RENEWABLE ENERGY

The climate crisis, threatening people, biodiversity, and the very foundations society depends upon, is to a great extent the result of activities and systems that depend on burning fossil fuel (coal, oil, gas)[1]. Developed countries, including the EU, with their wealth, historical responsibility and limited dependence on fossil fuel production should be the first to embrace the necessary energy transition away from a fossil-dependent economy. This transition is essential if we are to have any chance of meeting our climate goals and ensuring a stable and liveable planet for current and future generations[2]. Globally, the EU is one of the leaders on renewable energy, which made up 19.7% of the energy consumed in 2019[3]. Unfortunately, despite progress, much more must be done to reach the announced target of 32% renewables by 2030[4].

Although renewables are undoubtedly the way forward, it is vital that the energy transition is managed in a way that considers other environmental risks, including its relation to biodiversity. Renewable energy can negatively affect biodiversity through habitat disturbance, fragmentation, and degradation, noise pollution, and other indirect impacts such as those from material extraction[5,6,7].

Indeed, these energy sources are significantly more material intensive than fossil fuel energy, requiring substantial amounts of metals, including aluminium, cobalt, lithium, nickel and rare earth metals. Current mining practices for metals severely damage the local environment. For example, copper and lithium mining in Chile has depleted local groundwater resources across the Atacama Desert, and extraction of rare earth elements (REE), including neodymium and dysprosium for wind turbines, pollute water with ammonium sulphate and ammonium chloride in China. Not to mention the lack of adequate social and health safeguards for miners in many of the developing countries where these metals are extracted. Since the EU uses between 70% and 97% of the global environmentally 'safe operating space' related to resource extraction impacts and accounts for 25% of the global primary demands of minerals[8,9], it is key that its renewable energy projects undergo rigorous environmental and social risk assessments, from sourcing to decommission.

The transition towards renewable energy must be done holistically, in a way that balances our needs for climate action with our needs for biodiversity and ecosystems that thrive. Degradation of ecosystems on the one hand will not only contribute to the climate crisis (e.g., loss of blue carbon, forests)[10,11], but also reduce the resilience of society against impacts and disasters related to the climate crisis[12].

EU policies and strategies

Within the plethora of policies, regulations and legislation surrounding renewable energies in Europe, this policy brief focuses on two particular strategies. Firstly, the brief investigates how renewable energy is integrated in the EU Biodiversity Strategy to 2030[13], the main reference of this policy booklet and a future key pillar of environmental governance in the European Union. Secondly, the brief will explore offshore wind as a case study by presenting and analysing the recently released EU strategy on offshore renewable energy.

In the EU Biodiversity Strategy, the issue of renewable energies impacts on biodiversity is considered only marginally. The European Commission states in chapter 2.2.5. how it will: "*prioritise solutions such as ocean energy, offshore wind, which also allows for fish stock regeneration, solar-panel farms that provide biodiversity-friendly soil cover, and sustainable bioenergy".* Yet, the rest of the text focuses on the use of forest biomass for energy production and points to the Renewable Energy Directive and to the Regulation on land use, land use change and forestry (LULUCF). There is little to no mention on the potential impacts that other energy sources and technologies could have on biodiversity.

In the EU strategy on offshore renewable energy[14] biodiversity is mentioned several times throughout the document, underscoring good policy coherence by the EU Commission.

Already in the introduction, the Commission states how, in order to achieve the EU's climate target of 2030, the offshore wind industry will need to cover 3% of the European maritime space, highlighting that this will be compatible with the goals of the EU Biodiversity Strategy of protecting 30% of Europe's seas. The strategy then goes on calling for a long-term framework for business and investors that promotes coexistence between offshore installations and the protection of the environment and biodiversity.

A crucial paragraph in the strategy reaffirms how the development of offshore renewable energy must comply with the EU environmental acquis and the integrated maritime policy. It continues stating that the designation process of sea spaces for offshore energy exploitation should be compatible with biodiversity protection, as well as consider socio-economic consequences for sectors relying on good health of marine ecosystems.

The document continues specifying how, in the national maritime spatial plans, Member States should carry out an Environmental Impact Assessment as envisioned by the Birds and Habitats Directive to protect the Natura 2000 sites, the network of nature protection areas in the territory of the European Union. In line with this, the Commission also published on the same day an extensive guidance document[15] on wind energy development and EU nature legislation. Furthermore, the EC committed to *develop with Member States and regional organisations a common approach and pilot projects on MSP at sea-basin level looking at risks at sea, the compatibility with nature protection and restoration (2021-2025)*.

Lastly, the strategy recognises the need to invest in research and innovation to enhance the circularity of this technology, critical raw material substitution, and the environmental impacts of offshore technologies.

Case study: Offshore wind energy

While planning a new offshore wind energy structure, its impacts on biodiversity need to be considered at all phases: from site characterisation to decommission. This chapter will outline the main risks for biodiversity including the risk of collision mortality, displacement due to disturbance, barrier effects, habitat loss, and other indirect ecosystem-level effects[16].

The lifecycle of an offshore turbine can be divided into four phases: site characterisation, construction, operation and decommissioning. To have little to no negative impacts on biodiversity throughout these stages, governments and companies should take into consideration implementing the mitigation hierarchy proposed by The Biodiversity Consultancy (TBC). This framework includes four steps: *avoidance, minimization, restoration and offsetting*. While *avoidance* aims to entirely avoid adverse impacts on ecosystems, *minimization* reduces those that cannot be avoided. These are considered preventive measures. Subsequently, TBC categorised the remediating measures: *restoration* and *offsetting*. Restoration means restoring ecosystems as much as possible after adverse impacts. Offsetting compensates for the impacts not covered by the previous measures[17]. When considering this framework, it is crucial to emphasise that avoidance is the most important step, and that offsetting should be considered only to mitigate any remaining impacts on ecosystems.

During the lifecycle of offshore wind structures, underwater noise may have a significant impact on marine life. Little is known about its impacts on many species, such as turtles and, to a smaller extent, fish. The latter group can suffer temporary displacement and, in some cases, death[18]. A possible solution to mitigate this issue is to have a vessel with marine mammal observers (MMO) informing the operators on when these species are in close proximity so that activities can be temporarily halted.

The site-characterisation phase requires an iterative process of *avoidance* and *minimization*. Optimising *avoidance* and *minimisation* early on reduces the need for expensive restoration and offsetting. For example, areas to be avoided in the project design are: Marine Protected Areas, migratory corridors, habitats of threatened species, and nursing habitat. *Avoidance* of activity during sensitive periods of species' life cycles is also pivotal[19]. Furthermore, there is a risk of collision between vessels and marine mammals (especially whales and turtles), often fatal. Appropriate speed regulations are expected to reduce the risk of collision with whales by 30% (*minimization*)[20].

The operation of an offshore wind turbine also has several impacts. One is collision of birds and bats with the turbine blades, especially combined with light and particle pollution, which impedes their ability to recognize the danger of the turbine blades. A key factor to estimating this risk is knowing their flying altitudes. Additionally, although empirical evidence for this is lacking, bats might experience barotrauma, an injury caused by a sudden change in the air pressure, near the turbine blades[21].

Wind farms cause barrier effects and electromagnetic fields (EMF). Barrier effects arise when animals' regular movements through the farm area, such as migration routes, are changed due to the farm. The power cables give rise to an EMF that can potentially disturb species such as eel, salmon, sharks and lampreys, dependent on natural EMF for navigation and sensory reception. More research into specific and quantitative impacts of these effects is needed[22].

An offshore wind turbine requires substantial infrastructure. In the so-called developed countries, which constitute a majority of Europe, the turbines can be connected to an existing local power grid, which carries little risk of electrocution of birds and species of bats perching on pylons (*avoidance)*[23]. Disturbance of natural ecosystems, by for example introduction and proliferation of invasive alien species (IAS), is another risk. IAS from tools and the hulls of vessels can make habitats in the foundations of turbines[24]. The construction of the turbines' foundations can also lead to permanent loss, or degradation, of benthic habitats, in an often relatively small area[25].

Despite negative impacts, wind farms might also constitute a habitat and provide refuge for marine life at least as effectively as Marine Protected Areas by excluding fisheries (*restoration*/*offsetting*)[26]. They can also act as artificial reefs, increasing species abundance. The hard foundations of bottom-fixed turbines attract benthic organisms and fish, followed by animals of a higher trophic level and thus provide the basis for an ecosystem. This can constitute another *effective area-based conservation measure* (OECM)[27], as defined by the CBD and IUCN in 2018. Some of the structures may be left when dismantling a turbine, possibly contributing to a continued refuge effect due to safety restriction in fishing near these structures (*restoration/offsetting)*[28].

GYBN Europe Priorities

The fossil fuel era must end, and society needs to radically shift to renewable energy sources. To accelerate this process, while ensuring a just and fair transition, GYBN Europe joins the call by WWF to increase the EU's target for renewables from 32% to 50% by 2030[29]. However, this shift must place biodiversity at its core and not place additional stressors to habitats and species.

Investing in circularity

For renewable energy sources to be truly circular, recycling of their constituent metals needs to be increased. GYBN Europe calls on businesses and policy makers to invest in the creation of infrastructure for efficient recycling of metals, especially for those with a comparatively low recycling rate such as lithium, platinum and tin. This should be a key priority for the EU in securing sustainable, renewable energy generation.

Building on an inclusive process

A transparent, inclusive and cross-sectoral stakeholder consultation must be ensured before establishing new offshore wind energy infrastructure. Indigenous Peoples and local communities must be consulted throughout the entire process. Furthermore, the latest scientific evidence, including traditional knowledge, should underpin rigorous environmental impact assessments (EIA) and strategic environmental assessments (SEA). In conclusion, we strongly encourage all policy-makers to implement an ecosystem-based approach for all renewable energy projects.

Striving for policy coherence

The lack of considerations of the impacts of renewable energy structures in the EU Biodiversity Strategy and the fact that the word “energy” is not mentioned once in the first draft of the post-2020 Global Biodiversity Framework of the UN Convention on Biological Diversity underscores a severe gap in these strategies. At the global level, we suggest to Parties to include a specific mention on the issue under the indicators of Target 14[30]. At the EU level, we call on the European Commission, especially on DG ENV and DG ENER to boost their cooperation in the implementation of the strategies mentioned in this paper.

Facilitating public-private partnerships

GYBN Europe calls on policy makers at national and European levels to develop an investment framework that facilitates businesses in integrating biodiversity in their operations on offshore wind renewable energy. This framework should be developed in conjunction with leading environmental organisations in the field such as UNEP-FI, IUCN, WWF, Birdlife International, The Biodiversity Consultancy and many others. Public-private partnerships could also be useful in developing innovative technological solutions to certain environmental impacts. An example of this are noise mitigation measures like air bubble curtains and ‘Hydro Sound Dampers[31].

Monitoring biodiversity

Research gaps remain regarding offshore wind impacts on biodiversity, such as in the case of the effects of EMF and underwater noise. GYBN Europe advocates for close in situ monitoring of species before, during, and after offshore wind development. We further recommend that these monitoring efforts are standardized across projects throughout the EU[32]. This will allow for direct comparison between projects, providing further insight into how best to manage offshore wind projects.