Rialtas na hÉireann
Government of Ireland

Draft Offshore Renewable Energy Future Framework Policy Statement

2024

Prepared by the Department of
Environment, Climate and Communications
gov.ie/DECC

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Minister's Foreword

Ireland has the potential to be a world leader in offshore renewable energy. The abundance of our significant natural resources means that with the right ambition, focus and collaborative approach, we can have our own secure supply of clean, renewable and affordable energy. At the same time developing indigenous green growth and taking full advantage of the emerging export market opportunities. This will also enable Europe to meet our goal of making the EU climate-neutral by 2050, in line with the Paris Agreement.

This potential can only be achieved with national ambition and with a strategic long-term approach. This Future Framework Policy Statement on Offshore Renewable Energy addresses both of those things. It outlines our long-term ambitions of 20 GW by 2040 and 37 GW by 2050, and our objectives, and it lays down a roadmap of how they will be achieved. We have outlined what we need to deliver to be successful in our ambitions, and where further work is needed, and we have quantified what the potential economic benefits to Ireland could be.

Offshore renewable energy is a dynamic, fast-paced and evolving landscape, with new technologies being developed all the time. We are setting out our Future Framework now so that we will be ready, along with our local communities and business partners, for the future of offshore renewable energy. We are considering, exploring and open to all potential renewable energy sources, including wind – both fixed bottom and floating turbine - as well as wave and tidal renewable energy. Even though some of these technologies are nascent we will support research and innovation programmes to accelerate their development.

The Future Framework Policy Statement is part of a suite of policy initiatives that has been launched by this Government and co-ordinated by my Department through the Offshore Wind Delivery Taskforce.

As part of the development of the DMAP (Designated Maritime Area Plan) process we will consult widely with local communities around the country to hear their views on the development of the local areas and activities that they know best. Environmental considerations and protections are also of the utmost priority during the development of ORE in Ireland's maritime area, as an essential requirement of the DMAP process.

We are already well advanced in this process in the South Coast having completed almost 10 weeks of informal consultation in the second half of 2023. We met with and listened to members of the public, wind and supply chain industry, local elected members and council officials, fishers and seafood producers, environmental groups and many more interested stakeholders.

We will continue and complete this South Coast DMAP process in 2024. This is what a robust consultation process looks like. It means taking the time to listen to, and learn from, the local knowledge of coastal areas. This is the standard we have set for ourselves, and we will maintain that standard for future DMAPs to support development, protect biodiversity and enhance communities. We are planning for a robust future renewable industry that will deliver enormous benefits to communities around the country. The benefits of our offshore renewable industry will spread out from the local communities into surrounding counties, ultimately benefitting the whole country.

To achieve our offshore renewable energy targets, after the South Coast DMAP process, in alignment with requirements under Ireland's Climate Action Plan we will be engaging with communities around our island including on the east, west, and north coasts. We will proactively engage with communities, local businesses and international investors on future technologies such as deepwater fixed wind, floating wind and wave. We plan to advance DMAPs and routes to market for these technologies well ahead of time, so that when they are ready for deployment at scale, we, as a country, will be ready to take full and immediate advantage.

As a country, we can deliver on our long-term climate goals, ensure the long-term energy security of our country, and develop green industrial opportunities for the abundant energy resources we have off our coasts. We are planning for a future where we are more deeply connected to neighbouring states through increased electricity interconnection and export markets.

This Future Framework is our plan for the future. We will be ready for that future by working across Government and alongside local communities, Irish industry, and international energy partners.

Eamon Ryan TD

Minister for the Environment, Climate and Communications

Introduction – The ORE Future Framework Policy Statement

Ireland has significant potential for the development of offshore renewable energy, including wind, wave and tidal energy that can aid in the delivery of our long-term climate goals. Ambitious targets have been set for the delivery of Offshore Renewable Energy (ORE) in Ireland's exclusive economic zone: 20GW by 2040; and at least 37 GW in total by 2050[1, 2]. Deploying ORE at this scale in Ireland will result in a significant increase in revenue to the State as well as both direct and indirect job opportunities. There are also enormous potential benefits to the State through the delivery of a new ORE industrial base which will add employment and investment opportunities to communities across the country.

An economic analysis was commissioned by DECC and conducted by consultants AFRY Managing Consultants and BVG Associates to support the ORE targets and export ambitions set out in the Future Framework Policy Statement. The consultants applied a power system model using various ORE deployment capacities including a 16GW domestic net zero scenario and a 37GW export-focused scenario. This external analysis suggests that with 37GW ORE capacity the power sector in Ireland will reach net-zero emissions in advance of 2050, further examined in Annex 1 and supplementary materials.

The conducted economic market analysis further suggests that Gross Value Added (GVA) could sum to €69 billion over the lifetime of the projects – between 2022 and 2060 – including an additional €8.8 billion in GVA could be accrued to the State by 2050 purely through exports independent from employment benefits and GVA associated with domestic uses.

This presents opportunities not only for domestic use via direct connection to the all-island Single Electricity Market (SEM) electricity grid, but also, in the longer-term, for export to the remainder of the EU and UK via electricity interconnectors. There will also be opportunities for domestic industrial developments and through the production of renewable "green" hydrogen and other sources of renewable energy, such as electrofuels.

This Future Framework Policy Statement outlines our ambitions for the post-2030 period, the key processes needed for successful deployment, and a pathway to maximise economic

[1] https://www.gov.ie/en/publication/f3bb6-policy-statement-on-the-framework-for-phase-two-offshore-wind/

[2] https://circabc.europa.eu/ui/group/9198696f-e42c-4a88-b4f1-7a1788eb9b7c/library/082173b4-8d19-4c4b-aaa4-7612daf879c0/details

benefits to the State. The key reasons for sustainably developing Ireland's considerable offshore resources are threefold:

1. Decarbonising the Irish economy in line with legally binding national and international climate ambitions;
2. Ensuring long-term energy security; and
3. Developing green industrial opportunities for energy utilisation and for export markets.

Environmental considerations and protections are also of the utmost priority during the development of new ORE projects in Ireland's maritime area. Environmental concerns are at the forefront of the plan-led approach, from project planning to project decommissioning. An emphasis should be placed on taking an ecosystems-based approach with full consideration for the protection of marine environment and biodiversity as required in the Designated Maritime Area Plan (DMAP) process under the regulations set forth by the Maritime Area Planning (MAP) Act. This approach is also crucial to assessing cumulative impacts such that co-location of various marine activities with ORE development does not present additional and significant detrimental effects to biodiversity.

The use of sub-national forward maritime spatial planning such as DMAPs, will ensure that future developments in Ireland's maritime area take place in a managed, strategic and sustainable way. It will provide comprehensive opportunities for public and stakeholder engagement, and most importantly for local coastal communities.

Public engagement and statutory consultation will ensure that future development of ORE takes place with consideration of other marine activities and usages, including fishing, aquaculture, marine tourism and marine leisure, which are vital amenities and sources of income and employment for many coastal communities.

Consistent with global efforts to combat climate change, Ireland has committed to reaching net-zero greenhouse gas emissions by 2050, which will require a dramatic increase of utilisation of indigenous renewable energy sources, wholesale electrification of domestic demand, increasing electricity interconnection, and an emergent renewable hydrogen industry targeted towards hard-to-abate sectors. Realising Ireland's indigenous renewable energy potential will enhance our energy security by mitigating dependence on volatile international imports, through which Ireland received over 80% of current primary energy requirement in 2022[3].

[3] https://www.seai.ie/data-and-insights/seai-statistics/key-publications/energy-in-ireland/

Furthermore, as Ireland continues to develop its ORE sector there will be increased opportunities for supporting the domestic green growth agenda and export market opportunities from co-location of large energy users with renewable generation to electricity interconnection with neighbouring states to the export of renewable hydrogen and its derivatives. Creating a flagship ORE sector will enable Ireland to achieve its binding climate targets while bolstering the security and prosperity of the Irish State.

With the adoption of a plan-led approach to ORE comes a government responsibility to set forth a robust pathway for the achievement of Ireland's ambitious targets out to 2040 and 2050. The purpose of the ORE Future Framework is to set out the future of ORE development in Ireland from 2030 in a manner which will maximise environmental and social welfare. The ORE Future Framework will be delivered through collaboration between State, industry and local communities.

The Future Framework policy statement is aligned with and complementary to, Ireland's existing climate, renewable energy and ORE policy and legislative frameworks. It further complements Government objectives contained within the pending National Industrial Strategy and the Offshore Transmission Strategy. As this is an overarching Framework for long-term delivery of ORE, the intention is not to encapsulate the intricacies of the energy landscape in Ireland and beyond. As such, the Future Framework sets out a number of key actions, future directions and intergovernmental dependencies that will be addressed through subsequent policy to develop and initiate the long-term, plan-led approach to Ireland's ORE future.

Executive Summary

This Future Framework Policy Statement will outline:

- **National ORE targets up to 2050**

Reiterate Ireland's ambitious targets of 5GW of ORE by 2030, 20GW by 2040; and at least 37GW in total by 2050.

- **Project development procedures, as follows:**
    - Government will continue to develop DMAPs (Designated Maritime Area Plans) and Routes to Market with due consideration of all relevant legislation, obligations and policies, including those related to biodiversity protection and enhancement.
    - MARA will develop the future Maritime Area Consent (MAC) process within ORE DMAPs
    - Grid assessments and grid offers will be made by the Commission for the Regulation of Utilities (CRU) and EirGrid
    - Development Permissions will be assessed by An Bord Pleanála (ABP) and Coastal Local Authorities.

- **Resourcing off the coast of Ireland**

Gross technical resource capacity assessment, in gigawatts in Ireland's Exclusive Economic Zone for ORE. It is important to note this assessment does not take into account other constraints, such as environmental constraints, economic constraints or other maritime activities which will be evaluated and assessed at DMAP stage in line with the relevant provisions of the MAP Act.

- **Future ORE data acquisition strategy**

Access to high-quality data on our maritime environment, will help to form a rounded picture of how Ireland can sustainably develop our ORE potential. The Irish Government is committed to significantly scaling up the collection of social, economic and environmental data on the maritime environment to support the ORE DMAP establishment process and the development of associated environmental assessments.

- **Domestic and industrial considerations**

Ireland's ORE future will be developed in consideration to domestic demand and supply chain expansion, grid infrastructural requirements, port facility build-out and other domestic elements. Surplus ORE will be exported directly as electrons to neighbouring jurisdictions by interconnection or converted into alternative energy products and services that can be fed into international markets, such as renewable hydrogen and derivatives.

- **ORE export opportunity potential**

Economic analysis suggests that Gross Value Added (GVA) could sum to €69 billion over the lifetime of the projects – between 2022 and 2060 – including an additional €8.8 billion in GVA accrued to the State by 2050 purely through exports independent from employment benefits and GVA associated with domestic uses.

- **Economic return to the State**

Financial measures including royalty structures and community benefit funds have been analysed for their economic potential across various forecasted future ORE market scenarios and this analysis will inform future iterations of these measures.

Background

The Phase Two Policy Statement[4] adopted by Government in March 2023 provides for a plan-led, centralised approach to future ORE delivery in Ireland, previously indicated in the 2021 Policy Statement on the Framework for Ireland's Offshore Electricity System[5]. The move to a plan-led approach for ORE development in Ireland has taken place within the overarching frameworks of EU and national Marine Spatial Planning (MSP) policy and legislation. The first proposed South Coast DMAP[6] was initiated as a response to energy security requirements, however future DMAPs under the Maritime Area Planning (MAP) Act[7] will explore the untapped potential of ORE in Irish Waters, in a method which keeps pace with technological advances.

Maritime Spatial Planning

The EU Maritime Spatial Planning (MSP) Directive provides for the establishment of maritime spatial planning at EU Member State level, including with regard to the development of ORE, which must take place according to an ecosystem-based approach and include opportunities for public participation. In line with the MSP Directive, the National Marine Planning Framework (NMPF)[8] was adopted by Government in May 2021 as Ireland's first statutory maritime spatial plan. In order to facilitate sustainable maritime spatial planning, inter alia in a manner that ensures environmental protection and comprehensive public participation, the NMPF commits Government to the use of sub-national forward spatial planning through the establishment of Designated Maritime Area Plans, or DMAPs. It provides that DMAPs may be used to develop multi-activity area plans; to promote use of specific activities (such as ORE); and/or for the purposes of the sustainable use and protection of particular marine environments.

National policy context

ORE policy and ambitions are developed within the broader context of both national, EU and international climate, energy and environmental policy and legislative frameworks. The

[4] https://www.gov.ie/en/publication/f3bb6-policy-statement-on-the-framework-for-phase-two-offshore-wind/

[5] https://www.gov.ie/en/publication/5ec24-policy-statement-on-the-framework-for-irelands-offshore-electricity-transmission-system/

[6] https://www.gov.ie/en/consultation/eb17b-south-coast-designated-maritime-area-plan-dmap-proposal/

[7] https://www.irishstatutebook.ie/eli/2021/act/50/enacted/en/html

[8] https://www.gov.ie/en/publication/60e57-national-marine-planning-framework/

Future Framework builds on previous commitments, strategies and directions as outlined by both national policy – including the Climate Action Plan, the National Energy and Climate Plan, the NMPF, the National Planning Framework, the National Policy Statement on Interconnection 2023[9], and the National Hydrogen Strategy[10] – and EU policy such as RePowerEU[11] and the EU Strategy on Offshore Renewable Energy[12].

Ireland's Offshore Wind Delivery Taskforce (OWDT) was established in April 2022 to drive delivery of offshore wind targets in the Climate Action Plan, and to mobilise the Irish economy towards realising associated economic and societal opportunities through effective cross-Government collaboration. Membership of the OWDT, chaired by the Department of the Environment, Climate and Communications (DECC), comprises senior officials from the Government Departments and Agencies considered vital to the delivery of Ireland's ORE ambitions.

Among others, relevant objectives of the OWDT include:

- Developing a consolidated plan, collating all activities underway across departments and agencies to ensure delivery of offshore wind and related targets as set out in the Programme for Government and Climate Action Plan, ensuring the potential economic and societal benefits from establishing the offshore wind industry are maximised; and
- Ensure alignment in the development of the ORE sector with work being progressed to improve and protect marine biodiversity through designation of Marine Protected Areas (MPAs), Marine Special Areas of Conservation (SACs) and Marine Special Protection Areas (SPAs) and implementation of the Birds, Habitats and Marine Strategy Framework Directives more broadly.

The 2023 Key Actions of the OWDT were published in March 2023[13] across all workstreams including supply chain, ports policy, skills and workforce, and regulatory consenting. A progress report will be submitted for Government approval in Q1 2024, with publication soon afterwards, including Key Actions for 2024.

[9] https://www.gov.ie/en/publication/3d96f-national-policy-statement-on-electricity-connection-2023/

[10] https://www.gov.ie/en/publication/624ab-national-hydrogen-strategy/

[11] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en

[12] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A741%3AFIN&qid=1605792629666

[13] https://www.gov.ie/en/publication/c8749-offshore-wind-delivery-taskforce/

A key workstream of the OWDT is the development of this Future Framework policy document for offshore renewable energy policy beyond 2030.

A phased approach to ORE

To reach Ireland's commitments to reduce emissions by 51% and have 80% of electricity generated by renewables by 2030, a target of 5GW of ORE must be in operation by the end of the decade.

Phase One is intended to deliver the maximum competitively procured offshore wind capacity at the earliest feasible deployment stage, with the six most advanced offshore wind projects in Ireland awarded rights to occupy seabed via Maritime Area Consents, or MACs, in 2022 in order to participate in Ireland's first competitive offshore wind auction in 2023, known as ORESS 1. This was the largest renewable energy auction in the history of the State and procured over 3GW of capacity across four projects on the East and West Coasts[14]. A further 1.2GW of capacity across the two projects unsuccessful in this auction have a time-limited opportunity to secure an alternative route to market, totalling over 4.2GW in this phase. A recent regulatory decision[15] has clarified the grid pathway for non-ORESS 1, or merchant Phase 1 projects. Therefore, all six Phase One projects now have seabed rights, a grid pathway and are actively engaged in the planning process ahead of formal application for planning permission from An Bord Pleanála in 2024. Deployment in this phase is expected to take place over 2028-2030.

Phase Two aims to procure the remainder of Ireland's 5 GW capacity target by 2030 through further competitive ORESS auctions, with all future offshore wind developments to be plan-led and located within marine zones designated as suitable for offshore wind development, known as Designated Maritime Area Plans, or DMAPs. The plan-led approach and designation of renewable energy development areas by the State through DMAPs and, separately, grid access requirements[16] aims to provide greater investment and planning certainty for ORE projects. The first proposed DMAP, on the South Coast, will identify marine areas for development of fixed bottom offshore wind for delivery by both 2030 and post 2030. Fixed bottom offshore wind is more cost effective in the short term, has been delivered at scale in other jurisdictions, and offers the best prospects for the accelerated delivery of future offshore wind at an affordable cost to Irish electricity consumers in the next

[14] https://www.eirgrid.ie/industry/renewable-electricity-support-scheme-ress#ORESS%201

[15] https://cruie-live-96ca64acab2247eca8a850a7e54b-5b34f62.divio-media.com/documents/Grid_Connection_Pathway_for_Phase_-

[16] Offshore-Grid-Connection-Pathway-for-Phase-2-Proposed-Decsion.pdf (divio-media.com)

5-10 years. Once a DMAP is approved by Government and the Oireachtas, it has a statutory basis which will guide future planning application decisions. The South Coast DMAP is expected to be submitted for Oireachtas scrutiny and approval by summer 2024.

The final phase of offshore wind deployment is referred to as the Future Framework, which builds on previous ORE policy both published and in development, is informed by all previous public consultation carried out by DECC and is complimented by independent economic analysis commissioned by DECC. The intention is that following consultation, the draft Future Framework policy will be submitted for Government approval and publication by March 2024, to coincide with the publication of the National Industrial Strategy Roadmap by the Department of Enterprise, Trade and Employment (DETE).

Components of an ORE system

To realise Ireland's potential of offshore renewables extensive build-out of the appropriate structures is required, all which are governed by distinct authorities and regulatory procedures.

Physical components include specific ORE technologies, grid infrastructure including private wires and bootstrapping, port and O&M facilities, energy storage mechanisms, interconnection components, and the developing renewable hydrogen industry.

Technological innovation is constantly altering system efficiency, price, and regulatory constraints but will ultimately drive industry participation and enhance Ireland's competitiveness in global markets.

Key Components of an ORE System:

a) Technology

All ORE technologies will play a vital role as we aim for 20GW of ORE generation by 2040 and 37GW by 2050. This includes both fixed-bottom and floating offshore wind turbines as well as other ocean energy generation including wave and tidal devices.

- **Maximisation of more competitive technologies:** Each of the ORE technologies above have their own costs and technical considerations and thus have varying degrees of commercialisation. It is imperative that more competitive technology resources are maximised while simultaneously preparing for additional technology to mature. Innovation is driving larger capacity machinery as well as the potential for marine multipurpose sites and ORE technological co-location and the emerging opportunity for biodiversity enhancing infrastructure.

- **SEAI Technology Roadmap:** Key ORE technologies and future innovation will be detailed within the upcoming Technologies Roadmap being developed by the Sustainable Energy Authority of Ireland (SEAI). Innovative technologies will also play a role in data collection and management facilitated by remote operating vehicles and artificial intelligence; advanced cabling and grid infrastructure design including interconnection; energy storage mechanisms; and hydrogen electrolysis and related technology.

b) Grid

Given the targeted increase in offshore capacity, Ireland's electricity grid must be strengthened leading up to 2040. Grid development will accommodate the greater electricity supply and demand, variability in renewable generation, and spatial discrepancies between energy generation and demand centres. This means bolstering and reinforcing existing and developing new grid infrastructure through increased construction of cables, overhead lines, substations and other infrastructure. To meet the vast demand for grid build-out, we anticipate a role for private wire development and bootstrapping connections.

c) Storage

Due to the inherent intermittency of wind and ocean energy, discrepancies between supply and demand necessitate energy storage mechanisms including batteries, pumped hydro, electric vehicles, and renewable hydrogen. There are several battery options available including short-term lithium-ion batteries ranging from two to eight hours and longer term 100-hour iron-air batteries. Energy storage options should consider storage duration, generation technology cost, additional storage costs, reliability, and storage space.

d) Interconnection

Another method for ensuring security of supply is interconnecting electricity markets between neighbouring jurisdictions. Exporting electricity can represent a source of revenue to the country of origin contingent on energy price differentials between importing and exporting jurisdictions. Currently, the predominant technology for electricity interconnection are point-to-point interconnectors. The upcoming DECC Offshore Transmissions Strategy will explore the potential to develop multipurpose interconnectors in Ireland.

e) Renewable hydrogen

As described by the National Hydrogen Strategy, renewable hydrogen production through electrolysis addresses carbon emissions while also improving Ireland's energy security.

Additionally, by diverting surplus electricity generation into electrolysers electricity curtailment is minimised. Renewable hydrogen effectively stores electricity for use in its generated form or it can be converted into derivatives such as ammonia or methanol, which could substitute carbon-intense fuels in the aviation and maritime industries and in high temperature refining or industrial processing industries such as steel manufacturing.

f) Ports

Port facilities are required during various project stages including installation, operations and maintenance, and decommissioning. Distinct infrastructures are required depending on the technology, particularly in the case of fixed bottom compared to floating wind. Extensive resources are required to build, store, repair, and tow out machinery to project sites. This will include physical space and buildings to carry out activities both in onshore facilities and in offshore wet storage, access to various vessels, and proximity to other components of the supply chain. A dedicated workstream of the OWDT, led by the Department of Transport, is driving the development of Irish ports to meet these needs.

The Future Framework policy sets out the evidence base for Ireland's ORE targets as well as commits to the plan-led approach by outlining key priorities and processes to ORE delivery from 2030 to 2050. This includes identifying realistic potential for ORE generation as well as interconnection and renewable hydrogen production post-2030. Additionally, this document consolidates information provided by existing policy to clarify the regulatory pathway to successful delivery including any opportunities or barriers to implementation. Crucially, the Future Framework policy outlines how a plan-led approach will link all relevant components of the energy system, streamline the ORE consenting process, and integrate key priorities – such as environmental assessments and consultation processes – into the foundation of a sustainable regime for ORE delivery in Ireland.

1 Practical considerations

1.1 The Future of ORE

Ireland has commitments for renewable electricity to reach 80% of demand by 2030 and extensive plans to electrify end uses as outlined in the Climate Action Plan. Ideally, grid capacity should maximise the amount of ORE landed in Ireland resulting in significant in-

country benefits. As examined in EirGrid/SONI's Tomorrows Energy Scenarios[17], energy demand in Ireland is expected to at least double largely as a result of increased electrification, especially in the transport and residential sectors.

Domestic utilisation of the greatest possible proportion of indigenous ORE should maximise climate, economic and social benefits for Ireland. Domestic demand opportunities will be further examined by the upcoming National Industrial Strategy for Offshore Renewable Energy currently being developed by DETE. Additional domestic demand opportunities and associated considerations are further considered in Section 2. Any surplus ORE will be exported directly as electrons to neighbouring jurisdictions by interconnection or else converted into products and services that can be fed into international markets, such as renewable hydrogen and derivatives. Ireland ORE export ambitions and rationale are further analysed in Section 3.

Given the domestic demand and export considerations, Table 1 outlines the targets for ORE delivery in Ireland along with anticipated timelines. The ORE capacity ambitions are consistent with the ambitions of the revised EU TEN-E Regulation[18], as well as Ireland's climate and energy commitments – including the goal to become an annual net exporter of ORE. Our ambitions take into consideration practical constraints such as environmental concerns, area limitation for other marine activities, and project costs. Timelines have evolved from assumptions on technology readiness, policy and consenting processes, and project planning and construction. These targets are ambitious but necessary in order to meet Ireland's commitments to become a net zero economy by 2050.

Table 1: ORE generation capacity targets from 2030 to 2050

	2030 target	2040 target	2050 target
Generation capacity (GW)	5	20	37

Action Item

[17] https://www.eirgridgroup.com/site-files/library/EirGrid/Tomorrows-Energy-Scenarios-2023-Consultation-Report.pdf

[18] https://energy.ec.europa.eu/topics/infrastructure/trans-european-networks-energy_en

1. Conduct a study to assess the potential to deploy floating offshore wind in Irish waters, taking account of the upcoming first dedicated floating wind auctions to take place globally, including in France, in 2024.
2. Investigate the feasibility of a floating offshore wind demonstrator site.
3. Maintain State support for our existing or planned test sites and explore the feasibility of supporting additional test sites.
4. Conduct an analysis to determine the economic and practical viability of various innovative ORE technologies.

To meet these ambitious targets the plan-led approach to ORE is coordinated across all relevant Government Departments and agencies by the OWDT to deliver the necessary policy and regulatory development, financial supports for projects, grid build-out, port development, supply-chain management, opportunities for skills advancement, domestic demand prospects, and structures for export of ORE. Opportunities for domestic industrial uses and other domestic considerations are further examined in Section 2 of this document. Electricity interconnection will support the potential export of ORE that is surplus to domestic supply and improve energy security. ORE deployment post-2030 however will no longer be strictly limited by grid availability, with a range of potential applications for green products and services (including green hydrogen and green data), which may be entirely off-grid, or with a partial connection only to the domestic grid. In this way, at least 2GW of non-grid limited capacity is targeted to be in development by 2030. Ireland's interconnection and renewable hydrogen opportunities and considerations are based on robust economic analysis as described in Section 3 of this document.

1.2 Pathway to success

This section provides a detailed pathway for ORE projects under the plan-led regime in the post 2030 period, including timelines relative to other objectives and deliverables. The framework also highlights a requirement for further policy development to ensure timelines are met, eliminate delays and meet Ireland's ORE targets.

From 2030 onwards, all ORE development in Ireland will be led by the State including through the establishment of DMAPs, project auctions such as ORESS and other routes to market, grid connections, planning permission, environmental considerations, grid build-out and connections, increasing domestic demand opportunities, developing export markets, and establishing a financial return to the state and local communities. Government will play an increasingly involved role during pre-construction stage ORE development, including through the oversight and commissioning of marine surveys and environmental

assessments, and providing guidance on project design envelopes. This is the plan-led approach. Government will work with industry to ensure ORE operations are undertaken with utmost consideration of cost-competitiveness and delivery timelines.

There are several key priorities that will remain at the centre of the Future Framework.

i. Environmental concerns

Environment considerations and protection is of the utmost priority during the development of new ORE projects in Ireland's maritime area. As such environmental concerns must be at the forefront of the plan-led approach, from project planning to project decommissioning. An emphasis should be placed on taking an ecosystems-based approach with full consideration for the protection of marine environment and biodiversity as required in the DMAP process under the regulations set forth by the MAP Act. This approach is also crucial to assessing cumulative impacts such that co-location of various marine activities with ORE development does not present additional and significant detrimental effects.

The ORE planning and development process must comply will all relevant environmental legislation including Environmental Impact Assessments, Strategic Environmental Assessments and Appropriate Assessments, as required. Environmental surveys and consultations with relevant environmental groups and interest parties are required. Following proper environmental procedure, in part facilitated by data collection and data sharing as well as extensive consultation practice, will streamline the consenting process for ORE projects.

ii. Public and stakeholder consultation

In line with the NMPF, opportunities for comprehensive public participation will remain central to the establishment of future Government ORE policy and development of ORE and associated infrastructure. In particular, targeted engagement will take place with local coastal communities and other marine users in order to avoid, minimise and mitigate impacts of the development of ORE and associated infrastructure.

iii. Return to the State and local communities

The delivery of ORE will seek to maximise associated economic benefits to the State and to relevant local communities. Particular focus will be given to affordability for households and businesses in line with the commitments set out under the package for

Energy Security in Ireland to 2030[19]. For the State this means securing the maximum investment return for the export of electricity and energy products, fair royalty payments such as sea-bed levies for the use of State assets, development of indigenous supply chains through opportunities arising in the construction and operational phases of ORE projects, and knowledge sharing and dissemination to foster the development of indigenous ORE enterprises. For local communities this means enhanced and diversified career opportunities within their coastal communities and direct investment by ORE project developers in local communities during the construction and operational life of ORE projects, including through mandatory Community Benefit Funds (CBFs).

iv. Cost competitiveness

Specific ORE competitiveness varies given that some technologies are more viable for commercialisation since expenditure varies significantly between projects depending on scale, geographic location, generation profile and technology. To meet ORE targets, Government will support a diverse landscape of ORE technology supplied through various developers including through efforts to attract investment opportunities. Additionally, efforts will be made to promote economic returns to the State and local communities associated with the development of ORE that will target energy exports in international markets, particularly in the UK and the EU. There should be an emphasis on increasing access to international markets, reducing production costs in Ireland and analysing price differentials and policy constraints to ensure the highest cost-competitiveness of Irish exports.

v. Delivery of targets

Ireland will meet its energy and climate commitments if ORE development continues in alignment with previously outlined timelines. Timeline adherence will be impacted most significantly in the planning and development stage of ORE development including spatial mapping, project planning, consenting applications, environmental assessments, determining a route to market, and project investment in addition to securing supply chain components and construction. A strong emphasis will therefore be placed on streamlining government procedures while signposting relevant timelines to ensure advanced investment opportunities.

vi. Availability of relevant data

[19] https://www.gov.ie/en/publication/5c499-energy-security-in-ireland-to-2030/

Access to high-quality information and data on our seas and on the maritime environment, including data of a technical, economic, social and environmental nature, will help inform how Ireland can sustainably deliver our ORE potential. The integration of high-quality evidence and data into these processes will create conditions that bring investment certainty and strong competition to the Irish ORE sector while elucidating the impact of ORE policies on the environment and on wider society.

vii. Technology and Supply Chain Development

The development of indigenous supply chain capability, new innovative technologies and the potential for Ireland to maximise the value of the offshore energy opportunity is clear. This will in the short-term focus on the domestic supply chain demand, but also for the global export market. The global market for offshore wind, predicted to be 2.5TW by 2050 should be a target for Irish exporting companies and Multinational development in Ireland. Development sites must also be established in context of access to relevant components of the supply chain including jobs and skills, specifically focusing on educating and enabling a higher proportion of Irish local content and supporting innovation.

viii. Industrial alignment including infrastructure, port facilities

ORE project sites must be located within economic distance to key onshore and offshore infrastructure. Cables must be constructed in concert with ORE projects whether the intent is to land energy generation domestically or to export via interconnectors. Project construction is enabled by port facilities capable of building, storing, and transporting components as well as proximity for ongoing operations and maintenance activities.

Questions
1(a) Has this section adequately identified the general key priorities for ORE delivery in Ireland? Are there additional priorities that should be integrated into the holistic, plan-led approach?
1(b) Has each key priority been adequately described and considered all relevant components? For each key priority please provide any additional concerns, aspects or commentary for inclusion.

1.2.1 The plan-led process

The plan-led process is underpinned by a series of related but independent processes and components, each regulated by distinct competent authorities. Each relevant component is detailed below:

1.2.1.1 ORE Designated Maritime Area Plans

An important step in advancing the plan-led approach is the use of marine spatial planning, and specifically the requirement to establish Designated Maritime Area Plans (DMAPs) according to provisions within the MAP Act, 2021. DMAPs will determine the marine areas where all future ORE projects can be developed and will act as a management plan for specific areas of our marine waters. In line with provisions in the MAP Act, the Minister for the Environment, Climate and Communication has been designated as the competent authority for the purposes of preparing ORE DMAPs.

The use of sub-national forward maritime spatial planning such as DMAPs, will ensure that future developments in Ireland's maritime area take place in a managed, strategic and sustainable way. As required under the MAP Act, the establishment of DMAPs will take place according to an ecosystem-based approach, with full consideration for the protection of marine environment and biodiversity. It will provide comprehensive opportunities for public and stakeholder engagement, and most importantly for local coastal communities.

Public engagement and statutory consultation will ensure that future development of ORE takes place with consideration of other marine activities and usages, including fishing, aquaculture, marine tourism and marine leisure, which are vital amenities and sources of income and employment for many coastal communities.

The stages for DMAP establishment are as follows: publication of DMAP Proposal; DMAP Proposal area refinement through ongoing public and stakeholder consultation(s), Strategic Environmental Assessment, and other expert analysis of maritime areas to assess suitability for ORE development; publication of a draft DMAP; commencement of statutory consultation period; and the approval to be sought of both Houses of the Oireachtas.

The plan to establish an initial South Coast DMAP for ORE was approved by both Houses of the Oireachtas in May 2023. Following publication of a South Coast DMAP Proposal in July 2023, and subsequent periods of extensive 10-week public consultation, approval of both Houses of the Oireachtas will be sought for the South Coast DMAP in summer 2024. The South Coast DMAP will identify marine areas for development of ORE for deployment by 2030 and post 2030. It is further anticipated that further future ORE DMAPs will be announced by summer 2024, with the location and timing of these plans to be determined by the evolution of Government energy and climate policy, and decarbonisation objectives.

For the avoidance of doubt, State-led development means that DECC, in consultation with other Government departments and agencies such as the National Parks and Wildlife Service (NPWS) and Department of Agriculture Food and the Marine (DAFM), decide where

the ORE generation development sites will be situated as defined under Article 22(2)(c) of the MAP Act. This will be done through DMAPs. All supporting infrastructure, including and in particular grid, will align or as may be the case, review their strategies to ensure timely and efficient delivery of electricity from these sites.

Action item
5. Provide the structures and supports necessary to establish a future DMAP roadmap including timeline for deployment including DMAPs catered towards various technologies such as fixed, floating, wave and tidal. This roadmap should be produced in accordance with all relevant legislative and regulatory processes and in alignment with technology maturity and offtake availability.

1.2.1.2 Maritime Area Consent

The Maritime Area Regulatory Authority (MARA), established on 17 July 2023, marks the transition to the new maritime consenting regime. The new agency has responsibility for assessing applications for rights to occupy seabed, known as Maritime Area Consents (MACs). MACs are required ahead of planning application stage, the granting of site investigation licences for surveying, and the enforcement of both MARA and An Bord Pleanála decisions in the maritime area. Once a given DMAP is established, MARA will launch a process for a MAC, which could be based on pass/fail criteria (as per Phase One), integrated with a competitive process (as with ORESS 2.1) or a stand-alone competitive process.

MARA is keen to explore the potential to develop a competitive MAC process in a sustainable manner in collaboration with its key partners and stakeholders. Experience from other jurisdictions can inform how we develop this policy. This will signal a long-term ambition for ORE development in Ireland, build confidence in supply chain and provide certainty to civil society and consenting bodies in respect of robust forward planning.

Action item
6. Continue to support streamlining of the consenting process for ORE projects including support of necessary environmental procedures and a competitive MAC process with indicative timelines for implementation.

1.2.1.3 Route to market

The State supports for the development of ORE to date, for Phases 1 and 2 has taken place through the Offshore Renewable Electricity Support Scheme, ORESS. This scheme comprises competitive auctions which invites renewable energy developers to compete against each other in order to select the optimal project developer. Winning bidders are

awarded 2-way Contracts for Difference, financed by the Public Service Obligation (PSO) fund, which itself is financed via levy on electricity consumer bills. When the Irish wholesale market price is lower than the price secured at auction (the strike price), the generator is supported by the PSO fund up to this strike price, and conversely, when the wholesale price is greater than the strike price, the generator refunds the difference back to PSO fund. This mechanism reduces costs both for generators and consumers by providing price predictability, enhancing financial viability and competition, while also protecting consumers against price shocks. To enhance the competitiveness of Ireland and minimise costs borne by the Irish consumer, deliverability and cost reduction have been the priority outcomes of this process to date.

The ORESS scheme expires at end-2025, with the last auction, ORESS 2.2, provisionally scheduled for 2025. A successor scheme is therefore required, and in order to avoid a stop-start in the market, this new scheme, must be designed, State-Aid approved and operating by 2026.

Design parameters for this new scheme are broad, but at a minimum the development phase, to take place in 2024, will consider:

- accounting for the very high levels (80%+) of variable renewable electricity on the Irish system from the mid-2030s, including by considering variable support levels depending on time of generation or the level of curtailment on the Irish electricity system at a given interval;
- integration with other electricity market interventions such as capacity auctions and procurement of system services;
- broadening support from renewable electricity to renewable energy, enabling support for renewable fuels such as green hydrogen, which would require consideration also of broadening financing of the scheme beyond electricity consumers;
- pre-qualification and award criteria to include qualitative criteria to achieve other policy objectives such as cybersecurity, energy security, environmental protection and a thriving and competitive EU ORE manufacturing and supply chain, specifically taking account of the Net Zero Industries Act (NZIA)[20], and the European Wind Charter[21], signed by Ireland in December 2023.

[20] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan/net-zero-industry-act_en

[21] https://energy.ec.europa.eu/document/download/c302f43f-2592-455e-99e2-e14aed3dd871_en?filename=European%20Wind%20Charter%20signed%20without%20logos.pdf

In addition to the successor scheme to ORESS, alternative routes to market are emerging in other offshore markets, such as project financed by merchant means or via Corporate Power Purchase Agreements (CPPAs). In addition, new types of projects, such Power-to-X, interconnector-hybrid projects or non-grid limited projects (this could include projects that are shallow connected to the transmission grid) may require bespoke supports or frameworks to achieve broader objectives. Export only projects will also be supported via EU mechanisms such as the Joint Projects or the Cross Border Project processes.

At a minimum Ireland has committed, at the North Seas Energy Ministerial in November 2023[22], to procure over 11.5GW additional offshore wind capacity by end-decade, comprised of 2GW of non-grid-limited connected capacity and at least 9.5GW of capacity to be procured via the successor scheme to ORESS. This 2GW capacity is intended to provide the initial step to addressing challenges associated with grid limitations and will be procured in coordination with existing ORE development plans.

Action item

7. Maintain a single schedule for all upcoming State tenders for ORE, including non-grid limited ORE, in alignment with Action 5.
8. Design a competitive process to procure 2GW of non-grid limited capacity in 2025, to be in development by 2030.
9. Develop and obtain State Aid clearance for a successor support scheme to ORESS, be in operation from 2026-2030, to procure at least 9.5GW for deployment from 2033.
10. Assess the enabling supports and/or frameworks that may be required to maximise capacity from alternative routes to market.

Questions

1(c) How best should the 2GW of non-grid limited offshore wind capacity be procured?

1(d) What are your views on the design parameters for the successor scheme to ORESS, what else should/should not be considered?

1(e) What frameworks and/or supports are required for alternate routes to market such as CPPAs, Power-to-X projects, interconnector-hybrid projects and export projects?

[22] https://energy.ec.europa.eu/document/download/95a9abc5-aa53-41a3-8330-4aa70381b2ed_en?filename=231117%20NSEC%20tender%20planning%20-%20November%202023_0.pdf

1.2.1.4 Grid connection

A key advantage of the plan-led system is that onshore and offshore transmission can be proactively planned and developed towards marine areas designated as suitable for ORE deployment. Government and the CRU will continue to develop an appropriate regulatory framework that maximises long-term societal value by enabling anticipatory investment in transmission infrastructure, futureproofing our onshore and offshore grid and streamlining the grid connection process.

1.2.1.5 Development (planning) permission

Following the receipt of a MAC, a project is required to obtain development consent in the form of a planning permission as set out in the MAP Act. The responsibility to grant development permission falls to An Bord Pleanála (ABP). As part of the planning permission procedure, ABP will request and assess all appropriate environmental assessments. Development of other elements of the ORE system may require permissions under Local Authority governance, such as ports and O&M facilities.

1.2.2 Infrastructural Alignment

Aligning infrastructure efficiencies is intended to consolidate the vast structural and interdepartmental complexities throughout the ORE planning and development process. Infrastructure alignment will occur with consideration to DMAP designation, availability of marine data, environmental and cumulative impact analysis, quality of offshore resources, proximity to demand opportunities, access to port facilities, availability of supply chain components, coordinating generation capacity and grid infrastructure, implementation of energy storage mechanisms, facilitation of electricity interconnection with reference to curtailment risk, and available routes to market.

Action item
11. Rollout of EirGrid's Grid Implementation Plan and future iterations to aid in the alignment of infrastructure efficiencies in a manner which considers offshore generation, grid, and routes to market. 12. Within a regulatory review of CRU and EirGrid, consider provision for seeking an expansion of capacity to provide for proactive, anticipatory investment in onshore and offshore grid.

Table 2: Summary table of the plan-led process components during the ORE development stage.

Development stage	Description	Competent Authority	Dependencies

DMAP	A broad area within which ORE projects can be developed within specific sub-areas identified for that purpose by Government.	DECC	• SEA/AA assessment • Public and stakeholder consultations • Oireachtas approval
MAC	A consent to occupy a defined maritime area.	MARA	DMAP
Route to market	An agreement to retail electricity often at an agreed price	DECC Private sector Third country	DMAP
Grid offer	An agreement for generation to connect to the grid	CRU	DMAP
Development permission	Consent for the physical development of ORE projects including construction, operations, and decommissioning.	ABP	DMAP, MAC

Action item

13. Align resourcing needs across Government Departments and agencies to ensure all Government bodies in relevant marine and ORE disciplines are properly resourced to discharge the expanded responsibilities as set out under the Future Framework.

1.2.3 Role of the State and the role of industry

The success of Ireland's future ORE development depends on collaboration across Government Departments and Agencies, as well as between government and industry.

DECC will continue to engage with colleagues in the Department of Enterprise, Trade and Employment (DETE), the Department of Public Expenditure, NDP Delivery and Reform (DPENDR), DAFM, SEAI, NPWS, Geological Survey Ireland (GSI) and Eirgrid among others.

Government recognises the crucial role that industry holds, and will continue to hold, in the future of plan-led ORE development. Ongoing industry participation will involve intensive consultation across a range of topics. Feedback is encouraged regarding practical

considerations for DMAP delineation, price competitiveness, promoting technological innovation, and aiding in data collection for site selection.

Questions
1(f) What additional capacities and responsibilities should be held by industry in the context of the plan-led approach?
1(g) How can Government facilitate a more comprehensive and streamlined engagement process with developers to ensure national ORE targets are delivered?

1.3 Resource assessment and considerations

1.3.1 Marine data

Access to high-quality information and data on our seas and on the maritime environment, including data of a technical, economic, social and environmental nature, will help form a rounded picture of how Ireland can protect the marine environment and biodiversity as we deploy our world-recognised ORE potential. As we move forward with our plan-led approach for ORE, Government is committed to significantly scaling up the collection of data on the maritime environment to support the ORE DMAP establishment process and associated environmental assessments as required under Article 22 of the MAP Act 2021. The integration of high-quality evidence and data into these processes will create conditions that bring investment certainty and strong competition to the Irish ORE sector while also helping us better understand the impact of our policies on the environment and on wider society. It will support and inform the ecosystem-based approach to designating areas in our seas for ORE through DMAPs, to ensure that environmental impacts of ORE are minimised in line with relevant NMPF policies. It will also provide the opportunity to explore and maximise opportunities for coexistence of different maritime activities with future ORE developments.

As prescribed by the Map Act, ORE delivery must be supported by extensive data including areas of potential constraint on ORE deployment, environmental factors, socio-economic factors, including fishing and shipping, and heritage factors (non-wildlife heritage such as shipwrecks). A priority is to collect, analyse and utilise valuable data with respect to technical opportunity for ORE related to geophysical, geotechnical and metocean data; environmental and biological data; maritime activities data including human usage like fisheries; and other barriers such as topographical and heritage site data.

Under the MAP Act, data should be collected using a coordinated, efficient, and pro-active approach and be made more readily open and accessible to improve transparency and project planning efficiency. Research must be conducted in alignment with data standards

and be adaptive as per continuous monitoring and adaptation principles. A range of EU and national policy documents, including the Public Service Data Strategy 2019 – 2023[23], recognise the need for a more aligned integrated and consistent approach to data across Government, which enables the secure reuse of data and services. This could be adopted further with the development of a data strategy or policy targeted at ORE.

Government is committed to leading and coordinating stakeholders across the public sector, ORE industry, fishing industry, shipping and navigation, and research communities in the environmental and academic sectors to collaboratively share and produce data relevant to effective maritime spatial planning for ORE. Open sourcing of ocean data will more greatly inform the development of DMAPs and de-risk State auctions. As such, private data acquisition will become less competitively advantageous. DECC may procure data and related services as necessary to ensure the timely delivery of ORE climate and environmental targets. Additionally, DECC will work with Geological Survey Ireland and the Marine Institute to conduct surveys in areas where data is either unavailable or not forthcoming.

Action item
14. Procure, consolidate and publish all relevant data to support the open sourcing of ocean data available for the protection of the marine environment and biodiversity during development of ORE. 15. Establish a priority process to incorporate cumulative impact studies into the DMAP process as required by the MAP Act. 16. Conduct additional studies and data modelling to inform future ORE DMAP delineation given increasing frequency of weather extremes and future conditions. 17. Develop an overarching ORE data policy and governance statement.

1.3.2 ORE resources

A national-scale assessment was carried out by the Sustainable Energy Authority of Ireland (SEAI) to estimate the potential scale of opportunity for ORE technologies in Ireland's waters. The assessment considers the potential for wind, wave and tidal technologies. It involved:

1. Identifying and mapping the areas of Ireland's maritime waters where characteristics are most favourable to ORE development as a starting point; and
2. Estimating the overall theoretical potential for wind, wave and tidal technologies within these maritime areas through modelling carried out by the SEAI.

[23] https://www.gov.ie/en/publication/1d6bc7-public-service-data-strategy-2019-2023/

The theoretical and technical opportunities for offshore energy are based on assumptions on water depth, bathymetry, wind speed, tidal currents, and wave potential. It is important to note that these are theoretical potentials, based on gross geographic areas and significant assumptions. Certain environmental, economic and socio-cultural factors will reduce the sustainable potential of ORE in Ireland. However, technological innovation will increase ORE opportunity in Irish waters, for example, the understanding that fixed turbine technology will evolve to become viable in deeper water depths over the coming years, and the trend of larger and more efficient turbine machinery.

The total gross technical resource capacity for ORE technologies in Ireland is outlined in Table 3. These are estimates based in significant model assumptions and do not take into account other constraints, such an environmental constraints, technological constraints, economic constraints or other activities which will be evaluated and assessed at DMAP stage in line with the relevant provisions of the MAP Act.

Table 3: The gross technical resource capacity for various ORE technologies within Ireland's Exclusive Economic Zone.

Technology	Gross technical resource capacity (GW)
Bottom-fixed wind (10-70m)	62
Floating wind (70m-1000m)	579
Wave	23.8
Tidal	7.9

In addition to considering potential environmental constraints and other existing maritime activities and usages at DMAP stage, there will be areas in our seas that are less practical and economically viable to develop in than other areas depending on, for example, where grid infrastructure is located and how accessible development sites are to port facilities year-round during challenging weather conditions. Practical considerations to ORE delivery including domestic demand opportunities, grid infrastructure, port facilities and other considerations are further examined in Section 2. Some of these considerations will be more relevant than others depending on what the intended end use of the energy generated in question is, for example, connection to the national electricity grid for domestic consumption, electricity export, or to produce hydrogen or e-fuels. These considerations are driven by economic, practical, and logistical rationale as further examined in Section 3.

2 Domestic industry and infrastructure considerations

2.1 Domestic demand

It is intended to domestically capture the largest amount of ORE energy generation as possible. This requires a considerable build-out of domestic demand opportunities while maximising the value and development of Ireland's supply chain including jobs and skills. Capturing ORE generation in Ireland will require extensive electrification of end uses especially in the transport and residential sectors. New domestic industrial opportunities can also be created for existing businesses to expand operations or new businesses to locate in Ireland due to its potential abundance of green renewable energy. DETE are exploring domestic demand and supply chain considerations as part of the development of the National Industrial Strategy for Offshore Wind. The overarching objective of the Strategy will be to ensure that Ireland maximises the economic benefits associated with Government targets to deliver 37GW of offshore wind by 2050. This will include identifying measures to build a capable and resilient supply chain and to achieve the greatest economic impact possible arising from Ireland's future energy demand for our renewable energy.

It is intended that the Strategy will be an iterative piece of policy development, reflecting the timelines envisaged under the OWDT and prioritising the most immediate requirements of industry to deliver offshore wind energy (OWE) projects of scale. It is therefore intended that a first strategic roadmap will focus on measures to maximise Ireland's participation in the domestic and international OWE supply chain, in addition to setting out the main opportunities for Ireland to develop a globally recognised OWE RD&I to promote collaboration between SMEs, multinationals, and further and higher education institutes.

The initial Strategic Roadmap will also signpost subsequent Strategy development, including a scoping of additional measures required to develop enterprise opportunities associated with increased use of offshore wind energy in Ireland and export demand for energy derived from OWE. Future policy development is also expected to include a consideration of the co-location of industrial demand for renewable energy with development of large offshore wind projects, in line with the strategic direction of EirGrid and CRU, the National Planning Framework, and the NMPF.

The National Industrial Strategy for Offshore Wind – Strategic Roadmap is due to be published in Q1 2024 and is being developed in close collaboration with industry and key Government Departments and Agencies, and within the frame of the OWDT.

Action item
18. Work with DETE and other key stakeholders to explore potential investment incentives which could be developed to encourage both domestic investment opportunities and foreign direct investment in domestic supply chain facilities.

2.2 Grid infrastructure

Energy generated from ORE projects must be delivered to demand centres and as such ORE development must be aligned with onshore and offshore grid in domestic grid and interconnection export. Grid infrastructure is crucial to capturing as much energy in Ireland as possible. Grid capacity should not be a limiting factor leading up to 2040, as ORE targeted delivery has been established according to the Ten-Year Network Development Plan (TYNDP) and will therefore provide a roadmap for strategic development. Efforts are being made to align grid development at a national scale to coordinate appropriate infrastructural build-out. A functional grid system will include increasing capacity of existing infrastructure, involving private wire projects, developing HVDC and other bootstrap connections, constructing subsidiary infrastructure including substations and converters, and coordinating with proximity to ORE project development sites. Additionally, consideration must be given to ORE export ambitions through interconnection as this requires significant construction of both onshore and offshore grid capabilities.

Where the intended end-use of energy is connection to the national electricity grid for domestic consumption, it is important to note that project costs generally increase with distance of ORE developments to grid connection points. Energy transmission cables connecting project sites to the terrestrial electricity grid are currently particularly expensive components of ORE projects. These costs are ultimately borne by electricity consumers. From the perspective of ensuring that the best price of electricity for end-users can be secured, distance from a generation site to grid connection points is therefore a key consideration in the development of ORE.

In addition to connections to terrestrial and international electricity grids, the optimal locations and configurations for the necessary enabling infrastructure such as substations and offshore converter stations is a key consideration in the development of ORE. This also includes future proofing of the infrastructure to enable phased development of generation through anticipatory investment. It is anticipated that private wire and HVDC bootstrapping connections will facilitate the requisite grid-buildout to achieve Ireland's ORE targets. A workstream under the OWDT is taking action to address the grid requirements of offshore

wind in Ireland. While DECC oversees this workstream, there is close collaboration with EirGrid to achieve described actions.

Questions
2(a) What grid infrastructure should be of particular focus in facilitating the build-out of capacity to support ORE generation targets?

2.3 Ports

ORE developments will typically require access to large-scale port infrastructure for project marshalling and assembly (M&A), and smaller-scale port facilities to provide ongoing operations and maintenance (O&M) services after ORE structures are installed. It is understood that project costs associated with construction and deployment of ORE wind farms can increase the further a development site is located from its associated assembly port. Additionally, the further away from an appropriate port(s) an ORE development site is located, the more challenging it is to access that project site year-round to support ongoing Operations and Maintenance throughout the lifecycle of ORE developments. This is due to the limited number of days annually that sites can be safely accessed during challenging weather conditions, particularly in winter seasons.

An economic analysis was conducted to assess the viability of Ireland's long-term ORE goals and export potential, as outlined in Section 3. This study indicates that a minimum of four port facilities in Ireland is required to meet 2040 and 2050 targets not including the Belfast port, which already has capacity to service ORE projects. This is consistent with the minimum Irish port capacity assessment conducted by the Irish Maritime Development Office (IMDO), which after assessing existing and planned port infrastructure in Ireland and abroad, concluded that at least four Irish deployment ports are required to deliver 2030 and 2050 targets. As recognised in the National Ports Policy 2013, commercial state ports have an important role in servicing the offshore energy sector and offshore energy was identified as an emerging capacity requirement at that time. The National Ports Policy is in the process of being updated by the Department of Transport and is expected to be published in 2025. Future directions on ports policy will be signposted by the Department of Transport as the relevant competent authority for Irish ports and co-ordinated by the OWDT.

2.4 Other considerations

2.4.1 Security of supply

Renewables energy generation is inherently variable given the intermittency of wind, wave, and tidal resources. Ensuring a secure energy supply is critical to ensuring the resilience of Ireland's energy system especially looking towards the 2050 net-zero economy ambitions as oil and gas alternatives will be less frequently available for system backup. Energy security will be facilitated by:

- **Thermal fleet:** Currently the thermal fleet and backup energy generation is reliant on gas generation. By 2050, around half of the existing (and thus old, by 2050) natural gas-fired capacity on the system may be replaced by hydrogen-fired capacity particularly for open cycle turbines. The capacity of the thermal fleet will need to increase on the back of rising demand to ensure security of supply, although the higher levels of renewables may mean this fleet runs increasingly infrequently.
- **High-capacity factor renewables:** High-capacity factor renewables, such as offshore wind in Irish waters which may reach capacity factors above 60%, reducing the need for energy storage solutions.
- **Battery fleet:** Battery storage expected to increase particularly in short and medium duration battery capacity ranging from 1-8 hours. There is also opportunity to introduce a limited amount of 100-hour battery capacity, for example from iron-air batteries. While batteries offer some energy security, they have limitations in their efficiencies and physical storage requirements.
- **Interconnection:** electricity imports from neighbouring jurisdictions helps balance electricity supply and demand between countries and provides a valuable back-up power supply for when electricity systems have reduced capacity. New interconnections will also allow for increased energy imports in the case of an adverse shock, which may occur during extreme weather events.
- **Long Durational Energy Storage:** In the long term as we move beyond an 80% RES power system, long durational storage of energy in the form of renewable hydrogen and its derivatives will be required to supply the Thermal Fleet and balance supply and demand across the system over longer durations spanning from weeks to potentially years.

2.4.2 Co-existence

Consideration must also be given to enabling co-existence of ORE project footprints with other maritime activities. Such activities may include fishing, aquaculture, tourism, transport,

energy generation including the potential for co-location with additional ORE, and other industrial activities. Co-existence approvals are complex, and efforts should be made to regulate such an approach appropriately in accordance with DMAP procedures with special reference to environmental concerns, personnel safety, reduction in efficiency of other activities, and risk to infrastructure. Given that available maritime area is limited, co-existence can also contribute to better defence and security methods.

2.4.3 Defence and security

ORE development sites must be managed appropriately to ensure the energy infrastructure itself is well protected from external activities while limiting repercussions to existing defence and security actions. For example, the large-scale deployment of ORE could have adverse impacts on air defence radars or at-sea patrols. Efforts must be made to protect Ireland's energy generation sites while maintaining the quality of existing responsibilities under the Department of Defence.

Questions
2(b) In relation to National Security/Department of Defence interaction with ORE development, are there any issues you would like to highlight?

3 Export potential

3.1 Interconnection

While increasing interconnection capacity is crucial to the achievement of ORE goals and compliance with broader EU commitments, care should be taken that interconnection is not over-installed. To facilitate interconnector delivery, future surveys and studies must be conducted to assess the practical barriers and risks associated with interconnector projects including seabed feasibility. Ensuring that meaningful engagement occurs with local communities and industries and collaboration with neighbouring jurisdictions is essential to project success. In striving to reach the objectives of the EU Green Deal[24], Offshore Bidding Zones (OBZs) have been identified by ENTSO-E as a promising means of facilitating the deployment of multi-purpose electricity interconnection solutions[25]. Future interconnector policy, including the upcoming Offshore Transmission Strategy, will examine the potential for

[24] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[25] https://www.entsoe.eu/outlooks/offshore-development/

a more holistic model of interconnection in Ireland, including the potential for multi-purpose interconnectors and associated OBZs. Please see Annex 1 for further detail.

Action item
19. Establish Offshore Bidding Zone Frameworks necessary to maximise utilisation of offshore renewable energy potential for domestic and international markets, in order to meet the objectives of the EU Green Deal.

3.2 Renewable Hydrogen

To deliver a functioning energy system and realise Ireland's ambitious targets for ORE capacity electricity interconnection must increase along with the development of a significant renewable hydrogen economy and new industrial demand opportunities. In Ireland, there is an opportunity to deliver up to 3.5Mt of renewable hydrogen production. An effective renewable hydrogen industry will require a multi-faceted approach including significantly increasing domestic demand, establishing a commercially viable ammonia and methanol industry, producing sustainable aviation fuels and other heavy transport demand, and installing a hydrogen pipeline to Europe to facilitate exports.

As set out in the National Hydrogen Strategy there is a focus on efforts to scale up the production of renewable hydrogen to support both our economy decarbonisation and energy security needs, given our vast indigenous renewable resources. It is envisioned that, renewable hydrogen uses in Ireland will play a role as a zero-emission source of dispatchable flexible electricity, as a long duration store of renewable energy, in decarbonising industrial processes, and as a transport fuel in sectors such as heavy goods transport, maritime and aviation.

Currently, domestic demand for renewable hydrogen is small and is expected to remain below 1TWh up to 2030. The economic analysis shows domestic demand expanding as much as 24TWh by 2050. To be economically viable, increasing domestic use for renewable hydrogen will require the establishment of new high demand hydrogen industries. The most promising opportunity is increased production of ammonia, particularly to meet Ireland's domestic fertiliser needs of which currently all demand is met by imports. Alternatively, renewable hydrogen could be diverted to methanol for refining purposes or sustainable aviation fuel industries; however, such production would need to be developed at considerable scale to be commercially viable.

European hydrogen demand will likely outpace supply underpinning the need for import in the near future. The predominant demand opportunities for Ireland's hydrogen and derivatives are located in northwest Europe, specifically in Germany though also to France

and the UK. Northwest Europe imports its hydrogen needs from North Africa and the Middle East, as well as facilitates production domestically. Ireland has an opportunity to enter this market given its proximity to demand centres.

Hydrogen production costs from dedicated ORE in Ireland are broadly competitive globally but maintains no outright competitive advantage relative to other European production economies. While this presents challenges in getting Irish products out to market, several tactics could boost the competitiveness of Irish hydrogen economics. The analysis suggests the most economically advantageous opportunity is to establish a pipeline to northwest Europe, likely developed from repurposed gas pipelines where possible, since shipping hydrogen is costly. Further studies and cooperation with other member states and neighbouring jurisdictions is required to explore the feasibility of a hydrogen interconnection pipeline from Ireland.

Additionally, diverting curtailed wind to hydrogen electrolysers reduces the opportunity cost associated with curtailed ORE generation. Another option is to prioritise the production of hydrogen derivatives which adds value to the supply chain, but production scale would have to increase considerably to be competitive. Finally, Ireland should strive to exploit first mover advantage as there is currently small quantities of hydrogen production in Europe relative to demand.

The scale of production and security of supply, especially in context of Ireland's extensive ORE target build-out, are the key selling points of Irish hydrogen. There is a clear opportunity to produce significant volumes at parity with other producers in NW Europe and consequently the key question is whether to scale up domestic industry or export. Hydrogen could be used in several different industries that are currently not present in Ireland. Such industry needs will need to be considered with regard to the infrastructure to support them. Careful consideration will need to be taken to ensure the industry matches the available production profile as well as the broader skills, infrastructure, and storage opportunities available in Ireland, even before considering global competitiveness. The approach to producing an effective, long-term hydrogen industry in Ireland is further outlined in the National Hydrogen Strategy.

Action item
20. Assess renewable hydrogen and renewable hydrogen derivatives transport options, including assessing the viability of potential hydrogen export pipeline routes by 2040.

3.3 Export opportunities and implications

Deploying 37GW of ORE in Ireland will result in a significant increase in revenue to the State as well as both direct and indirect job opportunities. An economic analysis was commissioned by DECC and conducted by consultants AFRY Managing Consultants and BVG Associates to support the ORE targets and export ambitions set out in the Future Framework Policy Statement[26]. The consultants applied a power system model using various ORE deployment capacities including a 16GW domestic net zero scenario and a 37GW export-focused scenario. This external analysis suggests that with 37GW ORE capacity the power sector in Ireland will reach net-zero emissions in advance of 2050, further examined in Annex 1 and supplementary materials.

The conducted economic market analysis further suggests that Gross Value Added (GVA) could sum to €69 billion over the lifetime of the projects – between 2022 and 2060 – assuming 37GW of ORE capacity and 12.2GW of interconnection. GVA was provided as the aggregate of labour costs and operation profits. Total in-country GVA could peak to about €2.4 billion in 2049. Of this value a total €8.8 billion in GVA could be accrued to the State by 2050 purely through exports of products and services related to ORE independent from employment benefits and GVA associated with domestic uses. Total GVA does not include employment benefit which could accrue to 820,000 full-time equivalent (FTE) years in Ireland between 2022 and 2060, reaching a peak of about 31,000 FTE in 2049. The methodology and results from the economic analysis can be further explored in the commissioned reports by external consultants, particularly in reference to workstream 4.

All export opportunities must expertly navigate the discrepancies in policy and regulatory standards between connected states. Cooperation will be facilitated through ongoing and transparent communication with all relevant parties. Government will strive to streamline the planning process as well as signal to industry to move to these lucrative fields and encourage investment. Local and foreign direct investment should be encouraged through statements of ambition backed by clear, timely and predictable frameworks for leasing, permitting, offtake and grid connection.

The economic analysis produced an assessment of the risks and uncertainties associated with pursuing an energy export economic model, summarised as follows. Facilitating market competition must balance ORE deployment levels with real European demand, consideration to the deployment of alternative renewables in the EU such as solar, and external supply from the Middle East or north Africa. To prevent delays in putting in place

[26] See supplementary materials for Economic Analysis workstreams (WS) 1-5

effective trading frameworks, export-focused policy direction should be guided by EU regulation as a starting point to facilitate emergent collaboration for projects in uncertain or previously unexplored jurisdictions. Social and political opposition should be mitigated through robust engagement practices both domestically and with partner countries. Risks to technology readiness may be mitigated through R&D programmes, with the potential to pursue alternative technologies, albeit at higher cost. Risks to ORE target delivery must be managed through alignment with port construction, manufacturing facilities, and securing other supply chain components and services.

4 The domestic opportunities and implication of the ORE future

4.1 Return to the State and community benefits

A final component of the economic analysis assessed how best to maximise the economic benefit to the state and local communities to ensure that Ireland's net zero transition delivers for Irish people. In considering wider socio-economic and environmental priorities and benefits to local communities which facilitates a stable political consensus and drives investment.

The economic analysis considered financial measures including community ownership, revenue sharing, community benefit funds and royalty structures of which only the latter two options are being pursued in Irish policy. Royalty payments are a condition of MACs as required by MARA to establish a levy framework for seabed use under the MAP Act. In Phase 1, the levy will be applied in two stages. An initial development stage levy rate of €20,000 per km2 per year applies during the project development stage. Subsequently, as the project reaches the operational stage the levy payable become 2% of the project's gross annual revenue.

In addition to seabed levies, another mechanism for distributing economic and financial benefits to local communities is the Community Benefit Fund (CBF) as described under ORESS 1. The developer must contribute at least €2 per MWh of electricity generated by the project to the CBF during the operational life of the project. The CBF is assisted in the allocation of the funding by a dedicated Fund Administrator (FA). The anticipated benefits, and the potential economic multiplier impacts of these funds may be very significant.

Community Benefit Funding may be distributed to a variety of uses including improving local infrastructure, skills and training within the community or other community support

programmes. Future iterations may review the level of mandated contribution, conduct social impact assessments, establish robust measurement and reporting mechanisms, and ensure a fair distribution of funds especially across overlapping projects and affected communities. Government will navigate any discrepancies across different stages of project development and spatial regions across the country.

Aside from financial measures, it is important to consider non-financial measures to promote social acceptance of ORE deployment, including the potential for environmental and social impact assessments as already described in the MAP Act. There must also be a strong emphasis on meaningful community consultation and engagement beginning early in the planning process.

Action item
21. Include Community Benefit Fund provisions in MACs, applicable regardless of route to market.

4.2 Jobs and Skills[27]

The OWDT is taking action to address the skills required for the development of ORE in Ireland and the delivery of our 2030 targets. The Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) is leading, in collaboration with DECC, on a dedicated Skills and Workforce workstream. This workstream supports planning for training and upskilling in the offshore wind energy sector. There is close collaboration with industry, through Wind Energy Ireland. The main goal of the workstream is to identify the skills and workforce requirements for the development of offshore wind, and to establish a sustainable workforce and skills pipeline. To ensure that our long-term ambitions for offshore wind are met, however, continuous planning and skills interventions are required to support the creation of a sustainable skills and workforce pipeline.

Questions
4(a) What structures, measures, and interventions can the State and State agencies implement to assist in the development of a long-term, sustainable skills and workforce pipeline? Provide any recommendations on what the State can do to promote careers in ORE across a range of educational backgrounds and movement from other relevant sectors. 4(b) Are you aware of initiatives in other jurisdictions or at a European level that would be relevant to Ireland's ambition of building a sustainable skills and workforce pipeline for offshore wind?

[27] See Annex 2 for further information.

4.3 Technology

The SEAI is developing an ORE Technology Roadmap, due for publication early 2024, which is complementary to the market analysis and addresses the potential areas of innovation for cost reduction and the anticipated impact on the offshore energy mix from 2030 to 2050. It examines 37GW and 50GW development scenarios, used to identify the necessary technological advancement to realise similarly large-scale deployment, and the pathways to commercialisation considering the technological and economic maturity of fixed and floating offshore wind and emerging technologies, especially wave energy, which are the next generating technologies which might impact in Ireland. Priority is placed on the highest potential technologies and building industrial supports for commercialisation and deployment at scale, as well as localised opportunities to generate value across Irish supply chains, O&M and adjacent services (surveying, LiDAR, remote technologies).

Future directions on technology implementation will place a weighty emphasis on technological innovation, stakeholder consultation, and environmental and social impact assessments. One potential area for elucidation is the development of multi-purpose sites through the co-location of ORE generation technologies. Multipurpose sites optimise site efficiency by improving energy security through increased generation, streamlining the consenting process compared to distinct projects, and limiting adverse effects on the environment by using the same geographic area. Ireland is particularly well-suited for multi-purpose sites given its temporal offset between peak wind and wave generation periods, which enhances energy efficiency of the site. Government will continue to collaborate interdepartmentally to ensure an efficient approach to ORE deployment with consideration to new technologies and site configurations.

Questions
4(c) To what extent should an emphasis be placed on multipurpose sites for ORE delivery, including the colocation of devices? What Government structures should be developed to encourage and facilitate progress in this aspect?
4(d) How can Government ensure policy is kept in line with evolving technological innovation and developments in ORE devices? What structures and government procedures should be implemented to future-proof the ORE planning process and account for technological shifts?

5 Conclusions

The ORE landscape is ever-changing given technological innovation, new policy alignment, partnership with industry and developers, consultation with public and local communities, shifting maritime usages. Consequently, there is a need to maintain cohesive collaboration across Government Departments, agencies and stakeholders, as facilitated by the OWDT. Further research must prioritise study into future technological feasibility including cost-competitiveness, environmental concerns which may inform spatial designations, and adaptive maritime space utilisation. Meeting Ireland's energy and climate commitments as well as providing and delivering on a robust pathway to ORE deployment will require an adaptive and evolutionary approach across multidisciplinary facets.

New policy will be guided by the principles set forth in this Future Framework Policy Statement, informed by lessons learned from existing ORE policy such as DMAP designation, and directed based on the identified future actions proposed throughout the Future Framework and subsequent policy. Streamlining the planning and development process will be prioritised, with reference to alignment of infrastructural efficiencies for timely ORE delivery, consenting through MACs, and facilitating optimal routes to market.

Annex 1: Beyond Ireland's borders: Export potential through market analysis

Given Ireland's maritime endowment, there is potential to capture significantly more offshore wind energy than would be needed to satisfy domestic energy requirements indicating an opportunity to develop an export-focused energy industry. An economic analysis was conducted to establish the rationale for developing an export market for surplus ORE. Further analysis must examine whether ORE surplus should be exported as electricity, renewable hydrogen (or hydrogen derivative) or used to produce new value-added products and services domestically such as data centres, green ammonia or sustainable aviation fuels.

i) Economic market analysis

A study conducted by external consultants, AFRY Managing Consultants Ltd (AFRY) and sub-consultants BVG Associates, has provided an evidence-base for the proposed ORE targets and export ambitions in Ireland as set out in this Future Framework Policy Statement. A market analysis was conducted for Ireland and neighbouring jurisdictions in the EU and UK to forecast ORE demand into 2030, 2040 and 2050. This economic analysis assessed the market conditions for ORE development, the potential for interconnection and development of a renewable hydrogen industry as well as Ireland's export viability in terms of policy, trade, and investment. Additionally, an analysis was conducted to assess the optimised financial and economic return to the State and local communities.

To assess the economic viability of Ireland's ORE future, several scenarios were considered. Each scenario was categorised by the quantity of ORE capacity (16GW, 37GW and 50GW) and the quantity of interconnection capacity (10GW, 12.2GW, and 16.7GW), which were analysed in various combinations to assess economic viability. Based on initial market analysis results and coupled with expert feedback, four focus scenarios were selected to investigate subsequent aspects of this economic analysis.

1. Domestic Net Zero (DNZ): This scenario is based on EirGrid/SONI's Tomorrow's Energy Scenarios Self-Sustaining world outlining the quantity of ORE capacity needed to reach a net-zero economy by 2050 assuming a rapid decarbonisation approach. The modelled scenario considers 16GW of ORE with 10GW of electricity interconnection in alignment with the EU 2030 15% electricity interconnection target.
2. 37GW and Well-Connected Interconnection: This pathway sees offshore capacity reach the Government target of 20GW by 2040 and 37GW by 2050. Well-connected

interconnection assumes the 15% of total installed generation capacity, in addition to increased on-grid capacity resulting from higher ORE development. In the 37GW scenario, this equates to 12.2GW of interconnection by 2050.

3. 37GW and Stretch Interconnection: As above, this scenario sees ORE capacity reaching 37GW by 2050. The Stretch interconnection capacity is intended to account for a highly export-focused ORE landscape at 20% interconnection. In our 37GW model, this equates to 16.7GW of electricity interconnection by 2050.
4. 50GW and Stretch Interconnection: This pathway represents a more ambitious target that sees capacity reach 25GW in 2040 and 50GW by 2050. The 50GW scenario was taken as an upper modelling limit to stress test the 37GW scenario. Given the high levels of ORE capacity associated with this scenario, Stretch interconnection (16.7 GW) was taken as the minimum economically plausible capacity of electricity interconnection.

In contrasting the above scenarios, the study established an economic rationale for the implementation of ORE targets, and the resultant economic return to the State and local communities. Some of the key conclusions resulting from the economic analysis are outlined below:

- 37GW of offshore renewable energy generation by 2050 was identified as an ambitious but feasible target so long as it is coupled with large interconnection capacity, a growing hydrogen industry, and extensive domestic demand including high electrification and increasing data centre infrastructure.
- Despite energy demand growth potentially tripling compared to 2022, there remains extensive ORE surplus in Ireland in 2050 in a 37 GW generation scenario. This introduces challenges including mitigating a large support gap and costs to consumers but presents opportunities including strengthening the business case for export and domestic demand opportunities. Future domestic demand opportunities will be further explored by DETE as part of the National Industrial Strategy.
- To reach Ireland's ambitious targets, there needs to be large increases in interconnector capacity. Ireland will see a net export of ORE to the UK and EU (mainly through France and possibly Spain, Belgium or the Netherlands). In the 37GW generation scenario, models suggest a minimum of 12GW of interconnector capacity by 2050 with higher interconnection required if targets are more ambitious.
- While there is currently no commercial renewable hydrogen industry in Ireland this economic analysis indicates that Ireland will be globally competitive with growing industry elsewhere in Europe. Models suggest that the hydrogen industry is more

economically attractive through pipeline exports compared to shipping. Currently the key opportunity looking to the future is in ammonia production for fertiliser use.

ii) Interconnection

Electricity interconnection allows for the transfer of surplus energy to external consumers and is currently the primary means by which ORE is exported to international markets. Given the variability of renewable energy generation, electricity interconnection is key to ensuring the security of Ireland energy supply and to export surplus ORE to external markets. As proposed in this policy statement, the Future Framework sets out a pathway to achieving 20GW of ORE by 2040, ramping up to 37GW by 2050. In concert with creating high domestic demand (outlined in Section 2), this quantity of ORE generation capacity will require extensive electricity interconnection. The 2023 National Policy Statement on Electricity Interconnection commits Ireland to exploring more interconnection with more countries. Government is examining the potential for additional interconnection to the UK, France, Spain and other northern EU member States.

Point-to-point interconnection has been the traditional mechanism for electricity transmission. Multi-purpose (hybrid) interconnectors enabling electricity export from OBZs have the potential to offer significant benefits to the energy system including operational synergies, lower capital costs by sharing infrastructure, integrated planning process, and reduced environmental impacts. These are new departures in energy infrastructure and regulation with few established models to follow. We will be exploring this potential further and setting out the necessary steps to establish OBZs in an Irish context in the Offshore Transmission Strategy.

Optimising the level of electricity interconnection in Ireland requires balancing technical and practical complexities with economic returns and cost competitiveness. Technical and practical constraints include cable distance, seabed characteristics and international coordination through offshore jurisdictional arrangements. Interconnection projects must be appropriately managed to address practical challenges in context of the intensity of marine traffic, the frequency of maintenance required and the potential for cable damage.

The economic analysis examined the trade-offs between these implementation challenges and potential benefits to the state. A cost-benefit analysis accounted for congestion rent revenues, internal rates of return and socio-economic welfare benefits. The model incorporates the full generation capacity mix of relevant jurisdictions including natural gas, oil, renewables and nuclear. Furthermore, the analysis considers on a qualitative basis issues relating to the regulatory and commercial models for progressing further

interconnection. This includes looking at the economic rationale for hybrid interconnection, regulatory funding models for economic rationale for interconnection, regulatory funding models for interconnection, and other revenues than the congestion rent.

Along with the requirement to manage this extensive generation surplus there is a robust economic rationale for increasing interconnection capacity. Increasing ORE generation will decrease the price of energy in Ireland substantially. As a result of price dynamics, Ireland has a competitive advantage for interconnection exports, especially to the UK and France. Interconnection with France and Spain results in some imports to Ireland linked to extra solar generation in these countries and associated price spread dynamics. Interconnection projects to the UK followed by France have the highest internal rate of return given that capital expenditure is significantly lower relative to interconnection to other jurisdictions, attributed to shorter cable distances and associated resourcing constraints. Increasing interconnection capacity, ceteris paribus, substantially decreases the internal rate of return due to the cannibalisation effect. In a 37GW scenario congestion rent doubles compared to a net zero (16GW) economy, which can be attributed to additional flows.

A socio-economic welfare impact analysis identifies an overall net positive benefit for Ireland from 2030 to 2055, which is generally a requirement for regulatory approvals. The analysis considers a combination of different indicators such as the consumer surplus, producer surplus, congestion rent and interconnector cost. Each new interconnector shall be subject to a socioeconomic and environmental cost-benefit analysis and implemented only if the potential benefits outweigh the costs.

Annex 2: Jobs and skills

The same economic analysis conducted by consultants AFRY and BVG Associates as described in Section 3 and Annex 1 further assessed the economic impacts of the various ORE export scenarios measured using GVA, employment measured in full-time equivalent (FTE), and tax take. Naturally, larger capacity of ORE deployment sees an increasing trend in GVA and both direct and indirect employment. The analysis shows that the greatest proportion of local content in offshore wind projects is in the development and project management and O&M stages.

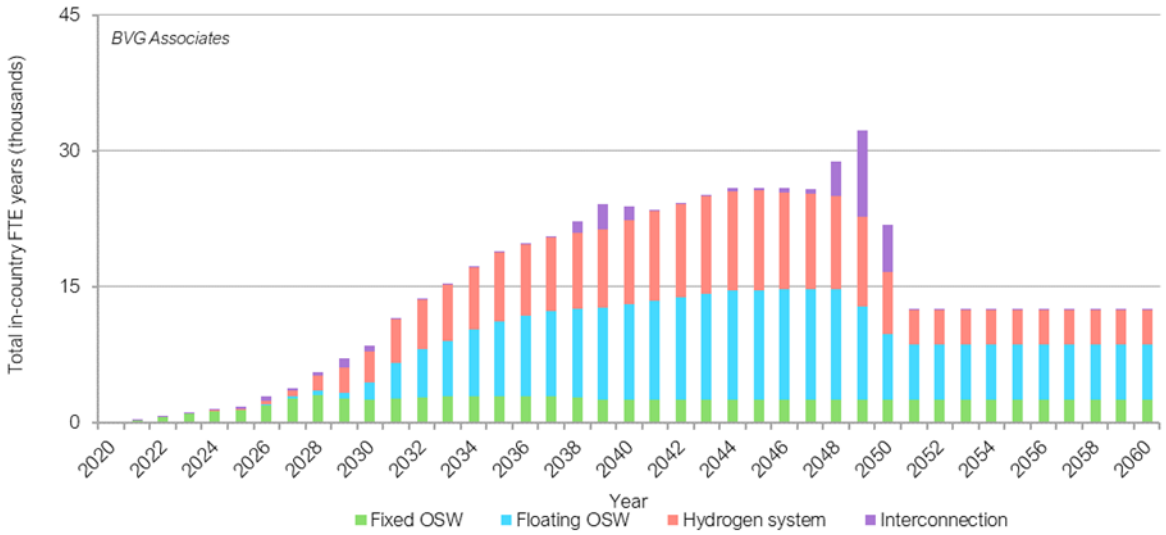

Figure 1: Irish annual FTE years employment for the 37GW well connected scenario as produced from the economic market analysis and associated model assumptions. Employment modelled out to 2060, split by technology.

In general, both fixed and floating offshore wind are characterised by a high share of overall value in the O&M stage. Floating offshore wind has comparably higher economic benefits relative to fixed projects which is largely attributed to greater supply in balance of plant and installation and commissioning, due to floating foundation assembly, synthetic line manufacture and floating offshore wind construction port provision. On the other hand, interconnection projects have markedly lower local value than other technologies associated with the high cost associated with cable manufacturing and offshore installation. Hydrogen electrolyser projects deliver the most domestic value as a result of the onshore nature of the works, which require civil engineering skills.

To meet ORE jobs and skills goals, a workstream under the OWDT has established an Expert Advisory Group with members from further and higher education, government departments, agencies and industry, to consider skills and workforce requirements. In

collaboration with Greentech Skillnet, a detailed skills assessment report has also been conducted. It outlines the roles and skills most likely to be required in Ireland, as well as the opportunities for roles and skills that could be developed, dependent upon supply chain and market conditions.

The identification of skills requirements for offshore wind has been progressing alongside important developments in the delivery of skills training for renewable energy. This includes Kerry Education and Training Board's Wind Turbine Maintenance Technician apprenticeship, which was launched in March 2022. Greentech Skillnet, sponsored by Wind Energy Ireland and co-funded by DFHERIS through Skillnet Ireland, provides industry-focused training in areas relevant to renewable energy and offshore wind. These subsidised, industry-led programmes are aimed at people in employment and not in employment and include upskilling and reskilling courses in areas such as offshore development and consenting, managing safely for wind power, and energy storage systems. In Higher Education, the 2023 Human Capital Initiative Pillar 1 call is funding 152 places across three courses at Level 9 in areas relevant to offshore wind for the 2023-2024 academic year. This includes a Certificate in Leadership in Offshore Renewable Energy at Technological University of the Shannon and a Postgraduate Certificate in Offshore Renewable Energy and an Offshore Wind and Ocean Energy Conversion Course, both at University College Cork. Funding of €200,000 was secured by DFHERIS in Budget 2024 to enable expansion of training provision on offshore wind energy skills requirements in the Further Education and Training sector.

Action Items

	ORE Delivery		
1.	Conduct a study to assess the potential to deploy floating offshore wind in Irish waters, taking account of the upcoming first dedicated floating wind auctions to take place globally, including in France, in 2024.	DECC, DETE	Q2 2024
2.	Investigate the feasibility of a floating offshore wind demonstrator site.	DECC, DETE	Q3 2024
3.	Maintain State support for our existing or planned test sites and explore the feasibility of supporting additional test sites.	DECC, SEAI	ongoing
4.	Conduct an analysis to determine the economic and practical viability of various innovative ORE technologies.	DECC, SEAI	Q3 2024-Q4 2025
5.	Provide the structures and supports necessary to establish a future DMAP roadmap including timeline for deployment including DMAPs catered towards various technologies such as fixed, floating, wave and tidal. This roadmap should be produced in accordance with all relevant legislative and regulatory processes and in alignment with technology maturity and offtake availability.	DECC	Q3 2024
6.	Continue to support streamlining of the consenting process for ORE projects including support of necessary environmental procedures and a competitive MAC process with indicative timelines for implementation.	DECC, MARA	ongoing
	Route to Market		
7.	Maintain a single schedule for all upcoming State tenders for ORE, including non-grid limited ORE, in alignment with Action 5.	DECC	ongoing
8.	Design a competitive process to procure 2GW of non-grid limited capacity in 2025, to be in development by 2030.	DECC, MARA	Q1 2024- Q2 2025
9.	Develop and obtain State Aid clearance for a successor support scheme to ORESS, be in operation from 2026-2030, to procure at least 9.5GW for deployment from 2030.	DECC	2024-2025

10.	Assess the enabling supports and/or frameworks that may be required to maximise capacity from alternative routes to market.	DECC	Q1 2024-Q4 2025
11.	Rollout of EirGrid's Grid Implementation Plan and future iterations to aid in the alignment of infrastructure efficiencies in a manner which considers offshore generation, grid, and routes to market.	EirGrid, DECC	Q2 2024- Q2 2025
12.	Within a regulatory review of CRU and EirGrid, consider provision for seeking an expansion of capacity to provide for proactive, anticipatory investment in onshore and offshore grid.	DECC, DPENDR	Q1 2024- Q4 2024
13.	Align resourcing needs across Government Departments and agencies to ensure all Government bodies in relevant marine and ORE disciplines are properly resourced to discharge the expanded responsibilities as set out under the Future Framework.	DECC	ongoing
	Data Policy		
14.	Procure, consolidate and publish all relevant data to support the open sourcing of ocean data available for the protection of the marine environment and biodiversity during development of ORE.	DECC, Marine Institute	Q3 2023-ongoing
15.	Establish a priority process to incorporate cumulative impact studies into the DMAP process as required by the MAP Act.	DECC	2024
16.	Conduct additional studies and data modelling to inform future ORE DMAP delineation given increasing frequency of weather extremes and future conditions.	DECC	Q3 2024-Q1 2025
17.	Develop an overarching ORE data policy and governance statement.	DECC	Q4 2024
	Alignment		
18.	Explore potential investment incentives which could be developed to encourage both domestic investment opportunities and foreign direct investment in domestic supply chain facilities.	DECC, DETE	Q3 2024- Q1 2025
19.	Establish Offshore Bidding Zone Frameworks necessary to maximise utilisation of offshore renewable energy potential for domestic and international markets, in order to meet the objectives of the EU Green Deal.	DECC	Q4 2024
20.	Assess renewable hydrogen and renewable hydrogen derivatives transport options, including assessing the	DECC	Q3 2024-Q2 2025

	viability of potential hydrogen export pipeline routes by 2040.		
21.	Include Community Benefit Fund provisions in MACs, applicable regardless of route to market.	DECC, MARA	Q3 2024- Q1 2025

Questions

1(a). Has this section adequately identified the general key priorities for ORE delivery in Ireland? Are there additional priorities that should be integrated into the holistic, plan-led approach?

1(b). Has each key priority been adequately described and considered all relevant components?

1(c). How best should the 2GW of non-grid limited offshore wind capacity be procured?

1(d). What are your views on the design parameters for the successor scheme to ORESS, what else should/should not be considered?

1(e). What frameworks and/or supports are required for alternate routes to market such as CPPAs, Power-to-X projects, interconnector-hybrid projects and export projects?

1(f). What additional capacities and responsibilities should be held by industry in the context of the plan-led approach?

1(g). How can Government facilitate a more comprehensive and streamlined engagement process with developers to ensure national ORE targets are delivered?

2(a). What grid infrastructure should be of particular focus in facilitating the build-out of capacity to support ORE generation targets?

2(b). In relation to National Security/Department of Defence interaction with ORE development, are there any issues you would like to highlight?

4(a). What structures, measures, and interventions can the State and State agencies implement to assist in the development of a long-term, sustainable skills and workforce pipeline? Provide any recommendations on what the State can do to promote careers in ORE across a range of educational backgrounds and movement from other relevant sectors.

4(b). Are you aware of initiatives in other jurisdictions or at a European level that would be relevant to Ireland's ambition of building a sustainable skills and workforce pipeline for offshore wind?

4(c). To what extent should an emphasis be placed on multipurpose sites for ORE delivery, including the colocation of devices? What Government structures should be developed to encourage and facilitate progress in this aspect?

4(d). How can Government ensure policy is kept in line with evolving technological innovation and developments in ORE devices? What structures and government procedures should be implemented to future-proof the ORE planning process and account for technological shifts?

Glossary

AA	Appropriate Assessment
ABP	An Bord Pleanála
CBF	Community Benefit Fund
CPPA	Corporate Power Purchase Agreement
CRU	Commission for Regulation of Utilities
DECC	Department of the Environment, Climate and Communications
DETE	Department of Enterprise, Trade and Employment
DFHERIS	Department of Further and Higher Education, Research, Innovation and Science
DMAP	Designated Maritime Area Plans
DNZ	Domestic Net Zero
ENTSO-E	European Network of Transmission Systems Operators for Electricity
FA	Fund Administrator
FTE	Full-time Equivalent
GCA	Grid Connection Assessments
GVA	Gross Value Added
GW	Gigawatt
HVDC	High-voltage Direct Current
IMDO	Irish Maritime Development Office
LiDAR	Light Detection and Ranging
M&A	Marshalling and Assembly
MAC	Maritime Area Consents
MAP Act	Maritime Area Planning (MAP) Act
MARA	Maritime Area Regulatory Authority
MSP Directive	Marine Spatial Planning Directive
Mt	Metric Ton

MWh	Megawatt-hour
NMPF	National Marine Planning Framework
O&M	Ongoing Operations and Maintenance
OBZ	Offshore Bidding Zones
ORE	Offshore Renewable Energy
OREDP	Offshore Renewable Energy Development Plan
ORESS	Offshore Renewable Electricity Support Scheme
OWDT	Offshore Wind Delivery Taskforce
OWE	Offshore Wind Energy
R&D	Research & Development
RD&I	Research, Development & Innovation
RES	Renewable Energy Storage
SEA	Strategic Environmental Assessment
SEAI	Sustainable Energy Authority of Ireland
SEM	Single Electricity Market
SME	Small and medium-sized enterprises
SONI	System Operator for Northern Ireland
TWh	Terawatt Hour
TYNDP	Ten-Year Network Development Plan