GRID DEVELOPMENT POLICY
OFFSHORE WIND IN IRELAND

SSE Renewables
Consultation Response

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CONSULTATION TO INFORM A GRID DEVELOPMENT POLICY FOR OFFSHORE WIND IN IRELAND

SSE Renewables wishes to make the enclosed submission for consideration as part of the DCCAE Consultation to Inform a Grid Development Policy for Offshore Wind in Ireland.

Who we are

SSE Renewables is the largest renewable energy developer, operator and owner in Ireland's all-island Integrated Single Electricity Market. The company owns and operates 890MW of onshore wind capacity across the island and is a leading developer of offshore wind energy projects in Irish waters. We are driven by our purpose: to provide the energy needed today while building a better world of energy for tomorrow. Since entering the Irish energy market in 2008 the SSE Group has invested significantly to grow our business here, with a total economic contribution of €3.8bn to Ireland's economy over the past five years. The company is actively developing Arklow Bank Wind Park Phase 2 off County Wicklow and is also in the early stages of work on two new offshore wind projects, Braymore Point off the north-east and Celtic Sea array off the south-east.

Scope of consultation

SSE Renewables strongly welcomes the publication of the offshore grid model consultation and the accompanying report produced by Navigant. We recognise this report outlines a wide range of information, some of which goes beyond the grid connection regime itself.

For the sake of clarity, we view the key issues in the development of a preferred grid model for Ireland, as including:

- Responsibility for offshore infrastructure construction, operation and maintenance of the same.
- Ownership of assets beyond the onshore substation connection point.
- Interaction between offshore development and investment in the onshore transmission network.
- The general principles for future-proofing of offshore transmission assets.

SSE Renewables believes the following items are tangential to an offshore grid connection regime, although we provide some observations on the same as they feature prominently in the consultation document and accompanying report:

- Marine spatial policy, which is currently under development via the NMPF and MPDM Bill, as led by the Department for Housing, Planning and Local Government (DHPLG); this includes stipulations such as minimum distance from shore as well as site selection, early development and consenting of sites.
- The development of RESS auction parameters and T&Cs.

- Detailed technical requirements for future-proofing of grid connections, which SSE Renewables recommends should be subject to a detailed cost-benefit analysis.

Our recommendations and feedback, therefore, focus on the topics which we see as central to the development of offshore grid policy, as set out above. With respect to site selection and consenting, whilst we view these as sitting within marine spatial planning policy, we recognise the interaction of these topics with the plan-led models proposed in Navigant's document. As such, we have provided comments in our response where necessary. We look forward to further engagement on all aspects of offshore wind policy and regulation under development in Ireland.

Our recommendation

SSE Renewables welcomes the acknowledgment in the consultation that a developer-led model will be required in order to progress Arklow Bank Wind Park Phase 2 and the Relevant Projects.

SSE Renewables recommends that a developer-led model will be required for all projects on the east and south coast. These projects will be required to achieve 2030 targets. Ten years is a short period of time with respect to the development of an offshore wind farm. A change from a developer-led to plan-led approach this decade would require a number of years to implement new institutions, processes and regulation, something which is likely to take a significant period of time. Such a change now, therefore, is incompatible with 2030 targets.

SSE Renewables also sees other significant advantages with taking a developer-led approach this decade, particularly given the progress made with projects to date and the nature of onshore transmission and marine space along the east and south coast, which are suited to such an approach. We outline these below, along with details of our recommended developer-led model.

As we look beyond 2030, to Ireland's west coast potential, SSE Renewables believes there may be some advantages to a form of plan-led approach due to the limited onshore transmission in the west of the country, lack of projects to date and the time horizon available for development. We therefore support the evaluation of a plan-led approach to development of offshore grid off the west coast and provide further details below.

Developer-led approach for the east and south coast

SSE Renewables notes that the consultation identifies two options within the category of developer-led approach. Our recommended model represents a hybrid of the two options, though it is most closely aligned with Option 1.

For the sake of clarity, SSE Renewables recommended model for a developer-led approach is:

- Developers remain responsible for site selection, early development (e.g. surveys) and consenting, with seabed allocation dealt with in line with the Foreshore Act where appropriate or the new processes

being introduced as part of the National Marine Planning Framework (NMPF) and Marine Planning and Development Management Bill (MPDM).

- The TSO provides connection offers which include the reinforcements required to connect the Relevant Projects and Arklow Bank Wind Park Phase 2 in the first instance;
    - Projects can then apply for early access to the network once consented, mirroring priority connections for "shovel-ready" projects under ECP-2.
    - As reinforcements are completed and additional capacity is released then allocation of this capacity is awarded based on earliest consent date.
    - Once all reinforcements are complete any remaining projects can connect.
- Developers are responsible for the design, construction, operation and maintenance of all aspects of the offshore wind farm from the onshore substation connection point and retain ownership for the same.
- Work involved in the onshore connection point (e.g. substation upgrades/build-out) will follow the onshore contestable model.
- Strong incentives are put in place to ensure the TSO delivers onshore reinforcements on time.
- Offshore projects will engage with the TSO (and vice versa) to identify proactive investment in east coast onshore transmission infrastructure.

We note that the approach outlined above mirrors current policy for onshore wind farm grid connections with the developer being responsible for all build out beyond the connection point whilst retaining ownership of the same and the ability to deliver shallow reinforcements (e.g. substation upgrades) via the contestable model. This developer-led model will provide significant advantages for kick starting the offshore industry in Ireland, such as:

- Alignment with the initiation of Ireland's offshore wind industry, providing 1 GW by 2025, for which developers will need clarity in time for the 2021 offshore RESS auction, putting us in a strong position to achieve 5 GW by 2030.
- Such a model leverages offshore developers' significant experience in site identification, cost efficient design and successful delivery and maintenance of offshore wind farms and associated grid connections.
- This approach avoids significant enacting/changing of legislation which would be required to facilitate construction and ownership of offshore infrastructure by parties other than the project developer and the creation of new state bodies.
- Costs of offshore infrastructure will sit within the development of projects overall, bringing competitive pressures on the same (via the RESS auctions).

Leveraging this available capital investment should be viewed with particular significance as we look towards Ireland's economic recovery from coronavirus, which needs to be twinned with Ireland's fight against climate breakdown. This private investment can provide an economic stimulus into towns and communities along the east coast, whilst also further decarbonising Ireland's energy supply. With respect to climate action in Ireland, investment is needed well beyond the offshore wind industry, in areas such as energy efficiency and decarbonisation of heat and transport. These other areas may require significant investment by the State to implement at scale.

Plan-led approach to offshore grid for the west coast post-2030

As we look beyond the next decade to Ireland's west coast potential, the delivery of the required infrastructure will take place in a different context, with both onshore and offshore infrastructure perhaps needing an alternative approach.

Onshore grid infrastructure along the west coast is very limited, with weak linkages back to Ireland's demand centre in the east. This limited capacity is particularly acute when compared to the 30 GW of west coast offshore potential as outlined in the recent Programme for Government. A state-led approach to the development of both onshore and offshore transmission infrastructure development may, therefore, be appropriate should Ireland wish to pursue this west coast potential. Such an approach could constitute state identification of west coast nodes, either on or offshore, at which projects could connect into.

Whilst SSE Renewables supports further evaluation of a plan-led approach to grid development in the west, we would urge caution in the centralisation of site selection and consenting. Developers have significant experience in the identification and early development of the most effective sites for offshore wind. Development of the most effective sites will be of benefit to the consumer. Any plan-led approach to grid development in the west should work in tandem with processes and timelines for seabed leasing and future RESS auctions.

Summary of SSE Renewables' comments on the consultation "key drivers"

SSE Renewables has outlined detailed responses in relation to each "key driver" identified by the Department in the consultation.

In summary, our conclusions on each key driver are as follows:

- **Costs** – SSE Renewables see significant benefits which can be gained via a developer-led model in the establishment of Ireland's offshore industry and delivery of 1 GW by 2025 and 5 GW by 2030. Such an approach will support global supply chain interest, enable competition in the market, reduce risk in the development and financing of projects, and utilise private capital finance in the delivery of infrastructure.
- **Environmental** - Stringent environmental assessments will be undertaken for all grid options. We recommend the knowledge and experience of offshore developers should be harnessed in the delivery of EIAs for offshore wind via a developer-led process for east and south coast projects this decade.
- **Future-proofing** – SSE Renewables recommends a robust cost-benefit analysis is performed to ensure that any proposed future-proofing of assets is warranted, and if needed, is cost effective.
- **Required Infrastructure** (including onshore-offshore coordination) – The developer-led model will leverage the significant experience of developers in the delivery of offshore wind infrastructure. This experience should be considered a significant strategic benefit to Ireland as it establishes its offshore industry. We believe coordination of onshore and offshore investment is important. The

TSO will need to provide clear information to projects in the development of optimum connection programmes and work with developers to progress upgrades. This approach can be delivered as part of a developer-led model.

- **Compatibility with Relevant Projects and Arklow Bank Wind Park Phase 2** – SSE Renewables agrees with the conclusion reached in the consultation that a developer-led approach will be needed to deliver the Relevant Projects and Arklow Bank Wind Park Phase 2. Option 1 (or SSE Renewables' proposed hybrid model) aligns most closely with the steps already taken in the development of projects under existing regimes and will facilitate the timely delivery of Ireland's first offshore wind farms of scale and 1 GW by 2025.
- **Social Acceptance** - We believe that Option 1 (or alternatively SSE Renewables' proposed hybrid option) offers the best way forward for projects along the east and south coast to engage with communities. Grouping wind farms together could have a negative impact on an individual project's chance of securing consent and create problematic interdependencies which may have a direct effect on Ireland's ability to deliver 1 GW by 2025 and the 5 GW target by 2030.
- **Delivery of 2030 targets** – Given the development timelines for offshore wind farms and the limited time to achieve the 2025 and 2030 targets, a developer-led grid model is most appropriate to deliver the necessary capacity in the coming decade.

SSE Renewables sees the key, clear differentiator between models as being our ability to achieve Ireland's 2025 and 2030 targets. We outline our response to the consultation questions below.

***Question 1**: With respect to key driver (i), **cost levels**, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

In assessing the impact on cost of the various options, we note that Navigant's accompanying report concludes that "*it is not possible to provide a total quantitative societal cost comparison*". We recognise the range of complex and interdependent cost impacts under all scenarios, and note that Navigant have not undertaken a cost benefit analysis of the various models proposed. These cost factors include, but are not limited to, the impact of competitive pressure on prices, investor/supply chain confidence, delivery against national and EU targets, deployment of onshore grid reinforcements, impacts on system operation, cost of redispatch/system services, project financeability and overall project risk.

We would also flag alongside costs, that potential benefits should be explicitly considered. These includes societal benefits associated with decarbonising our economy, as well as driving our green recovery in the short term.

Ireland's economic recovery from coronavirus

We note Navigant's conclusion that "*Ireland, as an emerging market, might benefit from a developer-led grid delivery model where experienced developers could deploy offshore wind transmission assets at more optimal cost levels right away*". We agree with this conclusion, which should be viewed with particular significance as we look towards Ireland's economic recovery from coronavirus.

Offshore wind developers in Ireland have undertaken significant investment so far in the assessment and early development of offshore windfarm sites and are poised to invest billions of euros in the establishment of Ireland's offshore wind sector, creating thousands of jobs (both direct and indirect) in the process.

As noted above, unlocking the available capital investment in Ireland's offshore wind industry, which sits ready to go, should be viewed as a route to driving national investment, providing an economic stimulus into towns and communities along the east coast, whilst also further decarbonising Ireland's energy supply.

Competitive Pressures

The consultation document outlines the positive impact on cost levels that can be attained by including offshore infrastructure within the scope of overall projects, which will go on to compete in RESS auctions. This competitive pressure goes beyond only delivery of the connection assets, applying equally to site selection and development and assessment of the same. The consultation notes as a negative consequence of Options 1 and 2 that there will be "*sunken costs for pre-development of sites unsuccessful at auction*". It should be highlighted that these sunken costs, for sites which do not go on to be developed, will sit with the taxpayer in Options 3 and 4.

A developer-led approach can ensure that the lowest cost projects, including the offshore connection, are developed to the benefit of the consumer.

We recommend that a grid connection offer is a pre-requisite to competing in RESS, with this information important in allowing projects to determine their overall RESS costs. This will also help ration the amount of grid capacity which could potentially be successful in a single auction. This would be preferable to the proposed feature of Option 2, where the TSO can predetermine parameters within the RESS auction i.e. grid location. Such a model would cause significant concern in the industry given lack of detail or information at this stage.

SSE Renewables' recommended approach is outlined in response to Question 10 on onshore and offshore coordination.

Cost recoupment

As Navigant's report highlights, for Options 1 and 2, spend by the developer in site selection, surveying, consenting and the development and delivery of the project as a whole including offshore connection will be factored into RESS prices, with CfD contracts providing support during periods of low market prices, funded by the PSO levy.

For Options 3 and 4, the consultation indicates that spend on infrastructure, both onshore and offshore, would be recouped via network charges. An important principle in networks charges is that these charges should be in support of the network. Should development of potential generation sites be undertaken by the State or TSO in such a model (i.e. assessment of site suitability, environmental impact assessments etc.) these should be paid for via other means, such as exchequer funding.

Whilst impact on PSO levy and/or network charges should be carefully considered, we would note the competitive pressures under Options 1 and 2 can assist in ensuring the PSO levy is used as effectively and efficiently as possible.

Shared Hubs - Largest infeed/single point of failure

Navigant's report highlights the opportunity for "shared infrastructure" or "hubs", which it is suggested may be more cost-effective given avoided multiple landfalls. Whilst recognising the potential savings opportunity with such hubs, shared infrastructure is likely to require longer offshore transmission networks, putting upwards pressure on projects costs.

Importantly, large single infeeds will represent a significant challenge to the TSO and may result in significant ongoing cost to the consumer. The TSO must procure System Services needed to stabilise the system in case the largest infeed is lost. Currently, this would be EWIC interconnector at 500 MW, though this would increase to 700 MW on delivery of the Celtic Interconnector. Offshore wind farms are likely to be of a similar magnitude and it is, therefore, questionable as to whether channelling multiple large offshore wind farms to the same point on the network is desirable from a system stability perspective. The potential system costs of such an approach should be carefully considered. We provide further information on this point in both the question of future-proofing and onshore/offshore coordination.

Notwithstanding this risk, such an approach may be necessary in the west coast, where distances to shore may be further and onshore transmission grid is much more limited. A plan-led approach to offshore grid in the west should be considered over the next decade, in conjunction with consideration of operational impact and costs of the same.

Minimum Distance

As SSE Renewables has already highlighted, we view this issue as sitting firmly within a marine spatial planning policy context. If such limits were set such that seabed suitable for offshore wind farm development was severely restricted, or that early offshore projects were no longer viable, Ireland's offshore industry could be set back significantly. A reduced amount of seabed available, potentially in deeper waters, is likely to put significant upward pressure on the costs of developing Ireland's offshore wind projects.

Financeability

The concerns with respect to the delivery of a centralised approach, and the potential delays resulting from the extra up-front work needed from government/network companies, should be considered within the context of project financeability. A connection build which is in the control of the developer increases significantly a project's ability to deliver to schedule. This would increase certainty and reliability thereby providing much greater assurance to investors, lenders and insurers.

Navigant's report acknowledges that a "plan-led" model would "increase perceived risk by developer as offshore wind transmission assets are not within their control". It is important to note that in the context of project financing, a risk of this nature, perceived or not, will have the same impact on project financeability i.e. to make it more challenging and/or more expensive. SSE Renewables views this as a significant potential concern, which should be considered as non-trivial within the context of the financeability of Ireland's offshore wind industry.

As noted in Navigant's report, a developer-led approach will require higher spend by the developers themselves, given that the offshore developer will need to finance all aspects of the offshore wind project including the connection.

Supply chain confidence

As noted in relation to delivery of Relevant Projects and delivery against 2030 targets, Ireland's offshore industry stands at a juncture. Ireland needs to deliver at least 1 GW by 2025, as targeted in the Climate Action Plan, if we are to stand a realistic chance of delivering 5 GW by 2030. Delivering Ireland's first offshore wind farm of scale by the middle of the decade will be critical in attracting the supply chain that the development of such projects will need. On a global scale, there is intense competition for vessels, expertise and other key supply chain elements, with an ever-increasing number of countries setting ambitious targets for the next decade.

If Ireland does not adhere to its targets, it will lose attractiveness to the global supply chain. Fewer companies with active interest in Ireland's offshore sector will likely put upward pressure on costs due to

reduced supply chain competition. It is therefore critical from a cost perspective that Ireland maintains confidence in its offshore plans and moves at pace. We need to begin issuing grid offers ahead of an auction in 2021 to provide clarity to projects.

Summary of costs

Over the next decade, maintaining confidence in Ireland's offshore sector (by delivering on targets) and attracting international supply chain companies will be critical critical to the development of an offshore industry here in Ireland. As we look beyond the coronavirus crisis, unlocking billions of euros of private investment in a green recovery will be of even greater importance, and should be considered a key strategic opportunity.

We note that the consultation paper proposes additional parameters could be established (i.e. minimum distance from shore) or input into an auction process (i.e. grid availability). Due consideration must be given to the cost effectiveness of such measures given potential knock-on effects such as skewing of auction price stacks, increased system operation costs etc., as well as the potential negative impact such uncertainty would bring as we look to establish Ireland's offshore wind industry.

As we look beyond the next decade at the west coast, a different approach may be needed given the low capacity of onshore transmission infrastructure in the region. A plan-led approach to the development of west coast offshore grid could be necessary and we support evaluation and development of the same over the next decade. Starting the evaluation process now will help put us on the path to net zero.

Costs - recommendation

Significant benefits can be gained via a developer-led model in the establishment of Ireland's offshore industry and delivery of 1 GW by 2025 and 5 GW by 2030. A developer-led model will support global supply chain interest, enable competition in the market, reduce risk in the development and financing of projects, and utilise private capital finance in delivering infrastructure.

***Question 2**: With respect to key driver (ii), **environmental impact,** which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

All offshore wind developments including associated grid connection are required to undergo a stringent environmental assessment. This will be the case in all grid model scenarios. The SEA Directive will ensure an assessment of the effects of certain plans and programmes be undertaken to provide for a high level of protection of the environment and to promote sustainable development. In addition, an environmental assessment in accordance with the EIA Directive will be required at project level to ensure that developments that are likely to have a significant effect on the environment are adequately assessed before they are approved.

Offshore wind is an emerging market in Ireland with the potential to transform our approach to tackling climate change. With the industry seeking to establish itself, there are benefits in enabling a developer-led grid delivery model. Experienced developers are primed and ready to deploy offshore wind transmission

assets and undertake associated EIA assessment. It does not appear that the state is currently resourced or prepared to deliver the initial wave of offshore wind transmission assets. The time taken to prepare for this would slow the industry down and put the delivery of the projects needed to meet our 1 GW by 2025 and 5 GW by 2030 targets at risk.

A developer-led model would draw on the considerable expertise of offshore wind developers with an interest in the Irish market. While the State has experience in the delivery of interconnection assets, it does not have experience of offshore wind connections. Offshore wind developers have already undertaken significant investment in the assessment and early development of offshore windfarm sites and are now ready to invest in the establishment of Ireland's offshore wind sector. From experience gained with previous projects, developers will have deeper knowledge and experience of developing EIAs in offshore environments. This knowledge and experience should be harnessed. EIAs require a wide range of expertise spanning multiple facets of the marine and onshore areas.

The Navigant report highlights the potential for lower levels of onshore-offshore transmission asset coordination in developer-led models and possible environmental impacts as a result. In a developer-led approach, consideration can be given to issues like minimising cable routes and landfalls if a proactive approach is adopted by the TSO. Where efficiencies are possible, developers will explore all possible options particularly where there is competition for limited space and there is the potential to increase the competitiveness of a project.

Given the comprehensive environmental assessments that will be required in any scenario, we do not believe the proposed advantages associated with Options 3 and 4 are reason enough to forego the benefits of opting for a developer-led approach this decade. We have concerns that opting for a plan-led approach could lead to significant delays and put our ability to reach the 5 GW offshore wind target and 70% renewable electricity target at risk.

Environmental Impact – recommendation

Stringent environmental assessments will be undertaken for all grid options. We recommend the knowledge and experience of offshore developers be harnessed in the delivery of EIAs for offshore wind via a developer-led process for east and south coast projects. A more centrally-planned approach may be necessary for grid infrastructure for projects along the West Coast to exploit the c.30 GW of offshore wind resource.

***Question 3**: With respect to key driver (iii), **future proofing and technologies**, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

A plan-led approach to an offshore transmission network may be appropriate for the west coast where floating offshore wind will be further from shore and where there is an extremely limited number of suitable onshore nodes to connect these projects. This is, however, not the case in the Irish Sea. The offshore projects in the Irish Sea are nearshore, close to significant demand centres, with an existing 220 kV onshore network running up the east coast.

The East Coast Generation Assessment study shows that there is a certain amount of capacity available on the east coast without any reinforcement and that further capacity can be released with additional onshore reinforcement. Where there is a need for significant additional grid reinforcement which cannot be achieved onshore, consideration could then be given to reinforcing the network via an offshore route. The cost of reinforcing offshore will, however, be significantly more expensive than any onshore solution and, as such, it is rational to reinforce onshore infrastructure where possible. As such, we strongly recommend a robust cost-benefit analysis covering all options to ensure any future-proofing requirements are in the interest of the consumer.

In Navigant's comparison between existing developer-led models they provide the examples of Germany and the Netherlands where the TSO has built large offshore DC nodes and used these to connect multiple offshore projects, using a DC interconnector to bulk transfer large volumes of MWs to large demand centres far from the coast. From a technical point of view this model is not appropriate for the Irish system. The Navigant report acknowledges that the 'tipping point' for cost efficient application of HVDC technology is determined by the distance from shore (80 km – 100 km) and capacity level (> 800 MW), neither of which are applicable to the east and south coast of Ireland. The Irish grid is a much smaller/ weaker grid than mainland Europe, with a largest infeed of 500 MW (which will increase to 700 MW once the Celtic Interconnector is connected) compared to a largest infeed of 3000 MW in Germany.

The Celtic Interconnector will require a greater volume of system services to be procured to ensure that system stability issues do not materialise. It is possible that bulk transfer beyond 700 MW may not be technically possible on the Irish System. Relevant projects on the east coast of Ireland are already close to the main demand centre and therefore do not need to transfer power over significant distances.

Future-proofing of offshore infrastructure

An AC offshore network would pose a different set of technical issues. The maximum rating of a 220kV offshore export cable is around 400MW per circuit. The relevant projects are likely to use the full capacity of their export cables meaning there is likely to be little added value to inter-connecting their offshore substations.

If the TSO/TAO were to pursue a "bootstrap" solution utilising multiple offshore platforms this would require further switchgear, reactors and additional facilities on the offshore platforms which would increase the offshore substation size and weight and fundamentally change the foundation type, substructure and topside design. This would add considerably to the cost of the offshore platform and substation. A TenneT style AC offshore platform (excluding equipment) costs circa €50m[1] more than a standard offshore wind farm platform and to merge both would add a further €30m-€50m.

The offshore industry has made great progress in recent years reducing the offshore substation weight to its bare minimum in order to reduce weight and cost. Future-proofing of offshore substation requirements, to facilitate an offshore bootstrap, would completely reverse this trend. It also risks adding significant additional cost in order to create an option for offshore network expansion in the future that may or may not be used.

[1] Budget pricing provide by offshore platform OEM

SSE Renewables does not view this as the most cost-effective way to create a bootstrap, particularly when the offshore platforms are located nearshore. An offshore bootstrap between two onshore nodes is a more cost-effective solution. This could be facilitated in early years by Relevant Projects future proofing the onshore substations, rather than offshore platforms. Given the order of magnitude difference in offshore infrastructure versus onshore infrastructure, it is disappointing that the Navigant analysis did not explore this as an option and didn't acknowledge the unique nature of the Irish grid and the proximity of Arklow and the Relevant Projects to the main demand centre.

There could be a conflict between the TSO's offshore functional requirements and a technically feasible design which could lead to protracted discussions and delays in the consenting process. An example of this would be if EirGrid insisted upon maintaining 220kV onshore circuit ratings offshore. OEMs have informed us that they don't currently manufacturer offshore landing cables that can match the rating of onshore cables.

There is, therefore, significant concern that future proofing requirements from the TSO would add cost and delays to relevant projects. Future-proofing will put upwards pressure on project costs, to the detriment of the consumer where such requirements are unnecessary, so called "gold-plating". Arklow and the Relevant Projects are further advanced in their designs and planning requirements. Future-proofing requirements could significantly impact on Relevant Project timescales and costs.

Future Asset Transfer

SSE Renewables also envisages issues with future asset transfer and change of ownership/ operational boundaries, for which it will take significant time to develop the necessary regulatory, technical and payment regime to support. The change in ownership boundary part way through the life of a wind farm would introduce significant risk, with the TSO's grid requirements for a connection point offshore still to be established. The wind farm will not have been designed to comply with requirements at this new boundary point and, therefore, there is a risk that the project would be non-compliant and in violation of its grid connection, needing costly remediation works.

In addition, if the ownership boundary is moved to the offshore platform, the TAO would be taking over the onshore substation, which houses the wind farm SCADA equipment, and the fibre optic link to the onshore substation, which the wind farm is relying on to control the offshore turbines. It is unclear how these assets could be transferred without severe disruption to the operation of the wind farm. Future proofing of the FO link by providing a dedicated FO link for both parties would be costly.

There is also a concern over the financeability of projects where future asset transfer is envisaged. This change in ownership boundary would affect insurance premiums and long-term service agreements that may be in place. Transferring assets to the TAO would also change TSO O&M costs, TUoS charges, TLAFs and DS3 revenue streams (given that STATCOMS located onshore would be transferred over to TAO), all of which are significant inputs to the financial model. It may not be possible to reach financial close on a project with this level of financial uncertainty without adding a large risk premium and putting upward pressure on costs at the expense of the consumer.

Future proofing – recommendation

In summary, SSE Renewables is not opposed to future proofing of onshore substations and/or reinforcements associated with offshore wind farms, if deemed beneficial and consistent with timely grid connection dates. SSE Renewables would be opposed to future proofing offshore assets associated with projects in the Irish Sea, which are likely to be incompatible with delivery of the Relevant Projects and the establishment of Ireland's first offshore wind farms of scale by 2025. Any decision to require future proofing of infrastructure should be made following assessment of cost-benefit to avoid gold-plating, at an unnecessary cost to the consumer.

SSE Renewables also cautions against the transfer of ownership for the offshore connection, which would present significant technical and financial challenges, increasing significantly the risk involved in offshore wind investments in Ireland.

***Question 4**: With respect to key driver (iv), **required infrastructure**, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

SSE Renewables proposed model will benefit significantly the aim of developing required infrastructure – in that it will do it fast, delivering on Ireland's targets and unlocking investment in support of our coronavirus recovery in the immediate future.

Please note, our response on the impact of the chosen model on "required infrastructure" does not address the topic of onshore/offshore coordination, which is covered in response to Question 10.

Experience in delivery of offshore infrastructure

The consultation rightly identifies the opportunity to leverage developer experience and expertise in the delivery of offshore infrastructure. SSE Renewables, for example, has significant experience in the delivery of such infrastructure. In the development of our Beatrice wind farm in Scotland, SSE Renewables delivered both the wind farm and transmission infrastructure itself on time and under budget. This project represented the largest ever private infrastructure investment in Scotland. This experience, and proven track record, will be of significant benefit in delivering Ireland's offshore wind industry on time, and in the securing of low-cost financing to support Ireland's first generation of offshore wind farms.

We note the consultation outlines the opportunity in Options 3 and 4 to leverage the experience of EirGrid and ESB Networks in the delivery of offshore infrastructure. Whilst we fully recognise both companies' technical and engineering expertise, and in particular the delivery of the EWIC interconnector by EirGrid, neither to our knowledge has experience of delivering infrastructure to connect an offshore wind farm. We note Navigant's conclusion that ESB Networks has the requisite relevant experience due to "*international experience with offshore transmission assets and wind farm development through their subsidiary ESB International*". As you will be aware, ESB business separation rules would not be compatible with such a conclusion.

As such we would challenge Navigant's assertion that EirGrid and ESB Networks experience to date means that experience in delivery is "*not a differentiator between models*". Whilst we have no doubt such experience can be gained, this lack of experience would increase perceived risk of late delivery by both developers and investors, reduce certainty and put upward pressure on costs. Rather, the experience of offshore wind developers to date should be viewed as a key strategic benefit which can be drawn upon as Ireland's launches its offshore wind industry.

Development bottleneck

As noted in the consultation, the massive increase in centralised activity associated with a plan-led model is likely to prove very challenging. A significant increase in resource is certain to be required, with a large number of projects likely to need progressing at the same time if we are to meet our 2030 targets. We agree with the suggested risk, as flagged in the consultation, that such an approach will lead to a significant development bottleneck.

At present there is significant activity going on across the market, with developers at various stages of project development, investing development cost at risk. Rolling back on this activity and centralising these responsibilities is a significant change and will cause lengthy delays. We have already flagged in our response to 'Environmental Concerns' that we do not see the state as currently resourced to take on the significant activity required in the identification of offshore wind sites and surveying and consenting of the same.

Largest infeed requirements

As already outlined in the Cost and Future-proofing section, any plan-led model which looks to utilise shared infrastructure or "hubs", should be viewed against both the cost to the consumer associated with longer offshore transmission networks, and the challenge to the TSO which such large single infeeds/point of failure could cause. Should these infeeds be of the size of several offshore wind farms, increased energy infrastructure will be required in order to ensure system security i.e. new system service providers, which will likely result in significant ongoing spend.

West Coast Infrastructure approach

As we look beyond the next decade to Ireland's west coast potential, the delivery of the required infrastructure will take place in a different context, with both onshore and offshore infrastructure being much more limited and perhaps requiring an alternative approach. Onshore grid is much more limited in the west coast and development sites are likely to be in deeper water. A state-led approach to the development of transmission infrastructure may be appropriate should Ireland pursue the 30 GW of west coast offshore potential as outlined in the recent Programme for Government.

For the sake of clarity, we would urge caution in any centralisation of site selection and consenting activities. Developers have significant experience in the identification and early development of the most effective sites for offshore wind, at a benefit to the consumer.

Required Infrastructure – recommendation

The experience of developers to date in the delivery of offshore wind infrastructure should be considered a significant benefit to Ireland as it establishes its offshore industry and, as such, we recommend a developer led model for east and south coast projects.

***Question 5**: With respect to key driver (v), **compatibility with Relevant Projects**, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

SSE Renewables welcomes the acknowledgement in the consultation that only the developer-led approach is compatible with Relevant Projects. As the Department is aware, SSE Renewables is progressing its Arklow Bank Wind Park Phase 2 project via its existing lease under the Foreshore Act. Engagement has now begun with the CRU and EirGrid on the grid connection process for Arklow Bank Wind Park Phase 2 and the Relevant Projects.

For these projects, and as outlined in the consultation, the next steps should recognise the urgent need to establish an offshore industry in Ireland. Given the timescales involved in developing offshore projects, SSE Renewables' view is that delivering 1 GW of operational wind farms in the Irish Sea by 2025 will be vital in achieving Ireland's increased ambition of 5 GW of offshore wind energy by 2030. Early action will also contribute to our interim EU emissions targets, whilst signalling Ireland's intent to the global offshore supply chain, where competition for resources and expertise is significant.

The approach to grid for Arklow Bank Wind Park Phase 2 and other projects has already begun, with EirGrid starting to proactively engage with projects to identify sensible no-regret onshore reinforcements. A developer-led approach, therefore, does not inherently require a reactive approach to such investment, as suggested in the consultation.

Indeed, this is reflected in Option 2 which highlights the need for proactive development of onshore grid reinforcements. To accommodate all offshore wind farms along the east coast, onshore reinforcements will be required. We understand that the necessary reinforcements, with appropriate priority and focus, can be delivered in a timeline to ensure that Arklow and some of the Relevant Projects can connect and contribute to our targets. The development of 220kV transmission infrastructure in the South West, critical to the delivery of the onshore wind required to meet the 2020 RES-E targets, demonstrates how substantial transmission infrastructure can be delivered in similar timelines.

The additional suggested design feature of option 2 involving TSO determination of connection locations to feed into RESS auctions would not be welcome given the significant uncertainty it would bring to projects in development.

Instead, SSE Renewables recommends the following model is adopted for early development in the Irish Sea:

- The TSO provides connection offers to Arklow Bank Wind Park Phase 2 and the Relevant Projects which includes reinforcements required to connect all Relevant Projects.
- Projects can then apply for early access to the network once consented.
- As reinforcements are completed and additional capacity is released then allocation of this capacity is awarded based on earliest consent date.

- Once all reinforcements are complete any remaining projects can connect.
- Many of the aspects of Option 1 align with what is most appropriate for Arklow and the Relevant projects. These features include the following:
- The grid connection point should be onshore, as facilitated by the existing regulatory environment.
- The developers are responsible for consenting, financing and construction of the windfarm, including all infrastructure out from the onshore substation.
- The offshore grid connection is owned, operated and maintained by the windfarm.

Compatibility with relevant projects – recommendation

As acknowledged in the consultation a developer-led approach based on Option 1 but including the proactive development of onshore reinforcements, discussion for which has already begun, will be the most appropriate for SSE Renewables' Arklow Bank Wind Park Phase 2 and the Relevant Projects.

Question 6: *With respect to key driver (vi),* ***social acceptance****, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

Community engagement and ensuring social acceptance is a critical part of infrastructure development. The approach taken by project promoters is a key factor in the success of a wind energy development.
In options 1 and 2, developers consent projects and carry out community consultation. In option 3 and 4, a State ORE Body leads on this and is the key interface with the community during the consent phase.
While there are advantages and disadvantages with each, we believe that option 1 offers the best way forward for projects along the east and south coast. It appears to us that the conclusions drawn in relation to the merits of the centralised approach are not borne out by the evidence provided in the report.

An extensive literature has developed regarding social acceptance and infrastructure development. While, there has been less research on offshore wind as it is a newer technology, some clear themes have emerged as acknowledged in Navigant's report:

- Meaningful consultation at an early stage can help to refine the design approach to a project, explain the potential benefits of a project, and establish an open relationship at the outset.
- Research also shows that it is crucial that communities have the opportunity to share in the socio-economic benefits of offshore wind farm projects.

In the sections below we will respond to arguments put forward in the Navigant report and set out the arguments in support of a developer-led approach.

Navigant's report states the following:

"Plan-led developments might improve social acceptance due to an overarching coordinated planning strategy across individual wind developments through clustering of projects and combining social acceptance processes".

While there are merits in seeking to coordinate community engagement strategies across projects as much as possible, it does not appear that the conclusion above is supported by the evidence provided in Navigant's report.

While there may be some benefits, the clustering of projects and combining of social acceptance processes could lead to confusion and have unintended consequences. All wind farms share certain characteristics but projects can differ when it comes to key criteria. For example, the make-up of the communities along the coast may vary, projects tend to be situated at varying distances from shore and can also vary significantly in size.

Project communications should be tailored to the characteristics of the specific project and concerns that may exist in the community. Grouping wind farms together could have a negative impact on an individual project's chance of getting consented and have a knock-on effect on Ireland's ability to meet its 5 GW target by 2030.

We believe there is a role for coordination in this space but that it would be more effective for this to be kept at a high-level rather than be focused on project specifics. A coordinated regional awareness campaign focused on the east and south coast could be beneficial. This could be led by the state, industry or collaboratively with input from local stakeholders. Research shows that general attitudes have a substantial influence on project-specific beliefs. It is therefore recommended that the public be engaged in discussions of both specific project characteristics and larger issues regarding renewable energy[2]. Research recently carried out by UCC suggests that there is merit in pursuing a national campaign to strengthen the perceived direct link between offshore wind and climate change[3]. An awareness raising campaign could be incorporated into Option 1 focused on influencing general attitudes to renewable energies to make clear the link between carbon emissions reduction and the installation of wind energy.

Coordination with regard to stakeholder outreach would also be beneficial particularly in the area of fisheries. The industry is already actively seeking to establish a formal mechanism for engagement modelled on the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) which was set up in 2002 in the UK to foster good relations between the fishing and offshore renewable energy sectors and to encourage co-existence. FLOWW's objectives are to enable and facilitate discussion on matters arising from the interaction of the fishing and offshore renewable energy industries, to promote and share best practice, and to encourage liaison with other sectors in the marine environment[4]. A key output of this Group has been the FLOWW Guidelines which cover planning and consenting processes, liaison practices, mitigations and coexistence and safety zones.

Navigant's report also notes the following regarding developer-led projects:

"Since a social acceptance process needs to be established for each individual project separately, this process is less standardised across developments and does not take into account future projects"

[2] D. Bidwell and M. Affairs, "Public acceptance of offshore wind energy: Relationships among general and specific attitudes," *OCEANS 2015 - MTS/IEEE Washington*, Washington, DC, 2015, pp. 1-6

[3] V. Cummins and Y. Cronin "Co-designing opportunities towards the development of Irish offshore wind: Public Perceptions report", EirWind

[4] FLOWW Best Practice Guidelines for Offshore Renewables Developments: https://www.thecrownestate.co.uk/media/1776/floww-best-practice-guidance-disruption-settlements-and-community-funds.pdf

As highlighted above, community consultation and engagement tailored to the needs of an individual project should not be viewed negatively. Wind farms and communities differ and the establishment of bespoke engagement campaigns will be necessary to ensure projects get consent. Steps can be taken at an industry level to promote good practice and consistency where appropriate. IWEA and NOW Ireland are forums where developers share engagement plans, good practice and seek to find synergies where beneficial. Good practice guidelines also be put in place to promote good practice and ensure a positive approach is adopted to offshore communications and engagement.

SSE Renewables' approach to consultation and engagement is to engage meaningfully and early with communities. While we acknowledge that ours and the industry's approach to community consultation can always improve, we believe that Navigant's report underestimates the extent to which developers have an interest in ensuring this is approached effectively. As a responsible developer we recognise that our approach to community engagement is a way in which we can differentiate ourselves from our competitors. We also know that the approach taken to community engagement in one community will have an impact on how we are perceived in other communities. We have plans to develop Arklow Bank Wind Park Phase 2 in the first half of this decade and have two other projects in the pipeline along the east and south coast. It is in our interest to ensure that we adopt a positive approach across all of these projects to ensure future success.

It should also be noted that community engagement has already commenced for projects not deemed legacy or relevant along the east and south coast. The move to a state-led approach once relevant and legacy projects are dealt with would undermine the progress made here. Disrupting an ongoing community engagement process needs to be avoided as it will create confusion and erode trust built up with stakeholders in the local community. It could also risk undermining efforts to develop 5 GW of offshore wind energy by 2030. A move to a more centralised approach for projects already underway would lead to the loss of knowledge and expertise and an inability for developers to build on relationships developed with relevant / legacy projects.

It cannot necessarily be inferred from the evidence provided in the report that a state body can carry out community consultation more effectively than developers. Recent experience shows that infrastructure projects can meet challenges regardless of whether the project promoter is the state or a private developer.

"Developer-led projects could result in wind farms closer to shore (< 20 km), increasing visual impact to coastal communities, as these locations are more competitive and cost efficient to developers since offshore wind transmission assets take up a significant part of the project development cost"

Ensuring proposals for development take proper account of the impact on landscape and seascape is a critical part of sustainable development. All offshore wind projects are required to demonstrate how they can avoid, minimise or mitigate significant adverse seascape and landscape impacts through an Environmental Impact Assessment during development.

The Marine Institute is undertaking work on the methodology and identification of preliminary/draft Seascape Character Types and Seascape Character Areas at a national and regional level to inform

Ireland's approach to marine spatial planning and contribute to Ireland's National Landscape Strategy 2015-2020. We welcome this piece of work as a consistent approach to the classification of landscape and seascape is required to ensure projects can be progressed with certainty.

As highlighted in our introductory section, we do not believe that minimum distances from shore should be a feature of offshore wind energy development or be within the scope of this grid options consultation. This did not emerge as a feature or recommendation in the draft National Marine Planning Framework, a document which has been subject to a lengthy and extensive consultation process. Minimum distances from shore on the east and south coast could rule out viable areas and put Ireland's ability to meet 2030 targets at risk. The siting of wind farms should be determined during the consenting process and is best scrutinised as part of an EIA rather than the imposition of blanket rules.

As noted in Navigant's report, a minimum distance from shore requirement would have an impact on costs to the consumer. If such limits were set such that seabed suitable for offshore wind farm development was severely restricted, or that early offshore projects were no longer viable, Ireland's offshore industry could be set back significantly. A reduced amount of seabed available, potentially in deeper waters, is likely to put upward pressure on costs and negatively impact on Ireland's competitiveness.

Finally, the Navigant report also states:

"As a developer-led model will not typically lead to offshore hub connections, it could generally result in more individual connections to shore that could negatively impact public acceptance".

As the Navigant report highlights, the pipeline of projects on the east coast are relatively close to each other and close to the shore. Therefore, the opportunities to leverage the advantages of combining projects on a single hub are likely limited. Onshore landing points can be managed with a proactive approach from the TSO. The TSO should work with developers to find synergies between projects when it comes to grid connection. An approach such as this could help mitigate the issues above.

Social Acceptance – recommendation

While there are advantages and disadvantages with each, we believe that Option 1 offers the best way forward for projects along the east and south coast. Project communications should be tailored to the characteristics of a specific project. Grouping wind farms together could have a negative impact on an individual project's chance of getting consented and have a knock-on effect on Ireland's ability to meet its 5 GW target by 2030. We believe there is a role for coordination in this space but that this may be more effective at a high-level (rather than be focused on project specifics).

Question 7: *With respect to key driver (vii),* ***facilitating the timely development of offshore wind capacity to achieve the 2030 target****, which of models 1,2,3,4, or variant of these, delivers the most satisfactory results? Which features of the model, or variant, are the most influential for your given choice?*

In assessing the impact of the grid delivery model on the ability to achieve the 2030 target it is important to set out the wider context of how our offshore wind 2030 target, now increased to 5 GW, will be achieved and an applicable project development timeline. This includes consideration of how to achieve the Government's planned offshore RESS auction in 2021 and deliver 1 GW of offshore wind by 2025.

Due to the project development timeframe, any project(s) which intends to connect in advance of 2030 will likely be required to commence detailed site-specific development comprising EIA scoping and environmental surveys in 2020. External factors, such as delays to the enactment of legislation, nature of grid delivery model or legal challenges, which either delay the commencement of development or prolong this phase will have a detrimental effect on the industry's ability to achieve 2030 targets.

Facilitating the timely development of offshore wind capacity to achieve the 2030 target – recommendation

Our view, is that given the development timelines and the relatively limited time to achieve the 2030 targets, a developer-led grid model is most appropriate to deliver the necessary capacity in the coming decade.

A significant change in approach to grid (beyond Arklow and the Relevant Projects) will add years of additional time to the delivery of projects meaning contribution to our 2030 targets will not be possible. This is driven by the time required at the outset to develop new governmental capabilities and to adapt policy, regulatory, licence and legislative frameworks. The establishment of a state development body including the associated upskilling would lead to a multi-year delay to site consenting and as such is not a suitable model to deliver capacity pre-2030.

Question 8: Rank the key drivers *in order of importance 1-7, which have the greatest impact on the choice of model.*

As outlined elsewhere in this document, SSE Renewables sees it as critical that Ireland finally initiates its offshore wind industry after years of false starts. Offshore wind provides the opportunity to promote massive investment at both a national level and into towns and ports along the east coast, providing thousands of direct and indirect jobs. Such an opportunity has particular significance as we look to our coronavirus economic recovery.

As such we view compatibility with Relevant Projects and with 2030 targets as the most critical consideration, particularly given the clear differentiation between different models in the delivery of these aims.

We fully understand that the establishment of this industry must go hand in hand with investment in communities and engagement. We would therefore place strong emphasis on **social acceptance**, an area where SSE Renewables has considerable experience as a result of the developments we have progressed and completed in the UK. As outlined in our response, we see a bespoke, project specific approach as being the most effective way to engender local engagement and support.

As we outlined in our response to the question on **relevant infrastructure,** we would caution that Navigant's report undervalues the benefit that experienced developers such as SSE Renewables, who have successfully completed offshore wind farms on time and under budget, will bring to Ireland's nascent industry. Ireland can leverage the experience of several experienced developers who are developing

projects in the Irish Sea and should consider these a key strategic advantage as we initiate our offshore wind industry.

Whilst drivers identified elsewhere in the consultation such as **impact on the environment** and **cost** are of paramount importance, we do not view these as being significant differentiators between different models. We do, however, believe a developer-led model can deliver supply-chain certainty and unlock private capital investment as we look towards our coronavirus economic recovery. Regarding environmental impact, potential projects will be subject to stringent environmental assessment in all scenarios in order to assess cumulative impacts.

Finally, with respect to **future-proofing** of projects, we've outlined that any such technical requirements should take place at onshore infrastructure/substations given the massive increased costs of offshore future-proofing and lack of necessity for such an approach. Any future-proofing should be carefully considered to avoid gold-plating at a cost to the consumer. We do not see such technical requirements as a significant differentiator between models.

Rank the key driver – recommendation

We see the key, clear differentiator between models as the compatibility with Relevant Projects and delivery of 2030 targets. These criteria should therefore be considered as a priority in deciding on Ireland's offshore grid model for the coming decade.

Question 9: *How important is it for Ireland to develop an* ***indigenous offshore wind energy industry****? How best can an indigenous industry be developed?*

It is essential that Ireland establish an offshore wind industry in the first half of this decade if we are to effectively address the threat of climate change and put Ireland on track to achieving the targets in the Climate Action Plan, Programme for Government and EU Green Deal commitments to achieve a net zero economy.

The European Green Deal contains a commitment for the EU to become climate neutral by 2050. This will result in an increase in climate targets for Member States. In keeping with this, Ireland's Programme for Government contains a commitment to an average 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 and to achieving net zero emissions by 2050.

Delivering on this welcome increase in ambition will require a significant step up in effort. Offshore wind represents the area where Ireland can outperform. To deliver a 70% renewable electricity target, Ireland needs to put a policy and regulatory framework in place that enables us to go beyond 5 GW of offshore wind to put us on a trajectory to deliver net zero by 2050.

Ireland needs to play to its strengths if we are to meet this increase in ambition. Ireland has a seabed ten times the size of its landmass. By exploiting our offshore wind potential, we can decarbonise other sectors through electrification. The Programme for Government has ambitions to develop 30 GW from the west coast in addition to the 5 GW targeted for 2030.

Not only can Ireland's offshore ambitions help us meet our decarbonisation targets, it can also establish a thriving industry and drive a green recovery here in Ireland. A recent supply chain study carried out by the Carbon Trust concluded that the offshore wind industry could bring approximately €60 billion worth of investment to Ireland, based on projects already in the pipeline (approx. 12 GW). This investment will be made in towns and rural communities along with thousands of jobs[5].

The transformative impact of offshore wind is evident in the experience of our nearest neighbour. The UK's offshore renewable industry is fuelling vital investment in manufacturing and the wider domestic supply chain, building vibrant economies and supporting thousands of skilled jobs. While Ireland is a smaller and less mature market, the potential benefits for Ireland's economic development are significant as outlined in IWEA's Supply Chain Study. According to the SEAI's Wind Energy Roadmap, onshore and offshore wind could create thousands of operation and maintenance jobs by 2040[6].

The Arklow Bank Wind Park Phase 2 project alone will see SSE Renewables invest between €1bn and €2bn in a development which could generate around 1.75 TWh of renewable electricity annually. In Great Britain it has been estimated that every 1 GW of offshore wind capacity installed delivers an economic boost of €2bn to the economy[7]. SSE Renewables estimate that a development on the scale of Arklow Bank Wind Park Phase 2 could sustain around 80 operation and maintenance (O&M) jobs once the project moves to its operational phase.

The offshore industry is a global industry. Intense competition in the supply chain is one of the factors which has led to cost reductions. While Tier 1 supply chain companies are unlikely to set up manufacturing facilities in Ireland due to market size, considerable opportunity exists around the provision of services and equipment by Tier 2 & 3 companies.

With support, the Irish supply chain can grow to serve areas beyond where Ireland is traditionally strong. Enterprise Ireland should be supported in continuing its effective work in developing offshore wind supply chain clusters for Irish companies. This would enable businesses to develop their resources and capacity to a point where they can not only support the development of offshore wind domestically but also compete effectively in the European and even global markets.

The approach to growing the offshore wind industry in Ireland needs to be carefully designed. The ultimate aim should be to increase local content over time but in a way that ensures projects still get built in a cost-competitive manner and in line with Climate Action Plan targets. We would caution against the approach taken in jurisdictions such as France which adopted strict local content criteria which led to the industry grinding to a halt. The approach taken in the UK shows that significant local and national economic benefits can be gained without local content requirements. However, an auction process focused on delivering the very lowest cost projects will inevitably lead to only the most competitive suppliers being contracted. Therefore, it is important that the Irish Government also considers its industrial strategy to identify and

[5] Carbon Trust Supply Chain Study: https://www.iwea.com/images/files/final-harnessing-our-potential-report-may-2020.pdf
[6] SEAI Wind Energy Roadmap: https://www.seai.ie/publications/Wind_Energy_Roadmap_2011-2050.pdf
[7] ORE Catapult (2017), 'The economic value of offshore wind': https://ore.catapult.org.uk/app/uploads/2017/12/SP-0012-The-Economic-Value-of-Offshore-Wind-1.pdf

support the development of domestic suppliers who can be globally competitive and considers the impact on electricity consumers.

The next two years are crucial if Ireland is to meet its 2030 targets.

The industry is poised to invest billions of euro in large capital expenditure to develop Ireland's offshore wind energy assets to their full potential. To unlock that investment, it is critical that the first projects get the green-light and are up and running by 2025 to contribute to meeting Ireland's existing climate change ambitions and interim EU targets.

As we have outlined in our response, we believe that a developer-led approach is needed in this decade to allow an offshore wind industry to become established.

Since the first commercial offshore wind farm was installed in Denmark in 1992, the policy and regulatory frameworks that govern offshore wind development have evolved in all European offshore wind nations. Open door approaches to seabed tenure and development rights were the starting point in Denmark, Germany, Belgium and Netherlands. Over time these countries have introduced changes that increase the degree of centralisation in decision-making. Similarly, these countries have transitioned or are transitioning to a TSO model for connecting offshore wind farms to onshore transmission systems8.

Ireland should adopt the same iterative approach to offshore wind grid development. This will allow Ireland to build and connect wind farms that are already at an advanced stage of development on the east and south coast to hit 2030 targets and ensure low-hanging fruit are not wasted. Ireland should begin its offshore wind journey with a developer-led approach and begin work to transition to a more centralised approach to grid planning and development post-2030 in order to exploit the c.30 GW of offshore that is estimated to be possible off our west coast.

Question 10: How should onshore and offshore grid connections be optimised*? For example, should consideration be given to common hubs for adjacent projects?*

SSE Renewables believes that coordination of offshore developments with onshore reinforcements can be achieved as part of option 1 as previously outlined in our response to Question 1. It is our view that the most expedient and efficient way of delivering 5 GW of offshore wind by 2030 is a developer-led approach to offshore grid combined with a proactive approach by EirGrid to onshore grid. We believe that there may need to be a different approach taken to offshore delivery for the west coast post 2030, given the much more limited onshore transmission infrastructure in the region.

The Relevant offshore projects in the Irish Sea are all nearshore and close to the major demand centres. The optimum solution for connecting these projects is unlikely to involve large offshore hubs. As previously described in response to Question 3, a more optimum solution could be for the TSO to take a proactive approach to reinforcing the onshore network. As highlighted in our comments on delivery of the Relevant

[8] Fitch-Roy, Oscar, 'An offshore wind union? Diversity and convergence in European offshore wind governance', *Climate Policy*, 16:5, 586-605

Projects, SSE Renewables supports the following model in the allocation of grid for Arklow Bank Phase 2 and the Relevant Projects:

- The TSO provides connection offers which includes reinforcements required to connect all Relevant Projects.
- Projects can then apply for early access to the network once consented, mirroring priority connections for "shovel-ready" projects under ECP-2.
- As reinforcements are completed and additional capacity is released then allocation of this capacity is awarded based on earliest consent date.
- Once all reinforcements are complete any remaining projects can connect.
- The Department's plan to hold multiple rounds of offshore RESS auctions can facilitate projects as they progress through this consenting and grid process.

Where onshore reinforcement solutions have been exhausted or cannot be delivered in time to meet 2030 targets, the TSO could build upon this by developing coastal "bootstraps". This could be facilitated by Relevant projects through future proofing of onshore substations and coordination of landing points and cable crossings points with the TSO.

The UK has nearly 10GW of offshore wind installed capacity. It is beginning to explore the option of moving to a more plan-led approach for future projects, recognising the need to maintain stability for those projects already in advanced stages of development. A developer-led, radial offshore grid approach has served the UK well to this point, but the scale of its future offshore ambitions and challenges with congestion in some areas such as East Anglia could require a shift to a different approach to offshore grid development. The UK has acknowledged it will need a variety of tools in its toolbox in order to do this and have not ruled out traditional radial AC connections for specific projects. The National Grid ESO's Offshore Coordination project is assessing technology options and identifying conceptual designs that could work for the GB system. Their next step is to carry out a power system analysis on the conceptual network design and a cost-benefit analysis.

This level of detailed analysis goes beyond what has been done in the Navigant report and we would ask that a similar process is initiated by EirGrid to explore a plan-led approach for the enduring offshore projects on the west coast, whilst progressing the 5 GW of offshore projects required for 2030. Ireland is going to need a bespoke solution suitable for the Irish network.

Onshore/Offshore coordination – recommendation

SSE Renewables views coordination of offshore developments with onshore reinforcements as being compatible with a developer-led approach for the east and south coast, with such an approach required to deliver on 2030 ambitions. Once the delivery model for 2030 has been established further consultation is required on how to deliver on Ireland's post 2030 ambitions and how to transition smoothly between both models.

Question 12: *Currently, developer compensation is not provided for delayed delivery of grid connections to renewable generators connecting to the network. Should developer* ***compensation arrangements*** *be*

*provided for delivery of offshore grid connections to renewable projects? Similarly, who is best placed to bear the **outage risks** under the various options?*

Compensation arrangements need to be considered against the context of the ambitious 2030 offshore wind target. The incentives placed on EirGrid and ESB Networks need to be sufficient so as to ensure the timely delivery of the necessary infrastructure upgrades. Failure to ensure delivery will undermine the ability to meet the proposed renewable targets as well as potentially jeopardise future development.

A developer-led approach provides, in part, a significant reduction in risk for developers in that they are in control of the development and construction of the offshore connection assets. Notwithstanding this, there remains considerable risk for projects in late or non-delivery of a project's connection point and/or onshore reinforcements by the TSO.

This risk was made even more significant by the finalised T&Cs for the first RESS auction, which provided no extension to long-stop dates due to non-delivery by the TSO, meaning projects could lose a RESS contract due to no fault of their own. Placing this risk with the developer is incompatible with the scale of investment required for offshore wind farms.

Clear time-bound contractual commitments to deliver connection assets with associated financial penalties for failure to deliver should be established as part of the connection offer.

It is SSE Renewables' view that, in the absence of a meaningful incentive/penalty regime for the transmission system owners/operators, there should be contractual obligations on the timely delivery of assets. Where the TSO is responsible for delivery of the offshore connection asset, developers should be compensated where the TSO fails to deliver in accordance with the contract. This compensation should be in line with the commercial revenue that would have been achieved if the delivery of the connection had been met in line with commitments.

Whilst risk is reduced where the developer itself is responsible for the offshore connection, the delivery of onshore connection point/upgrades could have a significant impact on project viability. SSE Renewables recommends that the RESS T&Cs will need to be revised for offshore projects, to ensure that long-stop dates can be extended with the full period of RESS support kept whole should delays due to the TSO/TAO occur.

Experience from developing onshore windfarms has demonstrated that delivery of connection assets by EirGrid and ESB Networks can take significant time, with some windfarms connecting under ECP-1 taking over 5 years to connect. Gate 3 occurred in 2008 and some projects are still waiting for grid reinforcement before they can connect. The ITC studies which allocated Firm Access were published in January 2010. Projects were then allocated associated transmission reinforcement to make them firm along with scheduled completion dates. The main ATR for North Mayo was the Grid West project (400kV), that never materialised. This was later scaled down to the North Connacht 110kV Redevelopment project which currently has a scheduled completion date of 2024.

Outage risk

It is also necessary to consider who is best placed to bear the outage risks under the various options. The party (or parties) that own and operate the relevant asset are best placed to bear the risks. For a wind generator, it would be the owner and operator of those assets, for the transmission system it would be the owner and operator of that system.

If, for example, there was a failure in the transmission system connecting the offshore windfarm then the transmission system owner/operator must be responsible for ensuring that all the relevant compensation is paid.

The delivery of energy is dealt with through the wholesale market and therefore any failure on the part of a generator to meet their market obligations are dealt with through the relevant market arrangements.

Question 13: *Are there any* ***further drivers*** *which should be considered when assessing a grid delivery model suitable for offshore wind development in Ireland?*

General comments on international comparisons

We would like to highlight an additional point. Whilst we understand the rationale for evaluating the approach to offshore development in other countries, it should be highlighted that not all countries will be equally comparable to Ireland with respect to seascape, grid or indeed, public policy objectives for offshore wind development.

Of particular significance is the relative marine “real estates” available to countries. Figure 1 below shows the relatively constricted marine space available to countries including the Netherlands, with much more limited foreshore space than Ireland. Looking at the marine space available to these counties, it is understandable why a plan-led approach to offshore grid may be more appropriate to make use of a resource which is narrow, serving large multi-phase offshore wind development zones.

Ireland has a marine space along the east coast with an extensive foreshore. Not only this, but onshore transmission network along the east coast of Ireland already has transmission nodes spaced along the east coast proximate to major demand centres. The projects anticipated to contribute to the 2030 targets are relatively nearshore (and in many cases may be closer to shore than an offshore connection hub) and run broadly parallel to the coast. Few of the advantages of a plan-led model can, therefore, be realised in relation to these projects.

For these reasons, the connection of offshore wind farms along the east coast via individual connections to a reinforced east coast grid presents itself as the most logical solution for east coast developments this decade.

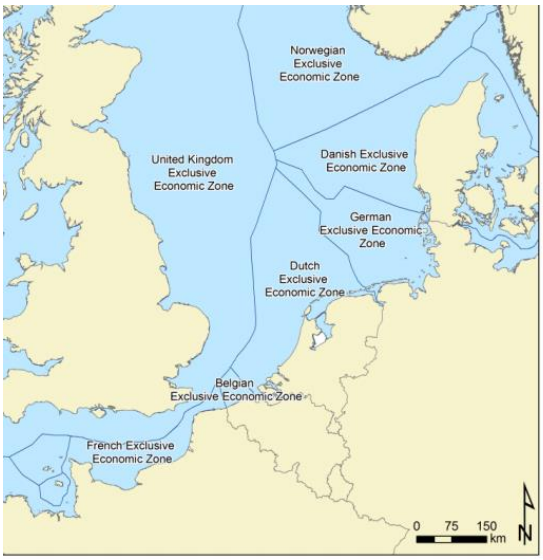

Figure 1: Continental European marine zones

As highlighted above, the west coast of Ireland presents a different challenge, with relatively little onshore transmission infrastructure to facilitate connections, and much deeper waters. Given the potential need for lengthier offshore transmission and onshore transmission/reinforcements, SSE Renewables believes there is rationale for considering a more centralised approach to the development of offshore grid in the west.

Question 14: *Overall,* ***which model, or model variant, is most appropriate*** *as an enduring grid delivery model for offshore wind in the Irish context?*

Question 15. *It is accepted that a transition towards the chosen enduring grid delivery model will be required to leverage the development of the Relevant Projects in the short term. Taking into account the high-level roadmaps set out at Figures 5 and 6 above,* ***what should this transition look like****?*

As outlined throughout this response, SSE Renewables sees a developer-led model as the most appropriate for Ireland this decade. Such an approach:

- Is compatible with Ireland's objectives of developing 5 GW of offshore wind by 2030, as well as holding a first offshore auction in 2021.
- Can enable Ireland to establish its first operational offshore wind farm of scale by the middle of the decade.
- Takes into account the nature of Ireland's seascape and onshore transmission infrastructure along the east coast.
- Makes the most efficient use of the projects already in development.
- Provides for competitive delivery of not only the offshore wind farm itself but also the development of sites and offshore connection infrastructure.
- Leverages developer's significant experience in the delivery of offshore wind farms.
- Is compatible with a bespoke, project specific approach to community engagement.

As highlighted in the introductory section of this response, engagement has already begun between EirGrid and SSE Renewables (as well as the Relevant Projects) in the development of onshore grid capability and reinforcements. **SSE Renewables therefore recommends a developer-led model based primarily on Option 1**, though with a proactive approach to onshore transmission infrastructure reinforcement.

We strongly support the development of Ireland's west coast potential and note the Programme for Government flags 30 GW of offshore wind resource. A more plan-led approach to development of grid in the west may be required to unlock this potential. Challenges with respect to very limited transmission infrastructure for both connection and transportation back to Ireland's demand centres will need to be addressed. Time is available to address these issues and evolve our approach as west coast development is not expected to commence until after 2030. The challenges in developing Ireland's west coast should not be underestimated and, as such, work should begin in the coming years to evaluate the best approach to west coast development. Early evaluation can also provide visibility to industry as to potential investment opportunities well ahead of time, maximising competition for future developments.