of the planning application submitted at this time will be the subject of separate subsequent planning applications.

The Environmental Impact Assessment procedure commenced at the project design stage where it was determined that an EIAR was required. The scope of the study was determined, after which the EIAR was prepared for the purpose of being included with the planning application for development consent. The competent authority will examine this EIAR, circulating copies to statutory consultees while also making it available to the public. The competent authority then makes its decision to refuse or grant permission or to seek additional information, having regard to the information contained in this EIAR among other factors.

The EIAR has been prepared following a comprehensive period of consultation with environmental and technical experts throughout the design and planning stages of the project's development. EIA is a practical and dynamic process of environmental protection. The specialist studies and professional and competent evaluations used for this EIAR have principally allowed the development to anticipate and avoid impacts. The EIAR is a document that records the process, showing how environmental consideration helped the project to achieve the most sustainable and least disruptive integration with the local environment.

European Union Directive 2011/92/EU ("the EIA Directive") requires that, before consent is given for certain public and private projects, an assessment of the effects on the environment is undertaken by the relevant competent authority. The EIA Directive has been transposed into Irish legislation, for the purposes of this EIA Development, by the Planning and Development Act 2000, as amended ("the Planning Acts") and the Planning and Development Regulations 2001, as amended ("the Planning Regulations"). The EIA Directive (2011/92/EU) was amended by the 2014 EIA Directive (2014/52/EU) 30. The 2014 EIA Directive was transposed into Irish legislation by the European Union (Planning and Development) (EIA) Regulations 2018 (S.I. No. 296 of 2018) which in turn amended the Planning Acts and the Planning Regulations to reflect the requirements of the 2014 EIA Directive. The regulations set out the information to be contained in the EIA and the thresholds for developments for which such assessments are required. The primary objective of the EIA Directive is to ensure that projects, which are likely to have significant effects on the environment, are subject to an assessment of their likely impacts. This EIAR complies with the EIA Directive as amended by Directive 2014/52/EU.

The EIA Directive requires Member States to ensure that a competent authority (in this case Mayo County Council) carries out an assessment of the likely significant effects of projects prior to development consent being given for the project.

The *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, May 2022), were published as a guide as how to prepare an EIAR in line with the requirements set out in the European Union Regulations 2018 (S.I. No. 296 of 2018). Additionally, the published *'Guidance on Screening', 'Guidance on Scoping'* and *'Guidance on the preparation of the Environmental Impact Assessment Report'* were also taking into consideration while producing the EIAR submitted at this time accompanying the Keerglen Wind Farm planning application.

This EIAR has taken into consideration the changes listed above, and has also been prepared with regard to the guidance documents below:

- Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report (EC, 2017)[2]
- '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, May 2022),
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DPHLG, 2018)[3]
- DoEHLG Wind Energy Development Guidelines 2006
- DoHPLG Draft Wind Energy Development Guidelines 2019
- IWEA Best Practice Guidelines for the Irish Wind Energy Industry 2012
- IWEA Best Practice Principles in Community Engagement and Community Commitment 2013
- DCCAE Code of Practice for Wind Energy Development Ireland- Guidelines for Community Engagement 2016

The EIAR has regard to the Wind Energy Development Guidelines 2006 (WEDGs), and considers many of the elements of the Draft Wind Energy Development Guidelines 2019 (DWEDGs)[4]. Should the DWEDGs be adopted in advance of a planning decision being made on the Proposed Development, Keerglen Wind Farm will have the capability of complying with any revised requirements through for example the implementation of mitigation measures such as turbine control systems.

[2] European Commission (2017) available at https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf
[3]Department of Housing Planning and Local Government (2018) available at https://www.housing.gov.ie/planning/guidelines/environmental-impact-assessment-eia/guidelines-planning-authorities-and-bord
[4]Department of Housing Planning and Local Government (2019) https://www.housing.gov.ie/sites/default/files/public-consultation/files/draft_revised_wind_energy_development_guidelines_december_2019.pdf

1.2 Environmental Impact Assessment Screening

Environmental Impact Assessment (EIA) is a process for anticipating the effects on the environment caused by the proposed development. An Environmental Impact Assessment Report (EIAR) is a document produced by the applicant to inform that process, containing a statement of the impact, if any, which the proposed development, if carried out, would have on the environment.

Part X of the Planning and Development Act, 2000, as amended, states that where a planning application is made in respect of a development or class of development referred to in the act under Section 176 that the development shall, in addition to meeting the requirements of the planning regulations be accompanied by an EIAR.

Schedule 5 of the Planning and Development Regulations 2001, as amended, sets out the developments and thresholds that are specified for the purposes of Part 10. In reference to energy industry, developments which comprises '*the installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts'* are specifically stated in Schedule 5, Part 2 (3) (i).

Pursuant to section 172(1)(a)(ii) of the Act, Part 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended, identifies classes and scales of development that require Environmental Impact Assessment (EIA). The relevant class of development in this case relates to *"installations for the harnessing of wind power for energy production (wind farms) with more than 5 turbines or having a total output greater than 5 megawatts"*, as per Item 3(i) of Part 2 of the Schedule. The proposed development exceeds 5 megawatts in scale and proposes more than 5 turbines, and therefore is subject to EIA.

The proposed development consists of up to 8 no. turbines. Accordingly, the proposed development engages the criteria for the requirement of a full environmental impact assessment to be carried out by the competent authority.

In respect of the information contained within this EIAR. It is in accordance with Schedule 6 of the *Planning and Development Regulations 2001*, as amended. It consists of a systematic analysis of the proposed development in relation to the existing environment. It is carried out at a stage in the design process where changes can still be made to avoid adverse impacts. The extensive scoping process of identifying the issues that are likely to be important during EIA is set out in more detail in Chapter 2.

1.3 Environmental Impact Assessment Report Methodology

Environmental Impact Assessment Report Structure

The EIAR has been prepared in compliance with the provisions set out in the revised EIA Directive 2014/52/EU (Revised Directive) which was transposed into Irish legislation in September 2018. The Environmental Protection Agency (EPA) published its *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, May 2022), which is intended to guide practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

The Revised Directive and EPA guidance document describes the minimum information that an EIAR is to contain:

> *a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
> *b) a description of the likely significant effects of the project on the environment;*
> *c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
> *d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
> *e) a non-technical summary of the information referred to in points (a) to (d); and*
> *f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.*

The format of this EIAR is designed to ensure that standard methods are used to ensure that all of the information set out above is captured and clearly described in each section of the EIAR. Each specialist topic is generally assessed and described in terms of:

- Introduction;
- Statement of Competence;
- Site/Development Description;
- Methodology;
- Potential Impacts (associated with the proposed development);
- Upstream-Downstream Impacts; Direct-Indirect Impacts; Permanent-Temporary Impacts; Positive-Negative Effects; Short-Medium-Long Term Impacts, Individual-Cumulative Impacts; Interactions of Impacts;
- Mitigation and Monitoring Measures (for any likely adverse impacts);

- Residual Effects
- Conclusions

Environmental Impact Assessment Report Topics

The following topics are covered:

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Subject	**Chapter**
Alternatives, Scoping and Consultation	2
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Policy and Legislation	4
Biodiversity - Ornithology	5
Biodiversity – Terrestrial and Aquatic Ecology	6
Hydrogeology, Hydrology and Water Quality	7
Soils and Geology	8
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Landscape and Visual Impact	10
Shadow Flicker	11
Noise	12
Archaeology and Cultural Heritage	13
Transport, Traffic & Access	14
Population and Human Health	15
Air Quality	16
Climate	17
Interactions	18

Description of Likely Significant Effects and Impacts

As stated in the *'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports'* (EPA, May 2022), an assessment of the likely impacts of a proposed development is a statutory requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans frontier nature (if applicable) of the impact.

Table 1.2 below, presents a summary of impacts as published in the EPA guidelines. Standard definitions are provided which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with a proposed development on the receiving environment. The use of pre-existing

standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the proposed development on the receiving environment.

Table 1.2 Impact Classification Terminology (EPA, 2022)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An effect capable of measurement but without significant consequences.
	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends.
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound	An effect which obliterates sensitive characteristics.
Extent and Context	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect.
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions.
Probability	Likely	Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely	Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Duration and Frequency	Momentary	Effects lasting from seconds to minutes.
	Brief	Effects lasting less than a day.
	Temporary	Effects lasting less than a year.
	Short-term	Effects lasting one to seven years.
	Medium-term	Effects lasting seven to fifteen years.
	Long-term	Effects lasting fifteen to sixty years.
	Permanent	Effect lasting over sixty years.
	Reversible	Effects that can be undone, for example through remediation or restoration.
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).
Type	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out.
	Worst Case	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents.

Each impact is described in terms of its quality, significance, extent, duration and frequency and type, where possible. A '*Do-Nothing*' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed. The remaining impact types are presented as required or applicable throughout the EIAR. Any potential interactions between the various aspects of the environment assessed throughout this EIAR are presented in Chapter 18: Interactions of the Foregoing.

Environmental Impact Assessment Report Volumes

The EIAR comprises five volumes and is accompanied by a Non-Technical Summary. The five volumes are as follows:

Table 1.3 EIAR Volumes

Volume	Content
Volume 1	EIAR Non-Technical Summary
Volume 2	EIAR Main Text
Volume 3	EIAR Figures
Volume 4	EIAR Appendices
Volume 5	EIAR Landscape Montages

Volume 1 of this EIAR contains a Non-Technical Summary, which gives a brief non-specialist outline of the project. This document is Volume 2 of the EIAR and contains the main text of the EIAR. Volume 3 contains the figures associated with the various Chapters in Volume 2 and Volume 5 contains landscape photomontages associated with Chapter 10. The appendices are contained in Volume 4.

Environmental Impact Assessment Report Team

ABO Energy Ireland Ltd are managing and coordinating the production of the EIAR and have engaged a project team which comprises a multidisciplinary team of experts with extensive experience in the assessment of wind energy developments and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation and scripting of this EIAR are summarised in Table 1.4 below.

Table 1.4 Summary of Professional Team

Consultant	Competence	Contribution	Chapter
ABO Energy Ireland Ltd	Bryan Meredith (MIPI, RTPI) is a Chartered Town Planner who holds a BA and MRUP (Masters in Rural and Urban Planning). He has over 9 years' experience covering the fields of strategic, environmental and urban planning across the UK and Ireland.	Project Management Description of the development Alternatives, scoping and consultation Policy and Legislation Interactions of the foregoing	1, 2, 3, 4 and 18
Biosphere Environmental Services	Dr. Brian Madden (BA Mod. (Hons.), PH.D., MCIEEM) is a consultant ecologist specialising in EIAR and AA, with particular emphasis on ornithological projects. Brian has worked on most groups of birds which	Biodiversity – Ornithology	5

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
	occur in Ireland, with particular expertise in upland species, raptors and gulls.		
O'Donnell Environmental Ltd.	O'Donnell Environmental Ltd. were commissioned by ABO Energy Ltd. to conduct an Ecological Impact Assessment for a proposed wind energy development at Keerglen, Co. Mayo. A team of specialist ecologists, led by Tom O'Donnell, have carried out intensive surveys at the proposed wind energy development site since 2022. O'Donnell Environmental is an independent environmental consultancy established by Tom O'Donnell BSc (Hons) MSc CEnv MCIEEM in 2019. Since then, O'Donnell Environmental has established itself as a provider of quality, Client-focused ecological and environmental services to public and private sector Clients nationwide. O'Donnell Environmental is a Chartered Institute of Ecology and Environmental Management (CIEEM) 'Registered Practice' which demonstrates our commitment to high professional standards and accountability. Tom O'Donnell is a Chartered Environmentalist and a full member of the Chartered Institute of Ecology and Environmental Management. He was awarded a BSc in Environmental and Earth System Science [Applied Ecology] in 2007 and an MSc in Ecological Assessment in 2009, both from UCC. Tom has 16 years professional experience in the environmental industry, including working on projects such as wind farms, overhead power lines, roads, cycleways and residential developments. Tom is licensed by NPWS for roost disturbance (Ref: DER/BAT 2023-16) and to capture bats (C25/2023). Key contributors to the Biodiversity Chapter were Ross Macklin (BSc, PhD candidate, MCIEEM, MIFM, HDip GIS, PDip IPM; Aquatic Ecology), Eamonn Delaney (BSc, MSc, MCIEEM, CEcol; Habitats and Botanical), Cian Ó Ceallaigh (BSc (Hons)	Biodiversity - Terrestrial ecology	6

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
	MSc; Habitats and Botanical), Colm Breslin (BSc (Hons); Mammal Ecology) and Claire McCarthy (BSc (Hons), MSc; Mammal Ecology)..		
Hydro Environmental Services	Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 22 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms and renewable projects in Ireland. He has substantial experience in surface water drainage design and SUDs design and surface water/groundwater interactions. Conor McGettigan (BSc, MSc) is an Environmental Scientist with over 3 years' experience in the environmental sector in Ireland. Conor holds an M.Sc. in Applied Environmental Science (2020) and a B.Sc. in Geology (2016) from University College Dublin. Conor routinely prepares the land, soils, geology, hydrology and hydrogeology sections of environmental impact assessment reports for wind farm development on peatlands.	Hydrogeology, Hydrology and Water Quality	7
Fehily Timoney and Company	Ian Higgins is a geotechnical engineer with over 25 years' experience in the design and supervision of construction of bulk earthworks, geotechnical foundation design, geotechnical monitoring and reviewing, reinforced earth design and 3rd party checking of piling and ground improvement designs. Ian holds a BSc (Hons) Engineering Geology from University of Sunderland, and a MSc in Geotechnical Engineering from the Heriot-Watt University. Ian's experience also includes the design, supervision and interpretation of ground investigations, including desk studies, walkover surveys, hazard mapping of rock excavations and slopes.	Soils and Geology	8
AI Bridges	AI Bridges have been supplying telecommunications solutions to the wind	Aviation, Telecommunications & Electromagnetic Interference	9

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
	farm industry throughout the Republic and Northern Ireland since 2007. They have undertaken aviation, telecommunications and Electromagnetic Interference impact study reports on behalf of wind farm operators on the potential impact on telecommunications networks and transmission networks of proposed wind farm developments. AI Bridges has also developed a 3D software prediction model that can predict the impact of a wind farm development on television transmission and aviation. The EIAR chapter was prepared by the Engineering Department which has an excess of 100 years of experience in aviation, telecommunications\ electromagnetic interference EIAR Studies.		
Macro Works APEM	This Landscape and Visual Assessment (LVIA) report was prepared by Jorden Derecourt (BLA (Hons), MLA (Hons), MILI) and reviewed by Richard Barker (MLA MILI) of Macro Works Ltd, a specialist LVIA company with over 20 years of experience in the appraisal of effects from a variety of energy, infrastructure and commercial developments. Relevant experience includes LVIA work on over 140 onshore wind farm proposals throughout Ireland, including six Strategic Infrastructure Development (SID) wind farms. Macro Works and its senior staff members are full/corporate members of the Irish Landscape Institute.	Landscape and Visual Assessment	10
ABO Energy Ireland Ltd	Maximilian Kilburg holds a Master of Science degree from the Department of Sustainability Sciences. Maximilian has been working in the wind energy industry since 2010 as a technical specialist in the fields of wind and site assessment, starting with (energy yield assessments at a consultant) and since 2014 with ABO Energy. Maximilian has undertaken a large number of site assessments preparing numerous Shadow Flicker chapters.	Shadow Flicker	11

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
Irwin Carr	This Noise assessment chapter has been prepared by Shane Carr (Senior Acoustic Consultant) of Irwin Carr Ltd. He holds a BSc (Hons) in Environmental Health. He has extensive knowledge and experience in environmental and occupational noise surveying and environmental acoustics, including windfarm commissioning and noise nuisance complaints.	Noise Assessment	12
Horizon Archaeology	This chapter of the EIAR has been prepared by Dermot Nelis and Fiona Maguire of Horizon Archaeology. Dermot graduated from Queen's University Belfast, and after gaining extensive fieldwork experience undertook postgraduate studies at the University of Oxford in archaeological consultancy and project management. He has carried out over 180 Licensed excavations, test trenching and monitoring programmes and acted as Senior Archaeologist on several road schemes for various County Councils. In addition, Dermot has prepared over 250 desk-based reports and Environmental Impact Assessments for wind farms, solar farms, grid connection schemes, *etc*. Fiona Maguire is a graduate of the National University of Ireland, Galway and a Licensed archaeological Director. She has worked in many roles in archaeology since the early 2000s, and has directed a number of archaeological excavations. Her field experience includes wetland survey and excavation, the preparation of Environmental Impact Assessment Reports, Archaeological Impact Assessments, research and excavation reports, project management, post-excavation management and field survey. Horizon Archaeology has submitted EIAs for more than 40 wind farms, and in total we have provided consultancy services for 450 turbines. We have monitored the construction of wind farms in Donegal, Mayo, Monaghan, Offaly, Roscommon, Sligo and Tyrone	Archaeology and Cultural Heritage	13

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
Roughan & O'Donovan Consulting Engineers	Roughan and O'Donovan (ROD) is a leading provider of transport planning services, including traffic and transport assessments, traffic modelling analysis and traffic engineering design. This EIAR chapter was prepared by John Ahern (B.A.I.) who is a Chartered Engineer with over 14 years' experience in traffic and transportation design industry.	Transport and Traffic Assessment	14
MacCabe Durney Barnes	The assessments with this chapter were undertaken by Richard Hamilton MIPI MRTPI (BA, MSc, P.Grad.Dip EMAE). Richard is a Chartered Town Planner with over 28 years' experience in public and private sectors, covering a broad range of practice including major development applications and strategic studies. His experience includes EIAR Screening, Scoping and management of EIAR projects for projects ranging from Dublin Airport's Runway, Metrolink, Off Shore Energy, active travel, as well as road and water infrastructure to residential projects. He has also undertaken a number of and SEAs and Integrated Impact Assessments (UK). Richard holds a BA (Geography and History) from University College Dublin, an MSc in Town and Country Planning from Heriot-Watt University Edinburgh, and a Postgraduate Diploma in Environmental Monitoring, Assessment and Engineering from Trinity College Dublin.	Population and Human Health	15
AWN Consulting Ltd.	The Air Quality and Climate chapter was completed Ciara Nolan. Ciara is a Senior Consultant in the Air Quality section of AWN Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a chartered Scientist (CSci), Member of the Institute of Air Quality Management and specialises in the fields of air quality, EIA and air dispersion modelling.	Air Quality	16

Table 1.4 Summary of Professional Team			
Consultant	**Competence**	**Contribution**	**Chapter**
AWN Consulting Ltd.	The Air Quality and Climate chapter was completed Ciara Nolan. Ciara is a Senior Consultant in the Air Quality section of AWN Consulting. She holds a BEng (Hons) in Environmental Engineering from the National University of Ireland Galway, HDip in Statistics from Trinity College Dublin and has completed a PhD in Environmental Engineering (Air Quality) in Trinity College Dublin. She is a chartered Scientist (CSci), Member of the Institute of Air Quality Management and specialises in the fields of air quality, EIA and air dispersion modelling.	Climate	17

Environmental Impact Assessment Report Difficulties & Deficiencies

The EIA regulations state that the EIAR must include, "*any difficulties, such as technical deficiencies or lack of knowledge, encountered in compiling information in this Schedule*". There were no particular difficulties encountered in obtaining or compiling the information contained in the EIAR.

The methods used in the assessments to forecast the likely impacts of the proposed development have been tried, tested and accepted in each of the relevant fields of expertise. The methodologies adopted in each of the assessments are outlined in each of the individual assessments.

A number of statutory and non-statutory organisations were consulted during the EIA process. Details of the responses received are included within Chapter 2 of the EIAR.

1.4 Environmental Impact Assessment Study Area

Main Study Area

The proposed wind energy project, to be known as '*Keerglen Wind Farm'*, is located in the townlands of: Keerglen, Ballinglen and Ballykinlettragh, County Mayo.

The proposed Keerglen Wind Farm site generally comprises of peat land and low value agricultural land. In this regard the site offers the opportunity of a multifunctional land use comprising a Wind Farm and agricultural operations. It is located approximately 8km to the south-east of Ballycastle and 15km north of Crossmolina. The site location is illustrated in more detail in the Drawing Pack submitted as part of the planning application.

Table 1.5 Main Study Area

Component	Townland(s)
Wind Farm	Keerglen, Ballykinlettragh, Ballinglen,
Underground Electricity Export Connection	Annagh More, Annagh Beg, Creevagh Beg, Creevagh More, Kincon, Ardnagor, Ballinagavna, Lecarrowanteean, Ballygowan, Knockaunderry, Cloonmaan, Farragh, Cloonawillin, Lisglennon, Tawnaghmore Upper, Ballinteean and Carrowreagh

For the purposes of the EIA Directive, this EIAR screens the turbine delivery route and works required along the same between Killybegs Port to the proposed wind farm site, underground electricity export connection works intended to connect the proposed development to the national electricity grid via a 110kV underground cable to the existing Tawnaghmore ESB Substation or to a Large Energy User at Killala Business Park, located c.22.8km southeast of the intended on-site 110kV substation, in the townland of Tawnaghmore Upper, Co. Mayo, and temporary meteorological mast of between 100-112m in height. The underground electricity export connection works, the temporary minor off-site works along the turbine delivery route or the temporary meteorological mast do not form part of the planning application, however, they are assessed in this EIAR.

Figure 1.2: Wider EIA Study Area

Cumulative Study Area

Cumulative impacts are those which result from incremental changes caused by other past, present or reasonably foreseeable developments together with the project. For example, the impact of incremental noise from a number of separate developments may individually be insignificant, however, when taken together have a cumulative effect.

Therefore, consideration will be given to the cumulative effects of the proposed development, along with the following identified projects:

Table 1.6 Cumulative Study Area			
Wind Farm Projects	**Number of Turbines**	**Approximate distance & Direction from the Proposed Wind Farm**	**Status**
Glenora WF	22	600m north	Proposed (with ABP)
Oweninny 1	29	6.8km southwest	Operational
Oweninny 3	18	6.9km southwest	Proposed (with APB)
Corvoderry Wind Farm	10	9.3km south/southwest	Permitted
ABO Sheskin	8	9km southwest	Permitted
Tirawley	24	7.5km east	Pre-planning
Bellacorrick	21	12km south	Decommissioning
Oweninny 2	30	11.4km southwest	Operational
Sheskin South	21	11.2km southwest	Proposed (with ABP)
Killala	6	12.8km east	Operational
Dooleg	1	13km south	Permitted
Gortnahurra	18	10.3km southwest	Pre-planning
Kilsallagh	13	17.2km southwest	Pre-planning

1.5 Environmental Impact Assessment Report Documentation

All volumes of the EIAR submitted in support of the planning application are available for viewing at Mayo County Council, Civic Offices, in Castlebar during their public opening hours. An electronic copy of all documentation can be viewed, under the relevant Planning Reference Number (to be assigned on lodgement of the application); via the Mayo County Council planning portal, available at http://www.eplanning.ie/MayoCC/searchtypes.

The EIAR is available to view online via the Department of Planning, Housing and Local Government's EIA Portal. An EIA Portal for this proposed development has been set up by the Department on the same portal to notify members of the public of the proposed development which accompanied by an EIAR. (https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eiaportal)

1.6 Need for the Proposed Development

Chapter 4 of this EIAR discusses in detail the legislative and policy landscape the proposed Keerglen Wind Farm development fits within. This section, however, seeks to broadly set the scene, succinctly outlining why there is a need for new renewable wind energy developments within Ireland.

Legislative and Policy Context

On the 10th December 2015, the Irish Government signed into law, the Climate Action and Low Carbon Development Act. This provided for the establishment of a national framework to facilitate a low carbon, climate resilient, and environmentally sustainable economy by 2050. The Act serves as a primary piece of legislation and was enacted in response to Ireland's legally binding commitments set out in the Paris Agreement.

The Paris Agreement is a universal, legally binding global climate change agreement. 195 countries signed the agreement which set out a global framework to mitigate against dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. It also aims to strengthen countries' ability to deal with the impacts of climate change and to support them in their efforts.

The Intergovernmental Panel on Climate Change (hereafter IPCC), a scientific body that provides clear and up to date views of the current state of scientific knowledge relevant to climate change, have made clear that the window for action on climate change is rapidly closing highlighting that each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.

The IPCC report outlined that continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system and to limit Climate change, substantial and sustained reductions of greenhouse gas emissions will be required. The energy supply sector is the largest contributor to global greenhouse gas emissions. As such, the IPCC have recommended that renewable energy sources (including wind energy) will have to grow from 30% of global electricity to 80% by 2050 in order to meet the commitments contained within the Paris Agreement.

In a European context, the EU Renewable Energy Directive (2009/28/EC) was published in April 2009 and sought the promotion of the use of energy from renewable sources. The Directive set a mandatory national target for the overall share of energy from renewable sources for each Member State. This package was designed to achieve the EU's overall 20:20:20 environmental target, consisting of a 20% reduction in greenhouse gases, a 20% share of renewable energy in the EU's total energy consumption and a 20% increase in energy efficiency by 2020.

In December 2018, a revised EU Renewable Energy Directive 2018/2001/EU (RED II) came into force and shall be transposed by June 2021. This new regulatory framework includes a binding renewable energy target of 32% for the EU by 2030. It further includes a review clause whereby an upward revision of this target will be considered by 2023.

In July 2021 the Climate Action and Low Carbon Development (Amendment) Act 2021 was signed into law. The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050'*. The 2021 Climate Act also *'provide for carbon budgets and a sectoral emissions ceiling to apply to different sectors of the economy'.* The 2021 Climate Act defines the carbon budget as *'the total amount of greenhouse gas emissions that are permitted during the budget period'*. It includes a statutory commitment to achieve a climate neutral economy by no later than 2050.

In July 2022, the EPA[5] reported that the total national greenhouse gas emissions of 2021 were estimated to have increased by 4.7% on 2020 levels to 61.52 million tonnes carbon dioxide equivalent (Mt CO2eq). An increase in the use of coal and oil for electricity generation were reported as major contributory factors for the same. The same EPA report stated that electricity generated from wind decreased by 16% respectively in 2021. Given those findings, it is submitted that the proposed development is critical to helping Ireland address these challenges.

The Climate Action Plan 2023 (CAP 23), launched in December 2022, is the second annual update of the Climate Action Plan 2019 and the first plan to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. The CAP 23 implements the carbon budgets and sectoral emission ceilings and sets a roadmap for taking decisive action to halve Ireland's GHG emissions by 2030. The CAP 2023 sets out how Ireland can accelerate the actions that are required to respond to the climate crisis, putting climate solutions at the centre of Ireland's social and economic development.

Among the most important measures in CAP 23, is to increase the proportion of renewable electricity to 80% by 2030 and a target of 9 GW (or 9,000MW) from onshore wind, 8 GW from solar, and at least 5 GW of offshore wind energy by 2030.

Achieving further emissions reductions between now and 2030 requires the following measures to be adhered to:

- Accelerate and increase the deployment of renewable energy to replace fossil fuels;
- Deliver a flexible system to support renewables and demand;

[5] EPA (July 2022) - Ireland's Provisional Greenhouse Gas Emissions 1990-202. https://www.epa.ie/publications/monitoring--assessment/climate-change/air-emissions/EPA-Ireland's-Provisional-GHG-Emissions-1990-2021_July-2022v3.pdf

- Manage electricity demand.

The CAP acknowledges that *"Ireland accommodates one of the highest global percentages of variable renewable generation on the grid. However, to maximise the output of renewables, the electricity system must increase its flexibility further."*

In December 2023, CAP24 was published (DECC, 2023). This is the second CAP since the publication of the carbon budgets and sectoral emissions ceilings and builds on the progress of CAP23, and it aims to implement the required changes to achieve a 51% reduction in carbon emissions by 2030 and 2050 net zero goal. The CAP has six vital high impact sectors where the biggest savings can be made: renewable energy, energy efficiency of buildings, transport, sustainable farming, sustainable business and change of land-use. CAP24 states that the decarbonisation of Ireland's manufacturing industry is key for Ireland's economy and future competitiveness. There is a target to reduce the embodied carbon in construction materials by 10% for materials produced and used in Ireland by 2025 and by at least 30% for materials produced and used in Ireland by 2030. CAP24 states that these reductions can be brought about by product substitution for construction materials and reduction of clinker content in cement. Cement and other high embodied carbon construction elements can be reduced by the adoption of the methods set out in the Construction Industry Federation 2021 report Modern Methods of Construction. In order to ensure economic growth can continue alongside a reduction in emissions, the IDA Ireland will also seek to attract businesses to invest in decarbonisation technologies.

As outlined in CAP24 the target for renewables on the national grid is 80% by 2030 which includes 9 gigawatts (GW) of onshore wind energy. This is a key target and action within CAP24.

In April 2023 the Government published a draft *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (Government of Ireland, 2023). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan. The strategy will be updated on the basis of a second round of public consultation throughout 2023 with an updated strategy published after this is complete.

The Mayo County Council Climate Action Plan 2024 – 2029 (Mayo County Council 2024) Mayo County Council's goals to mitigate GHG emissions and plans to prepare for and adapt to climate change. The vision of the Mayo Climate Action Plan is:

"*To create a sustainable and competitive county that supports the health and well-being of the people of Mayo, providing an attractive destination, as a place in which to live, work, invest, do business and visit, offering high quality employment and educational opportunities within strong and vibrant sustainable communities, whilst ensuring a transition to a low carbon and climate resilient county that supports high environmental quality*".

The Mayo County Council Climate Action Plan also highlights the risks that climate change poses to the county, these include increases in the number of heatwave events, increases in drought conditions, increased flooding and increased likelihood of extreme windstorms.

In light of the ongoing Russian invasions of Ukraine, the European Union published the REPowerEU Plan[6] in May 2022 with the stated purpose of the plan being to accelerate the EU's transition from the use of fossil fuel to renewable energy sources. In doing so the EU seeks to mitigate the impact of rising energy prices and accelerate a clean energy transition.

As briefly outlined above, Ireland, has numerous significant commitments to meet its International, European and National climate change and greenhouse gas reduction obligations. In this context, new renewable wind energy developments are of the utmost importance to facilitate Ireland's transition toward carbon neutrality. Ireland is a world leader when it comes to incorporating large amounts of wind-generated energy onto the electricity network, widely regarded as the main contributor to facilitating Ireland's climate change and energy supply obligations. Keerglen Wind Farm and other wind energy developments will further contribute towards this national effort and will play a critical role in addressing Ireland's climate change and renewable energy targets and obligations.

1.7 Costs and Benefits of Wind Energy

Overview of Benefits of Wind Energy Development

Wind energy provides an indigenous and secure renewable source of electricity while having the synergistic effect of reducing greenhouse gas emissions through the displacement of reliance on fossil fuel. This aids in addressing the requirements of policies set out in Section 1.6 and which are further elaborated in Chapter 4. The ranges of benefits associated with wind energy development in Ireland are listed below:

- diversifying and securing energy supply;
- promoting energy price stability;
- use of indigenous sustainable resources;
- provision of much needed electrical capacity;
- zero greenhouse gas emissions to the atmosphere during operation;
- contribution towards attainment of international, European and national targets;
- abatement of other pollutants and environmental protection;

[6] https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131

- reduction of energy imports;
- improvement of the balance of payments;
- contribution to sustainable development;
- source of employment and rural regeneration;
- source of funds for local community projects.

Costs of Wind Energy Deployment

Onshore wind energy is the world's cheapest renewable energy technology[7]. However, there are costs associated with wind energy deployment across Ireland. These include renewable energy support costs though the REFIT and RESS schemes which are funded through the Public Service Obligation (PSO) level on electricity bills, and also costs associated with electricity network upgrades and system balancing.

A 2019 study carried out by independent energy experts Baringa[8] weighed up the costs and benefits of wind energy in Ireland. Baringa took into account the costs mentioned in the paragraph above but also the savings that wind energy brings such as wholesale energy cost savings, capacity payment savings, and the avoided penalty costs for non-compliance with EU targets. Since 2000, it is estimated that wind energy has reduced wholesale electricity prices in the Irish electricity market by more than €2 billion through offsetting more expensive electricity sources such as gas or coal and through reduced gas imports. Capacity payment savings and non - compliance savings have amounted to almost €1 billion. The study concluded that the total net cost to consumers of wind energy in Ireland is €63 million, less than €1 per person per year over the 2000-2020 period.

Carbon Displacement

The operation of wind farms displaces the burning of fossil fuels, thereby reducing the amount of CO_2 emissions in the production of electricity. The estimated amount of CO^2 avoided through the use of renewable energy was 6.75 $MtCO^2$ in 2022, more than any previous year, with 4.48 $MtCO^2$ avoided by wind energy.[9] Latest figures from the June Wind Energy report reveal that Ireland's wind farms generated 34% of the country's power in the first half of 2024.[10] This will increase significantly over the next decade with the share of renewable electricity set to increase to 80% by 2030.

[7] https://www.irena.org//media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018_summary.pdf?la=en&hash=6A74B8D3F7931DEF00AB88BD3B339CAE180D11C3
[8] https://www.iwea.com/images/files/baringa-wind-for-a-euro-report-january-2019.pdf
[9] https://www.seai.ie/data-and-insights/seai-statistics/key-statistics/renewables/#:~:text=The%20estimated%20amount%20of%20CO,2%20avoided%20by%20wind%20energy
[10] https://www.renewableinstitute.org/wind-provides-34-of-power-in-ireland/#:~:text=Latest%20figures%20from%20the%20June,GWh%20(gigawatt%2Dhours).

Energy Payback

Electricity generated by a wind turbine does not produce any CO_2 emissions but there are some associated carbon emissions caused by construction, transport, installation and decommissioning of wind turbines.

Numerous studies have been carried out to examine the life cycle costs of carbon emissions from wind farms. A 2017 review of multiple studies on wind turbine lifecycles found that: *"Published studies on typical modern wind turbines (capacities of 0.5 MW to 4.5 MW) show the Energy Payback Time ranges from as little as three-and-a-half months to just over ten months*[11]*."*

Energy Security

Ireland is one of the most energy import (coal, oil and natural gas etc) dependent countries in the EU, with the SEAI reporting[12] that imported fossil fuels accounted for 87% (the EU average is just over 50%) of all energy consumed in Ireland in 2019. This means that Ireland is susceptible to large energy price fluctuations and the possibility of fuel shortages should there be any disruption to its energy supply chain (as a result of an environmental or manmade crises etc).

Such price fluctuations and volatility are likely to be exacerbated in the future as carbon taxes and prices increase in an effort to combat the impacts of climate change. This will have direct and profound implications on the energy costs of Irish households as the cost of carbon credits is included in all traded electricity (i.e. fossil fuels such as coal produce high carbon emissions costs per unit of electricity generated). The use of Ireland's indigenous energy resources, such as wind, are recognised as a vital component of Ireland's strategy to both tackle climate change and ensure a secure supply of energy.

The Sustainable Energy Authority of Ireland (SEAI), published a report in 2022 (Energy in Ireland, 2022 Report), which states that our heavy dependence on imported fossil fuels,

> *'Ireland imports most of its energy. …[…]…Oil and natural gas are by far our largest energy imports, but we also import significant quantities of coal…[…]…When averaged over the full year of 2021, we imported three times as much electricity as we exported'.*

The cost of carbon credits is included in all electricity traded, and the price of electricity generated by coal is particularly vulnerable due to its high carbon emissions per unit of electricity generated.

As discussed above, coal and oil use for electricity increased in 2021 Coal, but the Climate Action Plan 2023 calls for an aggregate reduction in carbon dioxide emissions of at least 80% (compared to 1990 levels) by 2050. Any steps to reduce this dependence on imported fossil fuels will add to financial autonomy and

[11] Centre for Sustainable Energy. Common concerns about wind power. Available at https://www.cse.org.uk/downloads/reports-and-publications/planning/renewables/common_concerns_about_wind_power.pdf
[12] https://www.seai.ie/publications/Energy-in-Ireland-2020.pdf

stability in Ireland. The use of Ireland's indigenous energy resources, such as wind, will contribute to a reduction in energy imports.

The Energy White Paper 2015 notes "There will be a substantial increase in the cost of carbon in the short and medium term, through the EU Emissions Trading Scheme". Any steps to reduce dependence on imported fossil fuels will add to financial autonomy and stability in Ireland. As the White Paper notes:

> *"In the longer term, fossil fuels will be largely replaced by renewable sources".*

Community Benefits and Business Rates

Wind farms invest in local communities through the establishment of community benefit funds. Under the new RESS, wind farms must pay €2/MWh generated from the wind farm into a community benefit fund. For an onshore wind farm of circa 40MW, this payment could be in the region of €180,000 per year[13]. Irish wind farms made contributions of millions of euros to communities to fund local projects, clubs, schools and recreation groups. In addition to the community benefit fund, wind farms also pay millions of euros per year to local councils which fund roads and services across rural Ireland[14].

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This is an indicative figure at this stage and will depend upon the final the generation capacity of Keerglen Wind Farm. The figure can be influenced by a number of factors, including the number of turbines which receive planning permission, the type of turbine used on site and wind conditions in any given year etc