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GLOBAL OFFSHORE WIND ALLIANCE

Integrating Responsible Offshore Wind into Nationally Determined Contributions:

A GUIDANCE TOOL

OCEAN & CLIMATE PLATFORM

CITATION

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1 Introduction

The world is at a critical juncture in its battle against climate change. To avoid the worst impacts, efforts to reduce greenhouse gas (GHG) emissions need to accelerate, applying innovative and scalable solutions across multiple sectors. Countries' commitments under the Paris Agreement, known as nationally determined contributions (NDCs), play a key role in driving those efforts and raising climate ambition around the world.

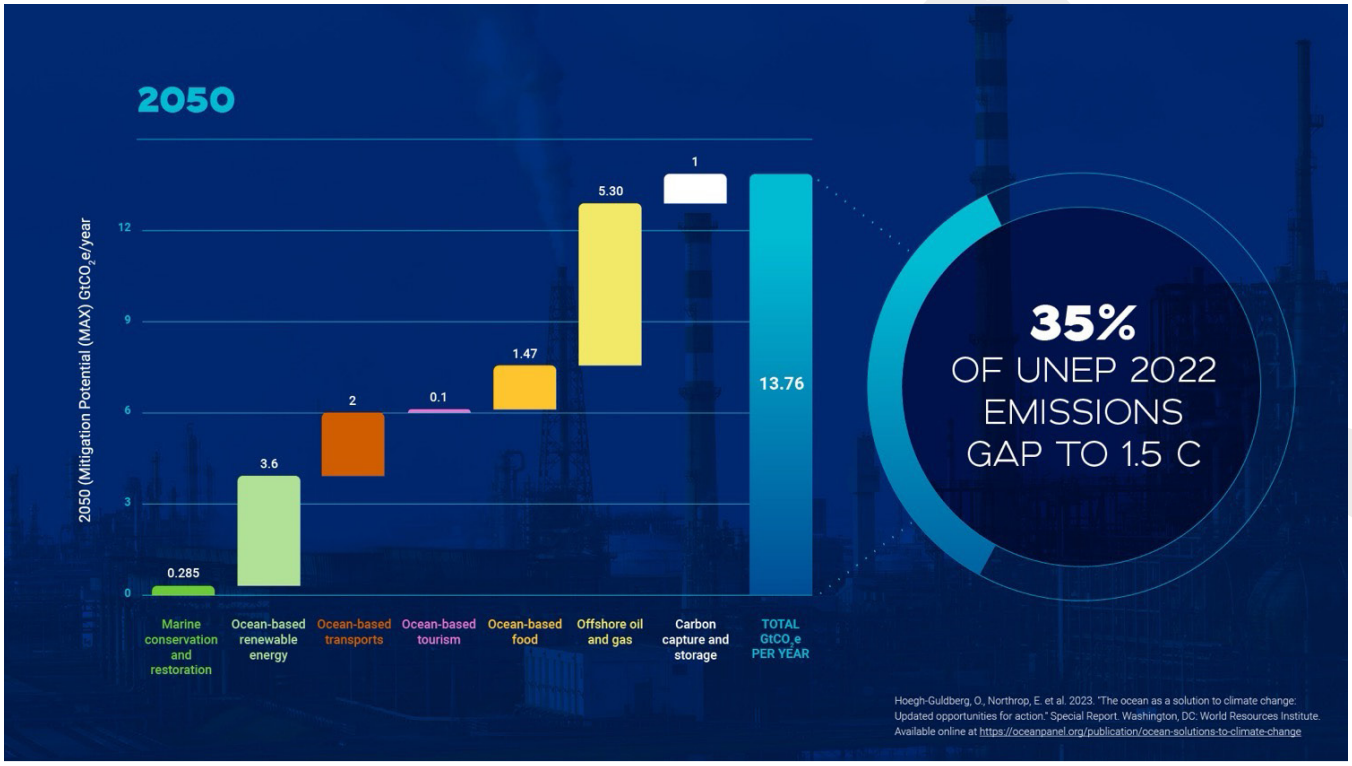
Decarbonizing the energy sector is a top priority, and for coastal nations, offshore renewable energy sources, particularly wind, hold great promise . When developed responsibly—that is, in a way that protects marine ecosystems, shares benefits with local communities, and ensures projects are economically viable—offshore wind can yield both climate and development benefits. Along with reducing GHG emissions, it can create jobs, stimulate local economies, improve energy security, and attract investment, while protecting biodiversity.

This is why, as part of the Ocean Breakthroughs, an initiative of the Marrakesh Partnership to catalyze climate action in ocean sectors, an Ocean Renewable Energy Breakthrough adopted the target to install at least 380 GW of offshore wind capacity by 2030.[1] The Breakthrough also advocates to mobilize US$10 billion in concessional finance to help developing countries deploy offshore wind, and to establish targets and enable measures for net-positive biodiversity outcomes.

The offshore wind target fits well within broader commitments to transform energy systems, such as the Global Renewables and Energy Efficiency Pledge signed by leaders of more than 130 countries, which aims to triple renewable energy capacity by 2030, to at least 11 TW.[2] As countries update their NDCs, including responsible offshore wind in their renewable energy targets can help them set bolder climate ambitions—and achieve or surpass them.

This document is designed to provide succinct, user-friendly guidance for decision-makers to help them set specific wind targets for biodiversity-positive offshore wind projects; integrate them in their mitigation pledges in their NDCs; develop supportive policies; and secure financial resources. Providing practical tools and insights, can help ensure that offshore wind commitments are ambitious, measurable, and environmentally-friendly; benefit local and national development; and are aligned with global climate goals.

The rest of this section provides an overview of the benefits of responsibly developed ocean renewable energy. Section 2 briefly reviews the NDC process and examines how these technologies fit into countries' broader climate change mitigation commitments. Section 3 lays out specific guidance for including offshore wind in future NDC updates. Section 4 focuses on monitoring, evaluation, and reporting.



1.1 OCEAN RENEWABLE ENERGY AS A MITIGATION SOLUTION

The High-Level Panel for a Sustainable Ocean Economy estimates that ocean-based climate mitigation measures could reduce GHG emissions by 1.1–4.5 Gt CO_2e per year by 2030 and 4.4–13.8 Gt CO_2e per year by 2050, enough to reduce the emissions gap to a 1.5°C pathway by as much as 35%.[3] Ocean renewable energy, particularly offshore wind, which is ready to be deployed at scale, could cut emissions by up to 3.6 Gt CO_2e by 2050.

One of the most significant advantages of responsible offshore wind energy is its ability to provide low-carbon electricity on a large scale. The International Energy Agency (IEA) has estimated the technical potential for offshore wind in shallow waters, within 60 km from shore, at 36,000 terawatt-hours (TWh) per year, well above current electricity demand worldwide.[4] Floating installations in deeper waters, the IEA found, could generate 11 times the projected global electricity demand in 2040. The World Bank, meanwhile, has found that 115 countries have technically extractable offshore wind potential, totaling 71,000 GW worldwide, including 20,000 GW near shore.[5]

All this potential makes responsible offshore wind a critical component in the global effort to decarbonize the energy sector. Both the IEA and the International Renewable Energy Agency (IRENA) have included offshore wind as a critical part of the renewable energy mix required to reach net zero GHG emissions by 2050.[6] By replacing fossil fuels in power generation, responsible offshore wind can help decarbonize the sector while providing an ample supply of clean electricity, thus supporting both climate and development goals.

1.2 PROTECTING MARINE ECOSYSTEMS

Climate change poses severe threats to marine ecosystems and biodiversity, but it is essential that mitigation measures—including offshore wind projects—be deployed responsibly, with respect for marine life.

A harm mitigation hierarchy can guide offshore wind development to minimize environmental impacts. This hierarchy begins with avoiding impacts on priority habitats and species, followed by minimizing any unavoidable effects, and then applying compensatory measures, such as habitat restoration, where harm could not be avoided.

Governments and regulators play a key role in creating enabling conditions for responsible offshore wind. Marine spatial planning, for example, helps identify ecologically sensitive areas to avoid during project siting. Effective permitting and leasing processes incorporating biodiversity safeguards can improve both environmental and economic outcomes. Incentives for adopting low-impact technologies, such as quieter foundations and electric-powered equipment, can further protect marine life.

By establishing clear standards for data sharing, adaptive management, and mitigation measures, governments foster transparency and accountability, paving the way for offshore wind projects that align with both climate and biodiversity objectives and making offshore wind a viable part of national climate strategies.

Additionally, building resilient supply chains that integrate best practices, including circularity in materials, is critical for scaling offshore wind energy responsibly. Such practices ensure the sector minimizes its environmental footprint while supporting rapid deployment. A holistic approach that ties emissions reduction to biodiversity conservation is essential for sustainable development, creating systems that protect marine ecosystems and advance clean energy goals in tandem.

1.3 ECONOMIC AND SOCIAL BENEFITS

Along with protecting marine life, responsible offshore wind development will aim to maximize social and economic benefits, with particular attention to local communities. These projects can create large numbers of jobs across multipe sectors, for instance, including manufacturing, construction, operations, and maintenance.

IRENA estimates that a 500 MW offshore wind farm requires over 2.1 million person-days of work.[7] In addition, a responsibly developed project will stimulate local economies by requiring services from local supply chains and businesses, which in turn creates a ripple effect of economic benefits. Careful planning is crucial, however, to minimize potential adverse impacts, such as the temporary or permanent displacement of fisheries or other blue economy activities. Through diligent marine spatial planning, these potential conflicts can be mitigated, ensuring that wind farms coexist with other critical industries.

Community benefit agreements (CBAs) can enhance benefits to local communities even more, and thus help ensure that offshore wind projects are socially responsible and inclusive. These agreements can include provisions for local hiring, investments in community infrastructure, and funding for local education and training programs. CBAs thus contribute to a more equitable distribution of the benefits of offshore wind projects, and help build community support and enhance social cohesion.

From a national perspective, responsible offshore wind can improve energy security by diversifying the energy mix and reducing dependence on imported fossil fuels. Responsible offshore wind farms also provide a stable and predictable source of energy, which can help stabilize electricity prices and reduce exposure to volatile fossil fuel markets. This stability is particularly valuable in the context of global energy uncertainties and price fluctuations. To achieve these benefits, it is crucial to ensure the projects' financial sustainability through innovative funding and policy support.

Another potentially significant benefit when offshore wind displaces fossil fuels is a reduction in air pollution, a major cause of illness and death around the world. Air pollution from fossil fuel combustion has been estimated to have killed 8.7 million people in 2018—the equivalent of 1 in 5 deaths worldwide that year.[8] Cleaner air not only avoids premature deaths, but also lowers healthcare costs and increases workforce productivity.

2 How does ocean renewable energy fit into NDCs?

The NDCs submitted by Parties to the United Nations Framework Convention on Climate Change (UNFCCC) formally communicate the steps that each country plans to take to reduce its GHG emissions and build resilience to climate change impacts. NDCs typically include specific emission reduction targets as well as the measures and policies through which they will be achieved. Developing countries may also note their need for climate finance, technology transfer, and/or capacity-building to support their plans.

The Paris Agreement includes a "ratcheting mechanism" to keep driving up climate ambition. Countries submitted their first NDCs in the lead-up to, or shortly after, the approval of the agreement in 2015. Then, every five years, they were expected to submit updated NDCs with progressively bolder commitments. Countries were also invited to create long-term low-emission development strategies (LT-LEDS) to guide their escalating ambitions.

The first NDC updates were due at COP26 in 2020, but the conference was postponed by a year due to the COVID-19 pandemic. As of July 2024, 179 Parties, representing 178 countries and 94.1% of global GHG emissions, had submitted a new or updated NDC;[9] 109 of them (accounting for 80.9% of global emissions) raised mitigation ambitions.

TYPES OF NDC Commitments

NDCs can vary significantly in scope and focus. They generally fall into two main categories:

- **Sectoral NDCs:** These NDCs focus only on emission reduction targets in selected sectors, such as energy, transportation, agriculture, or industrial processes, in which governments believe they can make the most significant impact, or in which they have specific policies and measures in place.
- **Economy-wide NDCs:** These NDCs take a comprehensive approach to reducing emissions all across the economy, ensuring that no sector is left out. Economy-wide NDCs are typically more ambitious and reflect a country's commitment to integrate climate action into all aspects of its economic activities.

Developing countries typically also make a key distinction in their commitments, reflecting their need for international climate finance and other forms of support:

- **Unconditional targets** are commitments that a country pledges to achieve using its own resources, regardless of external support.
- **Conditional targets** are contingent on receiving international support, such as climate finance, technology transfer, and capacity-building. Conditional targets often represent a significantly higher level of ambition that what a country can achieve on its own.

Why existing NDC commitments are not enough

In 2023, the first global stocktake (GST) under the Paris Agreement assessed progress to date, evaluating emission reduction efforts and identifying opportunities to do more; analyzing the progress made in enhancing climate resilience; and reviewing the support provided to developing countries and the overall alignment of global financial flows with the objectives of the Paris Agreement. The GST found, among other things, that:

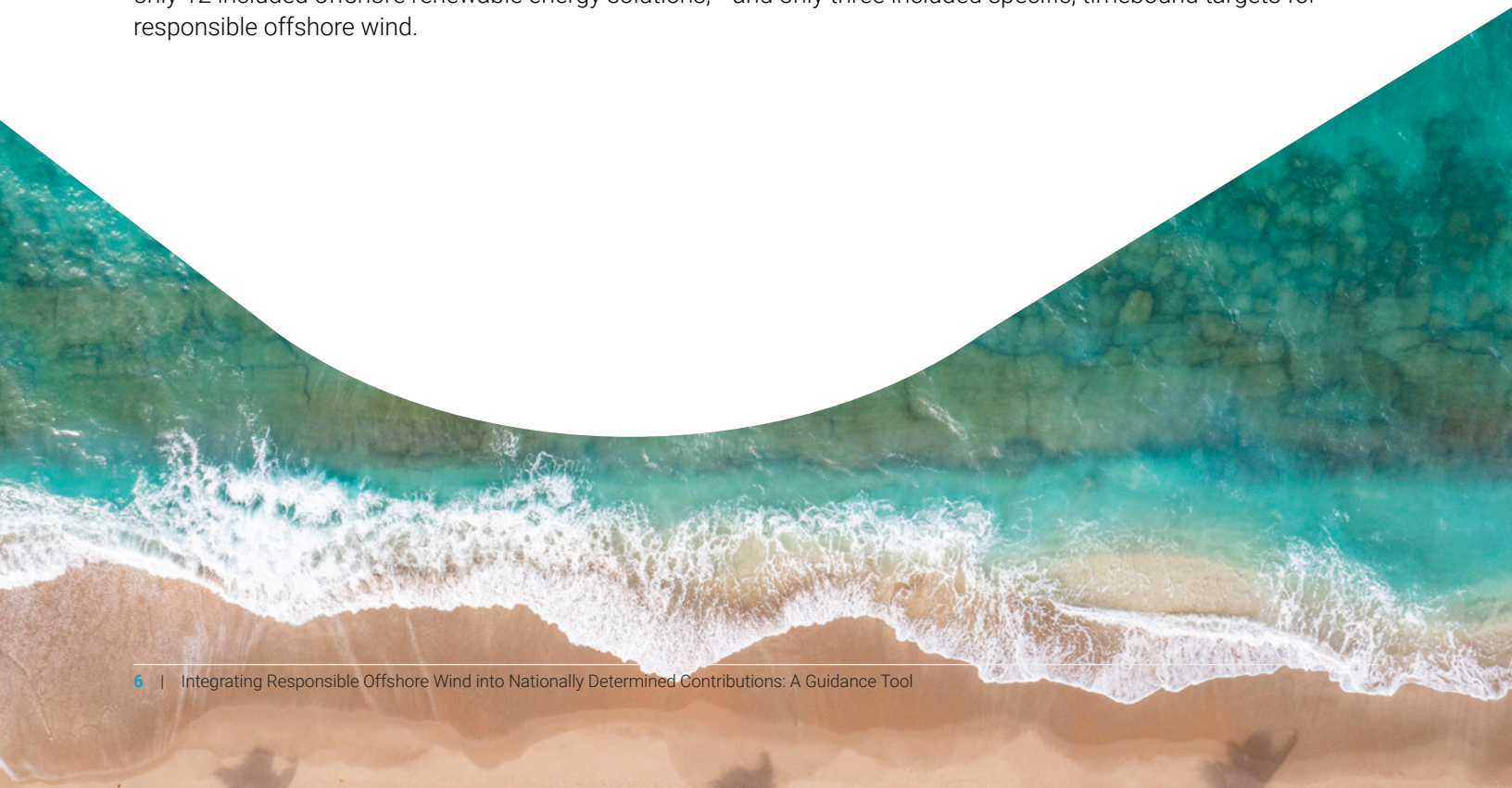
- Under current NDC commitments, by the end of this century, the world would be 2.4–2.6°C hotter than in pre-industrial times—better than the 3.7–4.8°C projected in 2010, but still not in line with the Paris Agreement commitment to keep warming "well below 2°C" above pre-industrial levels and to pursue efforts to limit the increase to 1.5°C.
- The transition away from unabated fossil fuels needs to accelerate, and so must the deployment of renewable energy sources. This marked the first formal acknowledgment in nearly 30 years of UN climate negotiations of the critical need to move away from fossil fuels.
- Urgent, system-wide transformations are needed in key sectors, including energy, food, transport, and industry, both to reduce emissions and to build climate resilience.In line with equity principles, developed countries must lead in reducing emissions, while supporting developing nations through finance and technology.

The next round of NDC updates are due in 2025. As the UNFCCC website notes, "NDCs 3.0 need to be progressive and more ambitious than current NDCs and may be the last opportunity to put the world on track with a global emission trajectory in line with the Paris Agreement's 1.5C goal."[10]

2.1 OFFSHORE WIND IN EXISTING NDCS

The GST made it clear that countries need to raise their ambition. It also explicitly invited Parties to preserve and restore oceans and coastal ecosystems and scale up, as appropriate, ocean-based climate change mitigation action. The latter can take several forms, but one key option is responsible offshore wind, as it has particularly large potential to accelerate the transition to clean energy and reduce GHG emissions.

When Ocean Conservancy reviewed NDCs and updates from 98 coastal countries in June 2023, however, it found only 12 included offshore renewable energy solutions,[11] and only three included specific, timebound targets for responsible offshore wind.



To fully realize the emissions reductions potential of offshore wind, more countries need to set ambitious, quantified, timebound targets for its deployment within their NDCs. This includes both developed nations with established offshore wind sectors, and developing countries seeking to expand their clean energy supplies and move away from fossil fuels.

Integrating offshore wind in updated NDCs—and actually delivering results—entails real challenges, particularly for countries where the technology is not already in use, and where international climate finance, technology transfer, and capacity-building are needed. Still, as noted at the outset, however, responsibly developed offshore wind also presents significant opportunities to promote sustainable development, create green jobs, and enhance climate resilience. International cooperation can support achieve better and equitable outcomes.

2.2 INVESTABLE NDCS

Developing-country NDCs typically include two sets of mitigation commitments: unconditional targets, which they intend to meet with their own resources, and more ambitious targets that are conditioned upon international climate finance and other support. One of the biggest challenges with NDCs to date has been that the financial resources needed to achieve the more ambitious targets never materialized.

A priority in the next round of NDC updates should be to ensure that they are investable—that is, that the commitments they make can be translated into actionable, finance-ready projects. Truly investable NDCs will be backed by clear policies, sector-specific targets, and, above all, stable domestic frameworks. By outlining these elements clearly, investable NDCs reduce risk for investors, making it easier for them to commit resources to long-term, sustainable projects.

A well-structured NDC provides a clear roadmap for how countries plan to achieve their climate targets, including cost estimates and anticipated funding sources. For emerging markets and developing economies, investable NDCs also attract critical financial support by de-risking projects through mechanisms such as guarantees, access to grants, and concessional finance, all of which can help crowd in private capital. Access to these financial flows empowers countries to move beyond planning and into implementation, fostering greater international cooperation and making meaningful progress towards the 1.5°C climate goal.

3 Integrating targets for offshore wind in NDCs

The first two sections of this guidance laid out the case for integrating responsible offshore wind development in coastal countries' next round of NDCs. This section focuses on how to do so, including how to formulate targets, key enabling conditions, and finance.

3.1 FORMULATING EFFECTIVE OFFSHORE WIND TARGETS

The NDCs submitted to date have taken two different approaches: **Sectoral** NDCs focus only on selected sectors that are deemed to be particularly crucial for climate action, such as energy, transportation, or agriculture. **Economy-wide** NDCs, meanwhile, take a more comprehensive approach, aiming to ensure that no sector is left out. Economy-wide NDCs are typically more ambitious and reflect a commitment to addressing climate change across all aspects of its economy. How offshore wind is integrated depends on the NDC's approach.

In a sectoral NDC, offshore wind could appear in the renewable energy section, as part of a larger vision for decarbonizing the power supply. Along with targets for offshore wind deployment, countries can outline policies and measures to help achieve them, such as streamlining regulations, offering financial incentives, or investing in infrastructure.

In an economy-wide NDC, offshore wind would be integrated as part of a broader national strategy to reduce emissions across the economy. Offshore wind would be deployed alongside other renewable energy sources to decarbonize the power supply and provide clean electricity to support economic diversification. That, in turn, would help workers in the fossil fuel sector to upskill and transition into new fields, supporting a just energy transition.

Economy-wide NDCs typically emphasize cross-sectoral coordination, which could help ensure that offshore wind development is supported by complementary policies in other areas, such as transportation, industry, land use, and transmission infrastructure. Countries may also focus on scaling up offshore wind to meet overall energy demand; driving innovation; and fostering international partnerships to accelerate the energy transition.

Specific and timebound targets

To integrate offshore wind energy into their NDCs and/or LT-LEDS, countries should set clear, measurable, timebound, and ambitious goals and reference the goal directly or reference the plan they come from in their NDC, ICTU and/or LT-LEDS. To set specific targets, countries develop an offshore wind roadmap analyzing wind resources, maritime spatial planning outputs, and grid integration capabilities.

Each country's targets should reflect the existing potential, as well as commitments under international agreements. They should also be aligned with national energy policies and climate strategies, so they can contribute effectively to the transition to clean energy. At the same time, they can contribute to broader socioeconomic objectives, such as job creation, community resilience, and enhanced energy security.

Countries should also consider the principles of fairness and ambition, as outlined in the so-called ICTU guidance ("information to facilitate clarity, transparency and understanding" of NDCs).[12] These principles encourage each Party to frame its targets relative to national circumstances and capabilities, while progressively aiming for higher ambition in every NDC update. Climate finance is part of the equation as well; it is discussed further below.

Here are some examples of ambitious offshore wind goals and how they are integrated into or referenced by the respective countries' NDC or where there is potential to do so:

UNITED KINGDOM

50 GW of offshore wind capacity by 2050;

- The United Kingdom's NDC[13], submitted in 2022, is an economy-wide commitment to reducing greenhouse gas emissions by at least 68% by 2030, compared with 1990 levels.
- The United Kingdom signed an Offshore Wind Sector Deal in 2019 that targeted 30 GW by 2030 but has since pledged to increase ambition to 50 GW.
- Their national offshore wind target is referenced in their ICTU: *Section 4, Planning Processes (a) Information on the planning processes that the Party undertook to prepare its nationally determined contribution and, if available, on the Party's implementation plans, including, as appropriate (i) Domestic institutional arrangements, public participation and engagement with local communities and indigenous peoples, in a genderresponsive manner: "Since its NDC was first communicated in December 2020, the UK has made progress on a range of specific policies and measures that will support delivery of the NDC. For example, as of September 2022, when the UK submitted its updated NDC, the UK has: Invested in substantially in clean energy, committing up to 1.7 billion to increase the UK's nuclear energy production and over 1.6 billion to advance offshore wind capacity to meet the UK's 50GW target by 2050."*

EUROPEAN UNION

60 GW by 2030 and 300 GW by 2050;

- The EU's NDC[14], submitted in 2020, is economy-wide and commits to a legally binding target of a domestic reduction of net greenhouse gas emissions by at least 55% compared to 1990 by 2030.
- Also in 2020 the EU released their Strategy on Offshore Renewable Energy[15] that proposed to increase Europe's offshore wind to at least 60 GW by 2030 and to 300 GW by 2050. In 2023 the EU Commission released European Wind Power Action Plan[16] that was accompanied by a Communication on delivering on the EU's offshore energy ambition as an update to the Strategy from 2020.
- The EU's NDC does not reference offshore wind targets specifically but does reference the papers and strategies that set the target.

UNITED STATES

30 GW by 2030, expanding to 110 GW by 2050; and deploy 15 GW of energy from floating offshore wind platforms by 2035;

- The United States' NDC[17], submitted in 2021, sets an economy-wide target of reducing its net greenhouse gas emissions by 50-52% below 2005 levels by 2030.
- The United States references offshore renewable energy in the introduction to its NDC, stating, "It further recognizes the role of the broader suite of ocean-based climate solutions, including scaling-up offshore renewable energy and reducing emissions from shipping and ports, in increasing climate ambition and creating jobs. "The United States' offshore wind target,[18] as announced in March 2021, is a shared goal by The Departments of Interior (DOI), Energy (DOE), and Commerce (DOC), "to deploy 30 GW of offshore wind in the United States by 2030, while protecting biodiversity and promoting ocean co-use."
- In 2023, the United States released an Ocean Climate Action Plan[19] that details implementation plans for achieving the 30 GW by 2030 goal as well as the 15 GW from floating offshore wind platforms by 2035 goal.

JAPAN

10 GW by 2030 and 30–45 GW, including floating wind, by 2040.

- Japan's economy-wide NDC[20], submitted in 2021, aims to reduce its greenhouse gas emissions by 46% in fiscal year 2030 from its fiscal year 2013 levels.
- In late 2020, following recommendations of a council of experts, Japan set offshore wind targets of up to 10 GW by 2030 and up to 45 GW by 2040.[21]
- Japan's NDC does not specifically reference offshore wind targets, although reference to the goal and the planned investment could be added to the ICTU Element 4 for 'Information on the planning processes'.

The above examples illustrate some options for including or referencing offshore wind targets in NDCs, although, notable, all existing examples come from developed countries. Conditional targets for offshore wind should be incorporated alongside statements of financial need in the NDCs of developing economies.

To illustrate ambition, offshore wind targets should reflect highest-possible goals that are achievable with the appropriate support mechanisms, such as technology transfer, concessional finance, and capacity-building, especially for developing and emerging economies. By linking offshore wind targets to measurable impacts—such as specified gigawatt capacities or emission reductions in the energy sector—countries underscore their commitment to a low-carbon future and align with the ICTU guidance on quantifiable progress indicators, discussed further in section 4.

In addition, by framing offshore wind goals in a way that considers fair access to resources, governments can ensure these projects contribute to local development, empower communities, and avoid exacerbating inequalities. As noted in section 1.3, CBAs can foster local ownership and increase public support, while also promoting inclusion. These elements make offshore wind an equitable and ambitious part of the national climate strategy, reinforcing each country's commitment to a just and sustainable energy transition.

Table 1 provides examples of detailed targets that could be included in an NDC and/or referenced in an ICTU or LT-LEDS:

Action	Output	Outcome	Impact
Capacity Development			
Develop 10 GW of responsible offshore wind capacity by 2030.	Installation of x responsible offshore wind turbines with a total capacity of 10 GW.	Increased renewable energy generation.	Significant reduction in GHG emissions, contributing to the national target of reducing emissions by [percentage] by 2030.
Policy and Regulation			
Implement streamlined permitting processes and regulatory frameworks.	Reduction in project approval times from x years to y months.	Accelerated development and deployment of offshore wind projects.	Enhanced investor confidence and increased foreign direct investment.
Establish national standards for offshore wind environmental impact assessments.	Uniform EIA guidelines for all offshore wind projects.	Improved environmental compliance and reduced project delays.	Enhanced protection of marine ecosystems and biodiversity.
Financial Incentives			
Establish a $x billion Responsible offshore wind Development Fund.	Provision of grants, subsidies, and low-interest loans for offshore wind projects.	Increased financial viability of offshore wind projects.	Attraction of private sector investment, boosting local economies.
Introduce tax incentives for companies investing in offshore wind R&D.	Increased investment in offshore wind technology development.	Accelerated innovation and technological advancements in offshore wind.	Strengthened position of [country] in the global offshore wind market.
Invest $x million in R&D for advanced turbine technology and floating wind platforms.	Development of new, more efficient offshore wind technologies.	Improved efficiency and cost-effectiveness of offshore wind projects.	Positioning [country] as a leader in responsible offshore wind technology.
Environmental Safeguards			
Conduct comprehensive environmental impact assessments and implement biodiversity-positive project designs.	Establishment of artificial reefs and marine protected areas.	Minimization of negative impacts on marine ecosystems.	Enhanced marine biodiversity and ecosystem services.
Develop monitoring programs to assess the impact of offshore wind on marine life.	Regular reports on marine ecosystem health.	Improved understanding of offshore wind environmental impacts.	Data-driven strategies to mitigate negative effects and promote biodiversity.

Action	Output	Outcome	Impact
Community Engagement			
Launch a Community Benefits Program to ensure local communities benefit from offshore wind projects.	Creation of x jobs in local communities and investment in local infrastructure.	Increased public support and social acceptance of offshore wind projects.	Improved local economic development and social equity.
Grid Integration			
Upgrade grid infrastructure to accommodate increased offshore wind capacity.	Construction of new transmission lines and substations.	Reliable and stable integration of offshore wind into the national grid.	Enhanced energy security and reduced dependence on fossil fuels.

Table 1: Example of NDC targets and actions for responsible offshore wind.

Policies and Measures

Supportive policies and measures are essential to achieving responsible offshore wind targets. These policies should create a conducive environment for investment and development, addressing regulatory, financial, and technical barriers. Key policies and measures that can facilitate the integration of responsible offshore wind targets into NDCs, and accelerate the development of projects, include:

- **Regulatory frameworks**: Clear and streamlined permitting processes are crucial. Establishing a one-stop-shop agency for approvals can simplify and expedite permitting. For example, the Danish Energy Agency manages a streamlined process that has made Denmark a leader in offshore wind deployment.
- **Financial incentives**: Financial mechanisms such as feed-in tariffs, tax credits, and grants can attract investment by mitigating high upfront costs. The UK's Contracts for Difference (CfD) scheme, for instance, has successfully established revenues and encouraged investment in responsible offshore wind projects.
- **Market integration**: Policies facilitating the integration of offshore wind energy into the national grid are essential. This includes upgrading infrastructure and ensuring grid stability. Germany's Energiewende policy, with substantial investments in grid infrastructure, supports renewable energy integration, including offshore wind.
- **Environmental safeguards**: Measures to protect marine biodiversity and minimize environmental impacts are vital. Comprehensive environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) help identify and effectively mitigate risks of offshore wind projects to marine life, such as birds and marine mammals.
- **Long-term planning and coordination**: Effective long-term planning, with robust stakeholder engagement, is crucial. National and regional plans should align with offshore wind targets and include clear timelines. Dedicated task forces or committees can oversee implementation. The UK Offshore Wind Sector Deal exemplifies successful government-industry collaboration for strategic goals.

Table 2 provides a generic example of a comprehensive national plan for developing and implementing responsible offshore wind energy projects, including specific actions, outputs, outcomes, and impacts, with key steps and indicators for tracking progress. Each country's plan will look different, but all require the same basic elements to create enabling conditions for the successful integration of offshore wind in an NDC.

Action	Output	Outcome	Impact
Develop and implement responsible offshore wind energy projects	**Increased installed capacity of responsible offshore wind energy**	**Enhanced renewable energy generation and reduced greenhouse gas emissions**	**Mitigation of climate change and promotion of sustainable development**
Description • Planning, constructing, and operating responsible offshore wind farms. • Identifying suitable sites, securing permits, engaging stakeholders, and deploying wind turbines and associated infrastructure.	**Description** • Immediate result of implementing responsible offshore wind projects. • Increase in total installed capacity of responsible offshore wind turbines measured in megawatts (MW).	**Description** • Generation of substantial renewable energy, contributing to the energy mix and reducing fossil fuel reliance. • Significant reduction in GHG emissions. • Alignment with climate targets.	**Description** • Long-term reduction in GHG emissions, contributing to climate change mitigation. • Economic and social benefits, including job creation, local economic growth, and enhanced community resilience. • Enhanced biodiversity through artificial reefs and conservation measures.
Steps • Conduct feasibility studies and environmental impact assessments (EIAs). • Secure financing and investment through public-private partnerships (PPPs) and concessional finance. • Develop regulatory frameworks and streamline permitting processes. • Engage with local communities and stakeholders. • Construct and commission responsible offshore wind turbines and infrastructure.	**Indicators** • Number of responsible offshore wind turbines installed. • Total installed capacity (MW). • Amount of electricity generated from responsible offshore wind (MWh).	**Indicators** • Percentage of national electricity generated from responsible offshore wind • Reduction in GHG emissions (tons of CO_2 equivalent). • Improvement in energy security and diversification of the energy mix.	**Indicator** • Overall reduction in national GHG emissions. • Economic benefits, including job creation and local investment. • Social benefits, such as improved air quality and public health. • Enhanced biodiversity through conservation measures.

Table 2: Example of a comprehensive plan for developing and implementing responsible offshore wind energy projects.

3.2 FINANCING RESPONSIBLE OFFSHORE WIND

For developing countries, it is important to quantify financial needs in their NDCs. Offshore wind is a capital-intensive technology, and—particularly if the sector is just getting started in the country—significant international climate finance may be needed to implement projects. NDCs should explain what kinds of international support will be needed, such as concessional finance and technology transfer, to meet offshore wind targets.

For developed countries, meanwhile, public development finance should be a priority, both to support the global expansion of offshore wind energy, particularly in developing and emerging markets, and to enable the implementation of floating offshore wind projects, which still require significant technological and financial support.

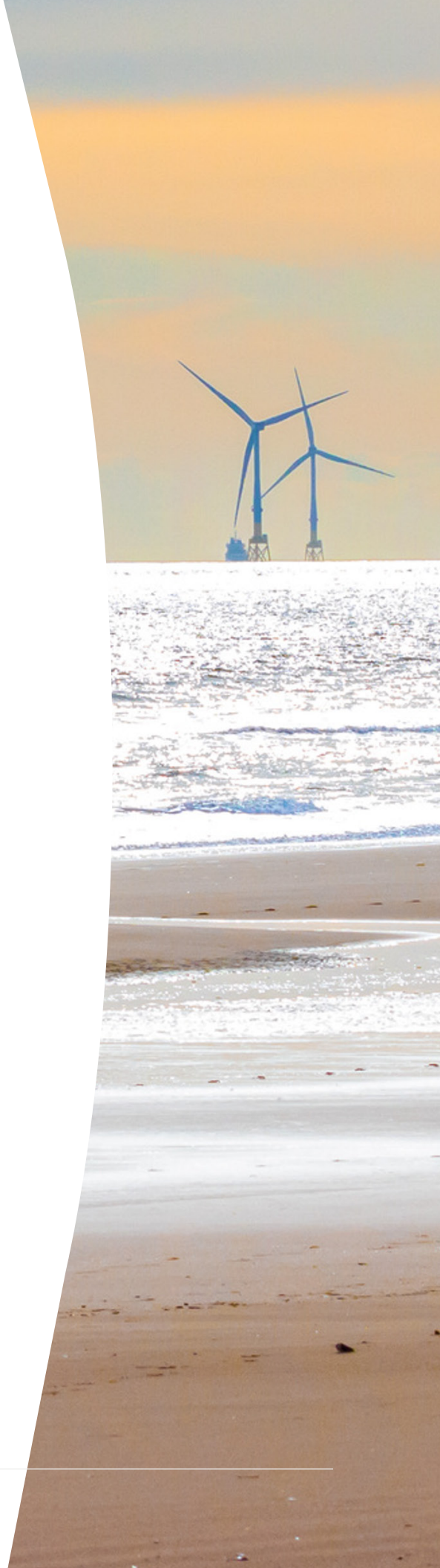
While some mature offshore wind markets may be financially independent, many developed nations would also benefit from international cooperation to help them scale up their offshore wind industries, especially with newer technologies such as floating offshore wind. By committing financial resources, technology transfer, and capacity-building through targeted public development financing, all countries, regardless of market maturity, can collaborate towards achieving global offshore wind energy goals.

Securing adequate financial resources is critical for the successful implementation of responsible offshore wind projects. Various financial mechanisms can be employed to mobilize the necessary investments:

Concessional finance: Countries can use concessional finance[22] from international financial institutions (IFIs) such as the World Bank, regional development banks, and multilateral climate funds such as the Green Climate Fund (GCF) and Climate Investment Funds (CIF) to support responsible offshore wind projects. Grants and low-interest loans can make projects more attractive to investors by reducing financial risks and costs. The specific options available to each country will depend on the source of finance.

Blended finance: Combining concessional finance with private capital, known as blended finance, can leverage limited public funds to attract significant private investment. This approach can mitigate risks for private investors while ensuring that projects are financially sustainable. The Asian Development Bank (ADB) has utilized blended finance to support renewable energy projects across Asia, demonstrating its effectiveness in mobilizing investment for large-scale infrastructure projects.

Government grants and subsidies: Direct financial support from governments in the form of grants and subsidies can play a crucial role in making responsible offshore wind projects financially viable. This financial support can help offset the high initial capital costs and provide ongoing operational support. For example, the U.S. Department of Energy has provided substantial grants for research and development in offshore wind technology, which have been instrumental in advancing the sector.



Green bonds: Issuing green bonds to raise capital specifically for renewable energy projects has become a popular tool for financing sustainable infrastructure. Green bonds allow investors to support environmentally friendly projects while receiving stable returns. In recent years, there has been a significant increase in green bond issuance, with many countries and companies using this mechanism to finance responsible offshore wind projects. For instance, the Netherlands issued green bonds to fund its renewable energy initiatives, including offshore wind farms.

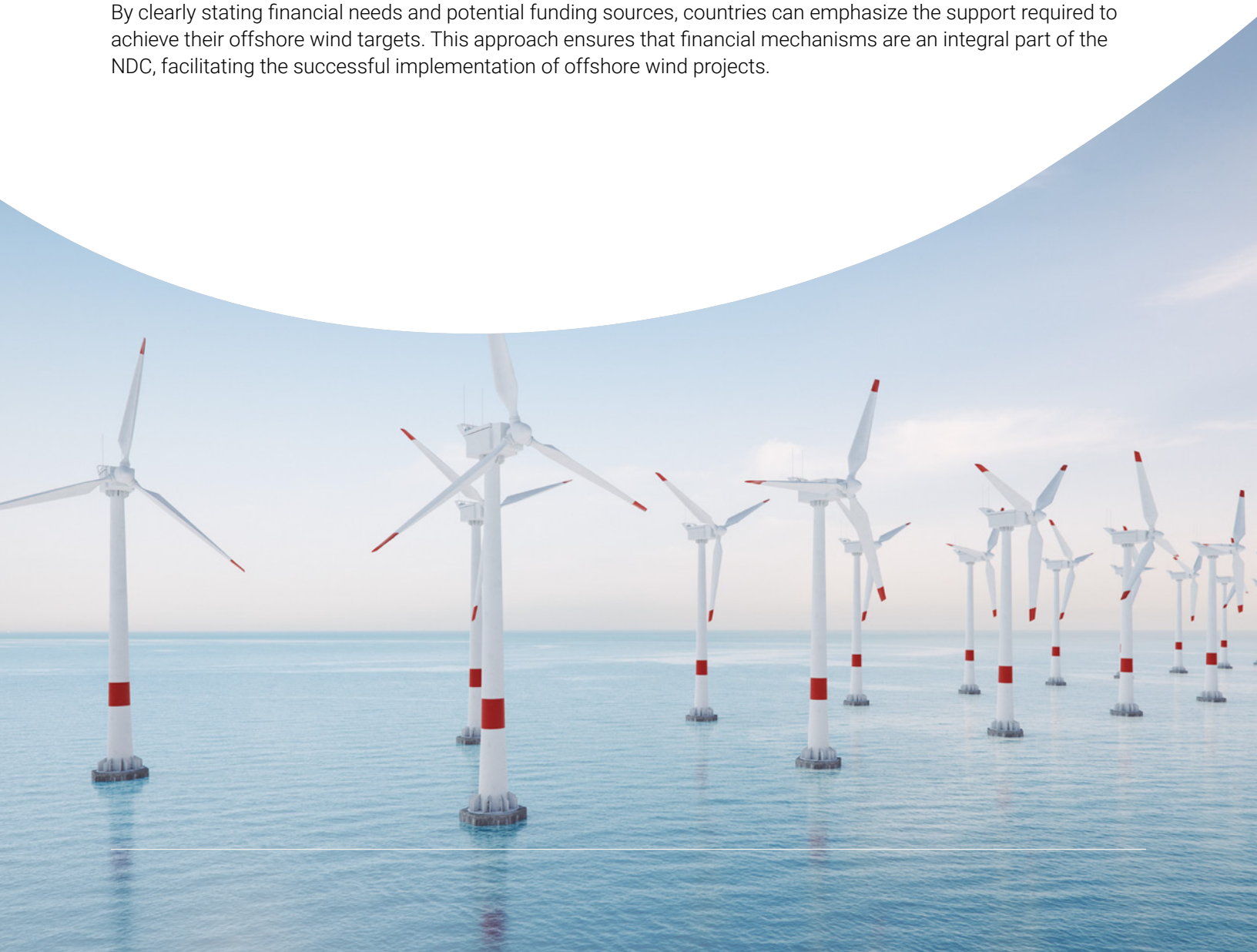
Public-private partnerships (PPPs): Leveraging PPPs allows for the sharing of financial burdens and risks associated with responsible offshore wind projects. Governments can provide initial funding and guarantees, while private sector partners contribute additional capital and expertise. This collaboration can help attract more investment and ensure efficient project execution. For example, the UK's Hornsea Project One, the world's largest offshore wind farm, was developed through a successful PPP, involving substantial investments from both public and private sectors.

Incorporating financial mechanisms in NDCs

Countries can include their ambition for responsible offshore wind in their NDCs alongside statements of financial need. This means that financial constraints should not prevent countries from setting ambitious offshore wind targets in their NDCs. Instead, these targets can be flagged as conditional on the availability of financial resources.

An example applicable to an NDC is presented in Vietnam's Offshore Wind Development Roadmap,[23] which notes that the country aims to develop 10 GW of offshore wind by 2030 and up to 40 GW by 2040, contingent on securing concessional finance.

By clearly stating financial needs and potential funding sources, countries can emphasize the support required to achieve their offshore wind targets. This approach ensures that financial mechanisms are an integral part of the NDC, facilitating the successful implementation of offshore wind projects.



4 Monitoring and Evaluation

Effective monitoring and evaluation are critical for tracking countries' progress on the targets for responsible offshore wind set in their NDCs, both for accountability at the national level, and to comply with their obligations under the Paris Agreement. A key first step is to choose the right indicators and suitable methodologies and understand data requirements. This section begins by recommending indicators for tracking offshore wind targets, along with the data required, and then discusses reporting requirements under the Paris Agreement.

4.1 METRICS AND INDICATORS

The most basic measures of progress that governments will need to track are how much offshore wind capacity has been installed, how much power is being generated, and what share of total generation that amounts to.

Indicator 1: Installed capacity by source

Tracking the installed capacity of responsible offshore wind (in megawatts or gigawatts) is a straightforward metric to gauge the scale and growth of responsible offshore wind infrastructure. Installed capacity reflects the total power that can be generated if the wind farms operate at full capacity. It provides insights into the progress of project development and helps in planning future expansions.

Data sources: Information on the total installed capacity of responsible offshore wind turbines is essential. This data can be obtained from regulatory authorities, industry associations, and project developers. Installed capacity data should be updated regularly to account for new installations and decommissioning, providing insights into the growth and scale of responsible offshore wind infrastructure.

Indicator 2: Total generation by source

Measuring the total amount of electricity generated by responsible offshore wind farms (in megawatt-hours or gigawatt-hours) offers insights into the actual energy output. This indicator helps in comparing actual generation against set targets, identifying seasonal and yearly production trends, and understanding the contribution of responsible offshore wind to overall energy production.

Data sources: This data can be sourced from grid operators, energy utilities, and project developers. Regular reporting ensures that data is up-to-date and reflective of actual performance, which helps in assessing the contribution of responsible offshore wind to the national energy mix. The aggregated data can be used to calculate indicator 3 below.

Indicator 3: Share of electricity generated by source

Tracking the proportion of total electricity generated from responsible offshore wind relative to the overall electricity generation mix is a vital indicator. This metric provides a clear understanding of responsible offshore wind's contribution to the national energy supply. By monitoring this percentage, countries can evaluate the success of integrating responsible offshore wind into the energy grid and its impact on reducing reliance on fossil fuels.

These quantitative indicators only provide a partial picture, however. Four other indicators can shed light on whether the overall vision for responsible offshore wind presented in an NDC is actually being realized—and whether crucial enablers of success are in place.

Indicator 4: Implementation of policies and measures

Qualitative indicators assess the effectiveness of policies and measures supporting responsible offshore wind development. These include the presence of supportive regulatory frameworks, financial incentives, research and development initiatives, and environmental safeguards. Tracking the implementation of such measures ensures a comprehensive view of the enabling environment for responsible offshore wind projects. For instance, the impact of the UK's Contracts for Difference (CfD) scheme, which stabilizes revenues for renewable energy projects, can demonstrate the effectiveness of financial incentives in promoting responsible offshore wind investment.

Data sources: Monitoring the adoption and implementation of policies and measures involves tracking legislative developments, financial incentives, and research and development initiatives. Surveys and policy reviews can provide insights into the effectiveness of these measures, ensuring that there is a suitable enabling environment for responsible offshore wind projects.

Indicator 5: Research, development, and innovation (RD&I) indicators

Another critical indicator involves tracking advancements in research, development, and innovation in the responsible offshore wind sector. This includes measuring progress in turbine efficiency, advancements in floating wind platforms, and improvements in maintenance practices. IRENA emphasizes the importance of RD&I indicators to understand how innovation drives cost reductions and technological improvements, which are crucial for the sustainable expansion of responsible offshore wind capacity.[24]

Indicator 6: Socioeconomic and environmental benefits

Monitoring the socioeconomic benefits and environmental impacts of responsible offshore wind projects is essential. Several indicators may be relevant, such as job creation, community engagement, and air quality improvements. The U.S. Department of Energy, for example, has highlighted the importance of tracking how responsible offshore wind projects support local economies, create jobs, and contribute to environmental sustainability.[25]

Data sources: This data may come from many different sources across government agencies. Some can be gathered through surveys, interviews, and economic reports, providing insights into the broader benefits of responsible offshore wind development.

Indicator 7: Marine ecosystems indicators

As stressed in section 1, a key condition for responsible offshore wind development is that it must minimize impacts on marine ecosystems. Carefully monitoring those impacts is thus crucial. Useful indicators may include the biomass of demersal and pelagic species, species diversity, the condition of sensitive species, habitat quality and extent, benthic invertebrate populations, water quality parameters, marine mammal and bird populations, artificial reef effects, noise pollution levels, and changes in the migratory patterns of fish, birds, and marine mammals.

Data sources: Government agencies monitoring different aspects of marine life and environmental conditions, as well as scientists and non-governmental organizations, may all be valuable sources of relevant data. Baseline, construction, and post-deployment monitoring of these parameters can help identify and mitigate adverse impacts.

Together, these seven (sets of) indicators can provide a more complete view of responsible offshore wind development. Generation data provide direct measures of the contribution of responsible offshore wind to the energy mix. Installed capacity provides insights into the infrastructural growth and potential of the sector. Qualitative policy implementation indicators help assess the broader support framework, ensuring that the right conditions are in place for sustained growth. Research and innovation indicators highlight the advancements driving the industry forward, while socioeconomic and environmental indicators can help determine whether offshore wind is delivering broader benefits. Ecological indicators are critical for understanding and mitigating the impacts of responsible offshore wind on marine biodiversity and fisheries resources. Regular reporting and independent verification of these indicators will enhance transparency and credibility, promoting greater confidence and more investment in responsible offshore wind projects.

4.2 METHODOLOGIES FOR TRACKING AND REPORTING PROGRESS

Implementing effective methodologies for data collection, management, and reporting is crucial for ensuring the reliability and usability of the data. The following approaches are recommended:

Regular Reporting

Establish a system for regular reporting of key indicators by relevant stakeholders, including project developers, grid operators, and regulatory bodies. This ensures timely and accurate data collection. Annual energy reports published by national energy agencies can serve as comprehensive sources of information.

Surveys and Questionnaires

Use surveys and questionnaires to gather qualitative data on the implementation of policies and measures. This approach can provide insights into the effectiveness of regulatory frameworks and financial incentives. Engaging with stakeholders through surveys helps in capturing a broad range of perspectives and experiences, ensuring that the data collected is comprehensive and reflective of on-the-ground realities.

Data Management Systems

Develop and utilize data management systems to store, analyze, and report data on responsible offshore wind projects. These systems should be capable of integrating data from various sources and providing real-time updates on key indicators. Advanced data analytics tools can enhance the accuracy and usability of the data collected, enabling policymakers to make informed decisions.

Third-Party Verification

Employ third-party verification to ensure the accuracy and reliability of reported data. Independent audits and assessments can validate the data and provide credibility to the monitoring and evaluation process. For example, third-party environmental audits can verify the compliance of responsible offshore wind projects with biodiversity conservation measures, ensuring that the reported data is accurate and reliable.

Geographic Information Systems (GIS)

Utilize GIS for spatial analysis and visualization of data related to responsible offshore wind projects. GIS tools can help in mapping the locations of wind farms, analyzing spatial patterns, and assessing environmental impacts. This spatial analysis is crucial for planning, monitoring, and managing responsible offshore wind projects effectively.

Case Studies and Best Practices

Document and analyze case studies and best practices from successful responsible offshore wind projects. This approach helps in identifying effective strategies, methodologies, and lessons learned, which can be applied to future projects. Sharing these insights through publications and workshops can enhance knowledge transfer and capacity building among stakeholders

4.3 INTEGRATION WITH THE ENHANCED TRANSPARENCY FRAMEWORK

To ensure effective tracking and reporting of NDC targets for responsible offshore wind under the Paris Agreement, it is essential to integrate the Enhanced Transparency Framework (ETF) requirements. The ETF mandates countries to provide clear, consistent, and transparent information on their climate actions and support through Biennial Transparency Reports (BTRs).

An NDC under Article 4 is communicated by Parties every five years and is not subject to review under the ETF. However, there is a crucial relationship between the NDC and the ETF. Parties need to provide a description of their NDC in their BTR against which progress made will be tracked. The information required in the BTR is similar but not identical to the information necessary for transparency, clarity, and understanding in the NDC.

While the adequacy and appropriateness of the NDC and the chosen indicators to track progress are not subject to review under the ETF, the actual tracking of progress, including the description of the NDC and information provided for each selected indicator, is subject to review. This ensures that the progress made in implementing and/or achieving the NDC is transparently summarized in the "structured summary" of the BTR and reviewed by a technical expert review team.

To align with ETF guidelines, it is essential that all data collection and reporting mechanisms for responsible offshore wind projects adhere to standardized methodologies for measuring, reporting, and verifying (MRV) GHG emissions reductions, renewable energy capacity, and other relevant metrics. This alignment ensures consistency and reliability in the data reported, facilitating accurate tracking of progress and compliance with NDC commitments.

In preparing their BTRs, countries should be provided with detailed guidance on how to report progress on responsible offshore wind targets. This includes templates and tools for compiling data, calculating emission reductions, and demonstrating compliance with NDC commitments. National planning processes should encourage Parties to clearly think through their NDCs and related targets, how they will domestically track implementation and achievement of the NDC, and how they will ensure the availability of information on indicators over time for reporting in subsequent BTRs. This consistency promotes a more robust accounting framework.

5 Resources and Support

5.1 TECHNICAL RESOURCES

List of available technical assistance for NDC creation and implementation.

- **NDC Partnership. 2024. Global Call for NDCs 3.0 & LT-LEDS**
  This document presents the NDC Partnership's Global Call to help countries enhance their Nationally Determined Contributions (NDCs) and Long-Term Low Emissions Development Strategies (LT-LEDS) in line with the Paris Agreement. It provides targeted support across three streams—preparatory support, ambition enhancement, and transformative action—connecting countries with technical assistance, resources, and partners to close ambition, implementation, and finance gaps.

- **NDC Partnership. 2023. NDC 3.0 Navigator**
  This comprehensive resource guides countries in identifying opportunities to enhance ambition in their Nationally Determined Contributions (NDCs) under the NDC 3.0 framework. It outlines impactful strategies to ensure climate actions leave no one behind, including all-of-society engagement, streamlined processes, and improved access to finance. The Navigator offers a range of options for countries to bolster finance accessibility and effectiveness, accelerating NDC implementation and impact.

- **UNDP, WRI. 2016. NDC Implementation Readiness Checklist**
  This guidance document presents a nine-step checklist to support countries in preparing for effective NDC implementation. Featuring key questions and considerations, it assists governments in organizing national discussions and planning for a smooth transition from strategy to action. Originally issued in 2016, it remains relevant as a foundational tool for current and future NDC planning and execution.

- **GIZ and Climate Analytics. 2021. The NDC Handover Checklist**
  This checklist aids countries in documenting essential data, methodologies, and stakeholder engagement from recent NDC processes, helping ensure a smooth handover for future NDC efforts. Tailored for flexibility, it enables countries to adapt the template to their unique contexts, preparing them for the 2025 NDC revisions by preserving key information and lessons learned.

- **WWF. 2024. WWF's Checklist for The NDCs We Want**
  This checklist provides a structured approach for countries to enhance their NDCs, focusing on five critical areas: ambition, systemic change, inclusiveness, sustainable development, and progress tracking. With 20 qualitative factors, it supports countries in building comprehensive, impactful, and inclusive climate strategies aligned with sustainable development goals.

- **IIGCC. 2024. Making NDCs Investable – The Investor Perspective**
  This guidance document outlines the criteria and information needed to make NDCs attractive to the finance sector, particularly institutional investors. It highlights conditions that countries should meet to unlock investment, promoting the creation of clear and viable investment opportunities that facilitate the successful implementation of NDCs.

5.2 RESPONSIBLE OFFSHORE WIND INFORMATION AND RESOURCES

- **ESMAP-IFC Offshore Wind Development Program**
  This program aims to accelerate the adoption of offshore wind energy in emerging markets by integrating it into the energy policies and strategies of World Bank Group client countries. The program estimates over 71,000 GW of technically feasible offshore wind potential worldwide, with more than 70% in deeper waters suited for floating turbines. A significant portion of this resource lies in low- and middle-income countries

- **UN Global Compact. 2024. Net-Positive Biodiversity in Offshore Renewable Energy: Minimum Criteria and Recommendations for Action**
  This document provides a comprehensive framework to guide the offshore renewable energy (ORE) sector in achieving net-positive biodiversity impact at the project level. It aligns ORE development with the Kunming-Montreal Global Biodiversity Framework and sets out minimum criteria to halt biodiversity loss, enhance ocean health, and encourage adaptive management. The framework includes actionable recommendations for ORE developers, policymakers, and stakeholders to integrate biodiversity-positive practices, emphasizing collaborative and inclusive approaches that contribute to global climate and biodiversity goals

- **World Bank. 2024. Integrated Environmental and Social Sensitivity Mapping: Guidance for Early Offshore Wind Spatial Planning (SenMap)**
  This document provides a four-step framework, SenMap, to guide governments in identifying environmentally and socially sensitive areas for offshore wind development. It helps planners map areas of high or low sensitivity to minimize impacts on coastal and marine ecosystems. With an emphasis on stakeholder engagement and alignment with international standards, SenMap aims to streamline permitting and support sustainable offshore wind expansion in emerging markets.

- **Royal Academy of Engineering, UK. 2024. Safer End of Life for Offshore Wind Infrastructure: Workshop Report**
  This report from Engineering X outlines recommendations from a 2024 workshop on ensuring safe, sustainable decommissioning of offshore wind infrastructure. Key areas include advancing technology, circularity, and regulatory standards, with 39 recommendations to foster collaboration, address regulatory gaps, and build a skilled workforce for end-of-life processes.

Endnotes

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21 See https://energytracker.asia/japans-offshore-wind-revolution/#:~:text=In%20late%202020%2C%20this%20council,to%2045%20GW%20by%202040

22 Concessional finance is below-market rate finance provided by major financial institutions, such as development banks and multilateral funds, to developing countries to accelerate development objectives. The term does not represent a single mechanism or type of financial support but comprises a range of below-market-rate products used to advance a climate or development objective.

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