Supporting document for Wind Energy in Ireland Submission for Citizens' Assembly on Biodiversity Loss

Wind energy in Ireland

The twin crises of climate change and biodiversity, both on land and at sea, need to be tackled jointly as they are intrinsically linked: biodiversity loss and ecosystem degradation accelerate climate change, while climate change increases stress on natural systems and biodiversity.

Carbon emissions are driving climate change by changing temperatures and rainfall patterns, raising sea levels and causing acidification of the ocean. The resulting impacts - habitat alteration/loss, increasingly frequent and intense extreme weather events, changes in the availability of food sources, changes in the distribution of species leading to more competition for limited resources, changes in the timing of key life stages etc. - are having a devastating impact on global biodiversity.

Wind energy cuts carbon emissions by reducing the amount of electricity we need to generate from fossil fuels, and therefore contributes towards the efforts to reduce the effects of climate change on biodiversity as well as generating energy from a renewable resource. Wind energy saved 4 million tonnes of CO2 in 2020, more than every other form of renewable energy in Ireland combined. The amount of CO2 emitted for each unit of electricity produced in Ireland is falling by more than 11 per cent annually because of wind.

The SEAI Energy in Ireland 2021 report confirmed that in 2020 wind energy provided 36.1% of Ireland's electricity. This was 86% of all renewable electricity that year. Wind energy avoided 4.5 million tonnes of CO2 in 2020. To put this in context the total amount of CO2 emissions avoided by renewable energy was 6.6 million tonnes, so wind energy avoided more than all other renewables combined and doubled.

Ireland currently has ~300 onshore wind farms totalling a capacity of ~4.3gigawatts (GW), enough capacity to power roughly 2.25 million homes, and one offshore wind farm with a capacity of 25MW. The onshore wind farms in Ireland range in size from one turbine to 38 turbines, and on average feature seven turbines. Ireland is the leader in Europe when it comes to onshore wind with the highest percentage of onshore wind generation as a percentage of our total electricity generation at over 40 per cent.

Along with many other countries in the EU and around the world, Ireland has set ambitious targets for achieving reductions in carbon emissions from across the energy, heat, transport, agriculture and industry sectors. These targets include reaching 80% RES-E (proportion of electricity from renewable energy sources) by 2030. It is critical to develop more onshore and offshore wind farms to achieve this. The Irish Government have set a target of 7GW of installed offshore wind energy and an additional 4GW of onshore wind by 2030.

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The target of an additional 4GW onshore wind is effectively double the current onshore capacity, however because of advances in technology, doubling the capacity does not equate to doubling the number of turbines.

Wind turbine manufacturers are constantly developing larger and more efficient turbine designs. When Arklow Bank wind farm, Ireland's only operational offshore wind farm, was commissioned in 2004, the seven 3.6MW turbines were the highest rated individual turbines in the world. Turbine manufacturer Vestas are currently gearing up for production of their first 15MW turbines whilst Ørsted have designed plans to commission a 27MW offshore prototype turbine. Larger turbines mean fewer individual turbines will be required to produce the same amount of energy, effectively reducing the area required for wind farm placement.

Similarly onshore turbines 15 years ago were of the order of 1-3MW capacity, but now 5-7MW capacity turbines are considered for new developments. These allow much more efficient use of the space available in terms of MW/km², while also reducing the amount of infrastructure development required, for example number of cables/MW capacity, number of wind farm roads, turbine foundations etc.

Onshore Wind Planning Process

It typically takes 7-8 years to develop an onshore wind farm – from initial site identification to entering the operational stage and generating electricity. The pre-planning timelines run to 3 years with a further 1-2 years in the planning system. Post consent (after competent authorities have considered all the information submitted ~ 1 year), a project must seek several more license/agreements i.e., grid connection, CRU License to construct, road opening license, planning condition discharge etc. before it can progress to construction.

The effects of the development of wind energy projects on biodiversity is considered at the earliest stage of the development process, in the site identification and feasibility stage. Considerations such as Natura 2000 sites, presence of Annex I habitats, archaeology, geology, hydrology / hydrogeology, sensitive or protected landscape/viewpoints are all considered when seeking to identify sites. The government agency SEAI has established an online tool called LARES (Local Authority Renewable Energy Strategies) where much of this information is available to developers and to assist the County Councils in identifying appropriate areas to zone for wind energy development.

The first exercise carried out by any developer is to identify the presence and / or proximity to their project site to sites designated for nature conservation such as Natura 2000 sites and National Heritage Areas (NHA). Information on protected and / rare flora and fauna within, or within a defined distance of, the proposed development site will be sought from sources such as National Parks and Wildlife Service (NPWS), National Biodiversity Data Centre and environmental non-governmental organisations such as the Irish Raptor Study Group (IRSG). This information would then be used to develop constraint maps and

to determine the scope of work for the ecological survey work required. At this stage measures will be embedded into the early project design to avoid effects on biodiversity, these measures would typically include buffers / exclusion zones along watercourses or exclusion of certain habitats from the footprint of the development.

The duration of ecological survey work varies dependent on the species and habitats present but is typically spread over 2 or more years. The scope of work is determined on site – by – site and project – by – project basis but at a minimum would include 2 years of bird surveys, bat surveys, habitat surveys and terrestrial mammal surveys. The surveys would be designed using recognised industry standard good practice guidance. The findings of the surveys would be regularly reported and, where appropriate, would be used to inform further refinement of the design of the wind farm project. The refinement of the design in this way to avoid effects on biodiversity is often referred to as embedded mitigation.

Upon completion of the fieldwork the findings will be used to inform the preparation of biodiversity chapter of the Environmental Impact Assessment Report (EIAR). The methods for assessment of the impacts and effects on biodiversity usually follows the approach set out in the guidance published by the Chartered Institute of Ecology and Environmental Management (CIEEM) which is a professional membership body representing and supporting ecologists and environmental managers. The potential impacts and effects of the proposed development on biodiversity will be assessed and where significant effects are identified mitigation will be proposed.

Where significant negative effects cannot be avoided or mitigated, compensation measures will be described and assessed. Biodiversity enhancement measures may also be proposed, over and above any mitigation required, and how these measures will be implemented described. Documentation accompanying the application for planning permission for wind farm developments usually include a Habitat Management Plan (HMP), Biodiversity Management Plan (BMP), or similar document, setting out the proposed mitigation, compensation and enhancement measures along with objectives and methods to achieve them.

The next stage in development is to commence bird surveys and a minimum of two years is required before submission to the planning system. An Environmental Impact Assessment Report (EIAR) is required for any development over 5MW – which qualifies most onshore and offshore wind farm projects. This a is a rigorous test of a project's impacts on the environment if it were to be developed. An EIAR requires the input of multiples of disciplines (ecologists, ornithologists, landscape architects, engineers, hydrologists, archaeologists etc) in order to assess the potential impact of the project design(s) on the receiving environment and a key element of the process of preparing an EIAR is that it's an iterative process with input from all disciplines to arrive at the design to be submitted to planning. The process involves all stakeholders both statutory and local.

The EIA mitigation hierarchy consists of 5 steps that an EIA team can take to successfully mitigate environmental impacts in the project site: Avoid; Minimize; Rectify; Reduce; Offset. The hierarchy begins from the most beneficial method of mitigation and goes on to the least beneficial method of mitigation.

As part of the EIA Directive scoping is proposed while not mandatory it is widely used. The EIA Scoping Report describes the key elements of the proposed development, the baseline conditions and sensitivities of the environment likely to be affected by the proposed development and the studies and assessments proposed. It identifies likely significant effects and provides an outline of the proposed Environmental Impact Assessment Report (EIAR). The report is prepared to facilitate stakeholder engagement, with feedback sought from consultees to further inform the content and scope of the EIAR.

Article 6(3) and 6(4) of the Habitats Directive (92/43/EEC) sets out the requirement for appropriate assessment of any plan or project likely to significantly affect Natura 2000 site(s). The Appropriate Assessment process involves a case-by-case examination of the implications of a development or activity on Natura 2000 site(s). Natura 2000 sites, also sometimes referred to as European sites, is the collective name given to Special Areas of Conservation (SAC) and Special Protection Areas (SPA). SAC are designated under the Habitats Directive while SPA are classified under the Birds Directive (2009/147/EC). Natura 2000 sites form a network of sites designated for nature conservation across the European Union and are sometimes referred to as the Natura 2000 network. The Natura 2000 network is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types that are protected in their own right. It stretches across all 27 EU countries, both on land and at sea.

The wording of Article 6(3) is as follows "*any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. Subject to the provisions of the Directive, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public*".

Article 6(4) of the Habitats Directive states "*If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Where the site concerned hosts a priority natural habitat type and/or a priority species, the only considerations which may be raised are those relating to human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission to other imperative reasons of overriding public interest*".

The AA process is often described in four distinct stages with the requirement to progress from one stage to the next dependent on the outcome of the preceding stage. In Ireland it is usual that the process is complete after the second stage is complete i.e., the completion of the appropriate assessment of the effects of the proposed development on the integrity of the Natura 2000 sites. The first stage of the AA process is known as screening, and this stage establishes whether a plan or project could have significant effects on a Natura 2000 site either on its own, or in combination with other plans or projects. Where

likely significant effects are identified, or where the significance of such effects is uncertain, an appropriate assessment is carried out by the relevant public authority and the outcome of this exercise will be used to inform the decision to grant or refuse permission for the proposed development.

Offshore Wind Farm Planning Process

While Ireland only has 1 operational offshore wind farm, many projects are currently in various stages of development. Most of Ireland's proposed offshore wind farms will use a technology called 'fixed-bottom wind turbines'. Put simply, the turbine is installed on a foundation which is connected to the seabed. There are a variety of well-tried sizes and installation techniques available which are suited to near shore sites of up to 60m water depth. To go beyond this depth would require the use of floating turbines. A floating offshore wind turbine is not fixed to the seabed like a fixed-bottom wind turbine. Instead, the wind turbine is mounted on a floating platform which is then secured to the seabed by mooring cables and anchors. This is a relatively new technology – there are only 3 operational floating wind farms in the world. There are already several proposed floating wind energy projects being developed in Ireland and we are confident that both fixed bottom and floating wind can contribute to the 2030 target of 7GW, with the right policy support from the Government.

Ireland has recently introduced a new planning regime for the Marine environment. This has been a significant undertaking by the Government and has been the culmination of many years of consultation and work. The new Maritime Area Planning Act (2021) replaces the existing marine consenting and licencing process that ORE projects would be required to undertake, streamlining the consenting regime to enable a swifter deployment of offshore renewable development while protecting the marine environment through rigorous environmental assessment.

The Climate Action Plan has set a target of 7GW by 2030 and 30GW by 2050 of offshore wind. This target is to be achieved from a standing start i.e., no current offshore industry, new legislation, new planning authority Marine Area Regulatory Authority (MARA) and the first Offshore auction will be in advance of consent therefore increasing the risk for projects.

Under the new government plans seabed allocation is awarded by virtue of a Marine Area Consent (MAC) which the government awards to developers that are deemed technically and financial capable of developing these large infrastructure projects. The Government sets the criteria for the award that is sought from the developer.

Currently, ORE development in Ireland is undertaken through a developer-led approach, whereby developers identify and define areas of seabed that they propose to undertaken further site investigation work to deem the suitability of the site for potential ORE development. These areas are typically defined from initial feasibility studies that consider a number of key parameters such as wind recourse,

environmental designated sites, shipping lanes, fishing grounds, onshore grid infrastructure, water depth, engineering issues such as ground conditions, examination of wave and wind climates.

Post 2030 it is expected that a plan-led approach will be taken, referred to as 'Enduring Regime', whereby Designated Marine Area Plans (DMAPs) will be defined for particular spatial areas or activities e.g., offshore wind development. This will be informed by various key factors e.g., potential grid connection points, environmental assessments, the location of existing developments and other marine users.

When a site area deemed suitable for further site investigation has been decided upon, multi-year site-specific environmental surveys commence. Typically, two years of bird and marine mammal surveys are undertaken in the marine area, and these are collected either through boat surveys or aerial surveys or both. Some onshore survey effort that may be undertaken along the coastline and onshore areas of a potential project may include bat surveys and onshore intertidal bird surveys at proposed cable landing points. Further site survey data may be required to understand the physical processes at the site e.g., wave buoys may be deployed to measure wave activity, geophysical site surveys may look at coastal erosion, sediment transport, benthic sampling (what is on the habitat on the sea floor), coastal archaeology (e.g. ship wrecks and associated remains), fisheries surveys to better understand the use of the site by the fishing community, water sampling to name a few potential surveys. There is a significant cost to these surveys due to the nature of the marine environment and access to it and the scope of the surveys may differ based on the level of existing information available in the area.

Throughout these early stages of the process, typically initial Stakeholder Consultation commences with some of the key interested parties including the fishing community, local communities and relevant stakeholders commence.

During the planning process considerations of key biodiversity indicators are considered. Seabirds and marine mammals due to their mobile nature and long foraging distances are considers in the EIAR and the Appropriate Assessment as they may belong to Natura 2000 sites that are several kilometres away from the proposed windfarm site. Risks to seabirds such as collisions with turbine blades and displacement (additional energy required by the seabirds if moving around the turbines) is considered in detail. Marine mammals can be sensitive to noise and extensive studies are carried out to understand the impact of drilling or hammering for the foundations would have on these mammals.

Wind farm construction

Construction of developments such as wind farms requires large excavations and use of heavy large machinery that has the potential to cause pollution events such as large releases of sediment, cement, hydrocarbons etc. Therefore, the planning permission for any development will set out conditions that require all mitigation or protective measures as described in the Environmental Impact Assessment Report, Construction Environmental Management Plan (CEMP) to be to be implemented in full. The CEMP

will be issued to the appointed construction contractor who will be expected to adhere to the environmental protection measures set out within this document. The contractor will also be required to prepare task / activity specific method statements that draw upon these protective measures and set out in detail the process for implementation.

The contractor appointed for the construction phase of the development will employ an environmental manager who will assume responsibility for ensuring that construction works are carried out in a manner that complies with the conditions of planning with respect environmental mitigation and protection. Examples of standard protective measures that are typically used on onshore wind developments include silt fencing, attenuation ponds, check dams and buffers around sensitive features such as watercourses. Marine mammals are protected during offshore wind development using measures, if suitable, such as acoustic deterrents and low-noise foundations that can mitigate the effects of pile driving noise.

Monitoring of the efficacy of the environmental mitigation measures will be required throughout the construction phase to ensure that they are functioning as they should. In addition, dependent on the location and sensitivity of receptors, monitoring of water quality, peat stability, habitat recovery and birds will also be carried out during construction. The requirement for monitoring is also usually set out in the EIAR and CEMP and forms part of the planning conditions.

In addition to measures to protect the environment as described above, the contractor and developer will also be required to enhance and / or restore habitats within the proposed development site. These measures can vary from very simple stripping and careful storage of soil and turves that are then used to restore habitat disturbed during construction to more complex measures required creation of new habitat or restoration of degraded habitats such as blanket bog and wet heath. The developer and contractor will be required to prevent the introduction and / or spread on non-native invasive species to the development site and to use seed sources that are local to the area or at least native to Ireland to re-seed and create new habitats. Many of the biodiversity enhancement measures will take time to show results and often require specific management prescriptions and monitoring during the operational life of the wind farm.

Operational monitoring and habitat management

Building on the baseline biological and environmental assessments that are carried out as part of the planning and Environmental Impact Assessment (EIA) process, a monitoring and habitat management plan will be prepared and implemented to last throughout the lifetime of a project. This will be informed to a large extent by baseline characterisation work carried out during the planning and construction phases.

Specific sensitivities that may have been previously identified or project elements where mitigations may have been designed-in to reduce potential impacts will inform this monitoring plan. Where unexpected or higher than anticipated impacts to a species or habitat are identified, project mitigations may have to

be introduced or adapted accordingly to achieve the necessary impact reductions. Alternative actions may also be required such as habitat enhancement or restoration, but this will depend very much on the receptor, the impact, and the extent of that impact.

The types of monitoring required will likely be project, location, species, habitat and even seasonally specific. Particular sensitivities such as bird collision risk, and the associated mitigations, will likely be considered for every project, both onshore and offshore. Surveys will have to be adapted to project specific considerations such as local bird populations, species, and activities and how the project design may impact these. These lifetime surveys will serve to identify unexpected or unanticipated impacts, or impacts due to behavioural changes, allowing mitigations to be introduced.

Habitat management plans may also include for enhancement or restoration of habitats, particularly in the onshore environment where wind farms may be situated on cutaway (industrially extracted) or cutover (some limited areas of habitat remain) bogs. This may be different in an offshore context, given licencing restrictions and differences in considerations around “brown field” sites.

Some common examples of operational monitoring and subsequent mitigations might be around bird collision monitoring. Baseline assessments would have been carried out for planning stages, informing the project and operational design. This would have involved species and population assessments, how the site is used by these species, and assessments of flight heights, to name but a few considerations. Ongoing operational monitoring may identify unanticipated impacts to species/populations, or changes in population structures/activities. Once these are identified, appropriate mitigations would be put in place to reduce impacts. These may include, for example, adjusting curtailment requirements to reduce turbine rotation during periods of sensitive bird activities such as migration or foraging. This is often referred to as adaptive management and is a very useful way of ensuring that the mitigation proposed is fit for purpose and avoiding / minimising effects on biodiversity.

New technologies will also be incorporated to help increase the ability to monitor and model impacts and to adjust operations more appropriately and dynamically to mitigate these. Live monitoring technology, for instance, is being developed that may be incorporated with reactive turbine curtailment to but reduce environmental impacts and increase turbine efficiency through curtailment reduction.

Consultation with stakeholders

Stakeholder engagement and consultation are key to us as an industry and on an individual project basis. Nowhere is this more evident than when considering biodiversity and environmental concerns, where inputs from prescribed bodies, NGOs and the public are essential to inform our understanding of the environment and specific sensitivities in the area of our projects.

Engagement with relevant stakeholders such as NPWS, An Bord Pleanála (ABP) and environmental NGOs (eNGOs) generally starts at an initial project phase and this will help to focus project teams on specific sensitivities and considerations, helping to narrow down site selection and boundary work. This environmental consultation will be carried on throughout the project planning, construction, and operations phases to ensure potential impacts are identified and are kept to a minimum. Public consultation will also be undertaken during the planning stage, we welcome the detailed local knowledge that individuals may share with us and listen to the concerns that people have. The feedback we receive, whether that be through ad hoc engagement or through formal consultation activities, can help shape our proposals.

Specific consultation milestones would typically be at EIA Scoping, EIA/AA preparation and submission, Construction Environmental Management Plan preparation, Habitat Management Plan preparation and at decommissioning.

Benefits to community and areas outside of wind farm

There are many benefits to the communities in the surrounding areas of wind farm development, including employment, amenity use and a general influx of economic activity. Community benefit funding also results in significant investment from wind farms to communities across rural Ireland. In 2020, Irish wind farms invested over €4 million in rural communities and this figure is expected to rise in years to come as more wind projects connect to the Irish grid. With the introduction of the Government's Renewable Electricity Support Scheme (RESS), projects seeking such support will be required to contribute €2 for every megawatt-hour (MWh) of electricity produced, which will typically result in over €15,000 per turbine going directly towards local community projects every year. These funds can be used across a range of initiatives spanning for sustainability, education and training, and energy-efficiency improvements.

Pollinator measures introduced at wind farms can also result in significant ecological benefits for surrounding communities. Many Irish developers have already pledged their commitment to the All-Ireland Pollinator Plan, by introducing measures such as providing natural nesting habitats, mowing grass under a pollinator-friendly regime, supporting beekeepers through the Community Fund and creating hedgerows for pollinators.

Benefits of wind farms to biodiversity

Traditionally wind farms have been developed on upland marginal farmland, peatland and at afforested sites. While viewed as poorly productive from an agricultural perspective, these habitats are often the most biodiverse.

Understanding the baseline biodiversity of a site is a critical first step in determining how best a wind energy development can benefit biodiversity at a local level. This can be informed through a suite of environmental and ecological survey work which can in turn be used to help inform constraint led design and site management.

In farmland areas, changes to farm practices, supported by the wind farm development, can have a positive impact on farmland habitats and species.

In peatland areas, projects can include measures to rewet and restore active peat forming systems which can greatly increase biodiversity and improve carbon sequestration.

At afforested sites, opening of conifer plantation can increase local floral and faunal diversity and increased woodland edge habitat can benefit foraging and commuting faunal species.

Following the recognised design principles and best practice guidance such as the All-Ireland Pollinator Plan's guidance on Pollinator-Friendly Management of Wind Farms, which was created in collaboration with WEI, can benefit invertebrates and those species that rely upon them for food and reproduction.

Offshore ORE infrastructure can act as artificial reefs and fish aggregating devices (FADs) which increase habitat complexity and positively influence biodiversity by providing refugia, nursery grounds, and enhanced larval settlement. The high degree to which ORE devices will act as FADs and artificial reefs has been documented[1]. Additionally, recent surveys on the Hywind Scotland spar FOW turbines recorded 121 epifaunal and mobile species. Evidence suggests that similar oil and gas (O&G) platforms are among the most productive marine fish habitats, comparable with designed reef habitats, benefiting pelagic and demersal fish species, and hosting diverse invertebrate communities. O&G platforms also attract a diverse range of large migratory species, including fish, sharks, reptile, marine mammals, and turtles, although, the nature of their interaction with structures remains poorly understood.

Offshore wind farms are likely to create oceanographic change, or a wake effect, via two main mechanisms: 1) Current flows flowing around infrastructure will create a wake effect, and 2) wind flow over and around an array of turbines will create a wind shear that can generate vertical rotation in the water column, i.e., upwelling and downwelling. These wakes increase turbulence and vertical mixing which can enhance primary productivity, with positive bottom-up effects for mid and high trophic level

[1] The potential compatibility of offshore wind power and fisheries: An example using bluefin tuna in the Adriatic Sea

taxa. The increased turbulence also creates valuable foraging and resting opportunities for larger mobile species.

Wind farms have great potential to benefit biodiversity and enhance the living landscape within which they are situated. WEI and many wind energy developers and asset managers are currently involved as partners in the Nature+Energy Project which aims to find ways to maximise biodiversity on onshore wind farms, and we look forward to the results of this important research.