



North Sea
Wind Power Hub
Programme

Offshore Wind Market Engagement

Report



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About this paper

Why read this report

Reaching the Paris Agreement targets requires a significant change in the current European approach towards energy policy and planning. In light of this and recent developments on both European and national levels, this report presents policymakers and the general public with the joint view and a call for urgent action shared by NSWPH and a broad representation of European offshore wind farm developers.

More specifically, this report introduces and discusses three key topics currently discussed across Europe and the North Sea countries. The analysis featured elaborates on the joint market view on the key sub-areas, which require urgent action, in order to trigger sufficient investor clarity and enable the initiation of hybrid projects.

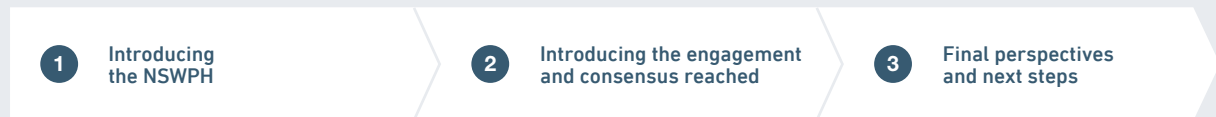
Highlights

NSWPH and eight leading offshore wind farm developers have participated in the engagement, and have discussed three topical themes across Europe: Market Setup, Grid Development Planning and Integration and Sector Coupling.

The Market Engagement Report presents the consensus reached on the key issues that must be addressed and the necessary next steps to be taken by policymakers in Europe, in order to enable the necessary deployment of offshore wind.

The engagement has shown that the market stands ready to engage and deliver the necessary parts for the solution to a green Europe.

Structure of the Market Engagement Report



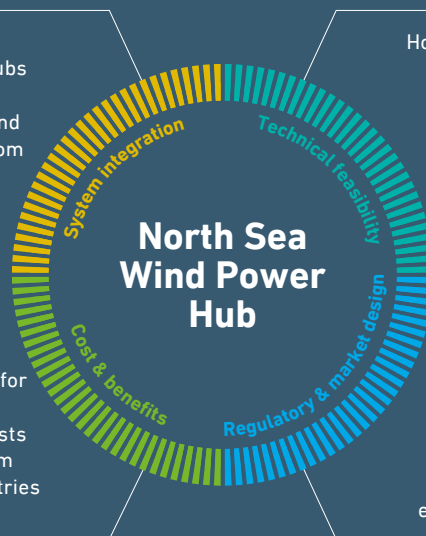
The big picture

The North Sea is a powerhouse of wind energy. Harnessing this power requires us to cooperate across countries and borders to build an efficient network. To show that a solution can be achieved in a cost-effective and secure manner, the North Sea Wind Power Hub is working within four key areas.

This report explores key topics within System integration, as well as Regulatory & market design.

How to design and build the physical hubs and spokes that will collect, transform and distribute energy from the North Sea.

How to ensure that the chosen solution maximises benefits for society and climate while minimising costs and distributing them fairly between countries and stakeholders.



Executive summary

Reaching the Paris Agreement targets and harnessing the potential of the North Sea by 2050 requires a fundamental change in the European approach to energy policy making, planning and the energy system as a whole. This transformation is complicated, but necessary, and can only be successful, if all parties come together.

In light of the task ahead and recent policy and target announcements, NSWPH and eight leading offshore wind farm developers in Europe have participated in this market engagement. The aim has been to build a consensus across the actors involved, and based on this to identify the key issues to address and potential next steps to be taken by European and national policymakers, in order to create a robust investment climate and enable the necessary deployment of offshore wind in Europe.

Political decision making on both a European and national level is considered to be critical for Europe's ability to reach Net Zero and the 2050 deployment targets. Targeted and coordinated political action is an absolute necessity, in order to provide the market with the necessary confidence and frameworks to accelerate deployment and realise hybrid projects – largely considered a game changer for the European energy system and decarbonisation.

In this Market Engagement Report, we jointly issue a call for action directed to European and national policy makers, with focus on three key messages aligned with the current focus and discussions of policymakers across Europe and the North Sea countries:

1. A market setup approach, which ensures an enabling, transparent and fair distribution of revenue, cost and risk, is critical for driving investment and project initiation. This necessitates that work is promptly launched on further understanding and detailing the implications of the respective models.
2. Long-term energy grid development planning (10+ years) on a European level is a necessity and requires significantly enhanced political coordination and commitment on a European level. This has to be coupled with strategic cooperation between governments, transmission system operators (TSOs) and offshore wind farm developers.
3. Sector coupling is a critical element in the future European energy system. It requires immediate political action to align supply and demand and necessitates cooperation across actors and industries in Europe on key regulatory, commercial and technical issues.

The policies and ambitions set across Europe in recent months are highly welcomed and have set a strong starting point. However, already today it is critical to accelerate the political, technical and commercial work that lies ahead – this engagement has shown that the market stands ready to engage and deliver the necessary parts for the solution to a green Europe.

1 Introducing the North Sea Wind Power Hub (NSWPH)

In this section, we introduce the NSWPH consortium and its vision. This is followed by an introduction to the hub-and-spoke concept, as well as selected aspects of NSWPH's work during the pre-feasibility phase.

The NSWPH consortium and its work in a glimpse

Founded in 2017, the NSWPH consortium consists of leading transmission system operators (TSOs) in the North Sea countries: Energinet, Gasunie and TenneT. NSWPH is a unique programme collaboration focused on taking a long-term and integrated perspective on the energy transition and meeting the Paris Agreement goals. We take a new approach combining transnational, hybrid and cross-sector features into the hub-and-spoke concept, aiming for the first project to be realised in the early 2030s.

In our work, we leverage our deep expertise to address the challenges associated with the timely realisation of the project, as well as to support governments and policymakers in this process. Since the first Industry Engagement in 2019, the programme has entered the feasibility phase for the first project, and we have developed the hub-and-spoke concept further. Additionally, "Project #335 North Sea Wind Power Hub" has been awarded the "Project of Common Interest" (PCI) status by the European Commission and we have received funding by "Connecting European Facility" (CEF), in recognition of the critical contribution of the project to the European energy system as a whole.

The NSWPH vision and hub-and-spoke concept

The European Strategy on Offshore Renewable Energy, published in November 2020, has set a significant and unprecedented target for the European Union to reach 300GW of offshore wind capacity by 2050. This makes the North Sea a critical element in the European solution to climate change, largely due to the favourable conditions it offers for the deployment of offshore wind.

Vision | Harnessing the potential of the North Sea is a complex, but necessary step, which requires a significant change in the current approach: from national, isolated energy policies towards a large-scale, coordinated European approach, which can account for the increasing volume of offshore wind, provide security of supply and maximum societal benefits, as well as integrate emerging technologies and solutions advancing our green transition.

Highlight

The NSWPH Programme has entered the feasibility phase for the first project, and has received "Project of Common Interest" status, as well as funding by "Connecting European Facility".

Nice to know

The North Sea has been recognised as a leading region with regard to deployed capacity and expertise, and has been marked as the most "advanced example and reference point" for actors with significant interest in offshore wind by the European Strategy on Offshore Renewable Energy.

NSWPH advocates for a transnational, integrated and step change approach to the massive build out of offshore wind in the North Sea through the hub-and-spoke concept – a concept linking the energy system of North-West Europe together in one well-planned and coordinated network, while connecting large amounts of offshore wind. The consortium takes a pragmatic approach towards the first project to be realised in the early 2030s. The timeline required to establish infrastructure for the realisation of such a project is significant (~10 years) and international agreements on certain topics are required, thereby increasing the amount of time necessary.

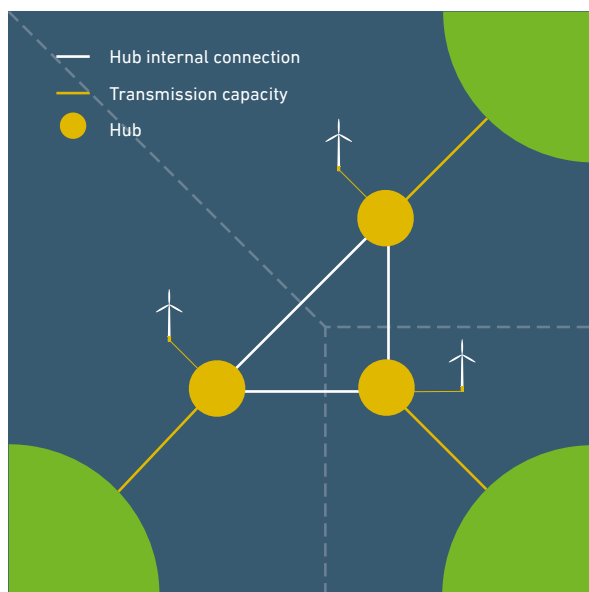
Concept | The hub-and-spoke concept presents an opportunity to facilitate the first of a series of projects to harvest the enormous offshore wind potential in the North Sea, and builds on a modular approach, where additional hubs could be added in a stepwise manner. The concept is characterised by three unique features, namely that it will be:

1. **Transnational** | by connecting multiple countries
2. **Hybrid** | by combining interconnection with the connection of offshore wind
3. **Cross-sector** | by integrating different energy sectors and energy carriers

As a result, offshore hubs in the North Sea could each connect 10 - 16 GW of offshore wind power and distribute generated power to European markets through a network of cables (spokes) and/or pipelines via utilisation of P2X facilities. During the pre-feasibility phase for the first project, we have analysed the feasibility of different configurations for the hub-and-spoke concept, and have defined two concepts for the first project:

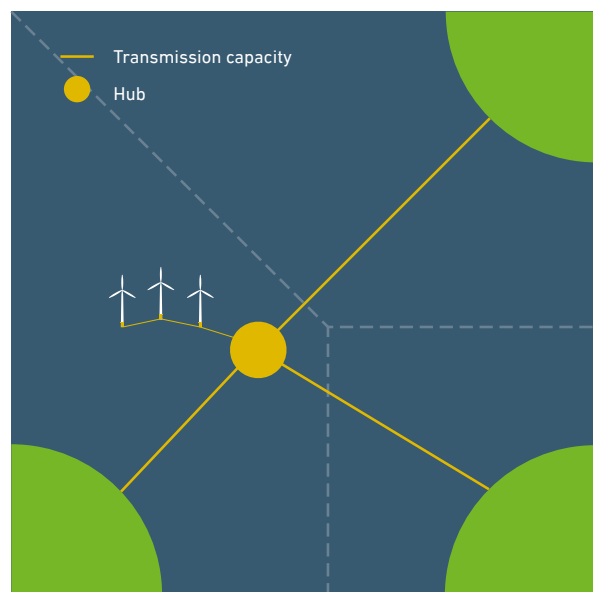
For a more extensive review of NSWPH's work and next steps, please consult NSWPH Concept Paper 2021: Towards the first hub-and-spoke project.

Figure 1a: Distributed hub concept



Distributed hub concept | comprising of multiple, smaller hubs in the Economic Exclusive Zone (EEZ) of multiple countries with interconnectors between the hubs and countries.

Figure 1b: Centralised hub concept



Centralised hub concept | consisting of a single large hub located within the EEZ of a single country with interconnectors to different countries.

NSWPH's work and next steps

During the pre-feasibility phase for the first project, NSWPH has completed a number of steps and has undertaken extensive analyses on four overarching topics, namely 1) System integration, 2) Technical feasibility, 3) Cost & benefits, and 4) Regulation and market design.

In order to enable the realisation of the first hub-and-spoke project, NSWPH has supplemented this work with active dialogue with both policymakers and market actors on a number of regulatory, commercial and technical considerations.

- 1 **Market Engagement** | In 2019, NSWPH engaged successfully with offshore wind farm developers. Here, experts from leading offshore wind farm developers were engaged to highlight key regulatory and commercial issues from an offshore wind farm developer perspective. An Industry Report was published¹, entailing four key messages directed to policymakers. In the spring of 2021, NSWPH conducted a second engagement, resulting into the present Offshore Wind Market Engagement Report.
- 2 **Political consultations and necessary roadmap development** | NSWPH is involved in ongoing consultations with Member States and policymakers on multiple levels and has developed a Topical Agenda² to serve as a policy-making roadmap. This is supported by a structured process to develop international consensus and prepare timely decision making on key issues to facilitate international agreements on cross-border and cross-sector offshore wind projects in the early 2030s.

Highlight
The NSWPH is involved in ongoing consultations with Member States and policy makers on multiple levels, coupled with carrying out periodic market engagements.

Nice to know: In parallel with NSWPH's work with political consultations, a number of intergovernmental engagements and activities are taking place and have resulted into concrete Memorandum of Understanding (MoUs)

In June 2020, Denmark and the Netherlands signed an MoU to establish cooperation on the renewable energy transition. In December 2020, this was amended to include perspectives on offshore energy infrastructure, initiating collaboration on offshore energy hubs. Additionally, the Netherlands and Germany have signed a Joint Declaration on further cooperation within grids and electricity transmission. Lastly, a Letter of Intent between Denmark and Germany was recently published to support cooperation on joint and hybrid offshore renewable energy projects between the countries.



For more information on this, as well as next steps planned by the consortium, please consult NSWPH Concept Paper 2021: Towards the first hub-and-spoke project.

1 <https://northseawindpowerhub.eu/report-industry-engagement-june-2019/>
 2 <https://northseawindpowerhub.eu/discussion-paper-topical-agenda/>

2 The Offshore Wind Market Engagement

In this section, we introduce the purpose, focus and participants in the engagement. This is followed by concrete sub-sections presenting the consensus reached on Market Setup, Grid Development Planning and Integration and Sector Coupling.

Purpose of the Market Engagement

The green transition, Paris Agreement goals and recent policy ambitions and targets set across Europe have resulted into an unprecedented opportunity and challenge for the European energy system – offshore wind build-out in the North Sea is expected to have a key contribution to meeting the European goals. Harnessing the potential in the North Sea requires a fundamental change in approach, and can only be successful, if all parties come together.

NSWPH has sought early engagement with offshore wind farm developers to ensure that the first hub-and-spoke project is developed in a way that provides the right incentives for stakeholders involved.

The aim of this collaboration and this report is to present policymakers with key issues to be addressed and possible next steps, in order to create a robust investment climate and thereby enable the necessary deployment of offshore wind in Europe. These represent the joint view reached between NSWPH and offshore wind farm developers involved in this engagement.

Key focus areas

Based on the preliminary analysis and initial discussions held, the engagement has focused on three key themes of discussion:

1. **Market Setup** | Identifying the market's current thinking on market design and bidding zone configuration, including the critical elements for each suggested solution and the necessary next steps for policymakers.
2. **Grid Development Planning and Integration** | Detailing the need and necessary focus areas for enhanced European cooperation and a revised and cross-sector integrated approach to Grid Development Planning.
3. **Sector Coupling** | Discussing the role of sector coupling for the European energy system, as well as the way and extent to which this need to be prioritised in European policy making.

Highlight

The aim of this collaboration and report is to build on the consensus reached in 2019 and present policymakers with key issues to be addressed and possible next steps.

Nice to know: The Engagement Process

In late 2020, NSWPH launched the second Market Engagement, aiming to build on the discussions and consensus reached in the first Market Engagement in 2019.

NSWPH identified eight leading offshore wind farm developers with different positions and/or a strong commitment in the North Sea markets.

During the spring of 2021, NSWPH has engaged in discussions with senior executives and policy experts from the respective offshore wind farm developers.

This Market Engagement Report presents the findings and consensus reached between NSWPH and offshore wind farm developers, and has been developed on the background of our interactions and the analysis carried out.

The following offshore wind farm developers have been involved in the Market Engagement in 2021 and endorsed the report.



Hybrid projects and the hub-and-spoke concept as a key way forward in the North Sea

The engagement shows that the participants perceive recent political support as a key enabling factor for the project and that consequently this has strengthened the market's interest in such projects even prior to this engagement. More specifically,

1. The European Offshore Renewable Energy Strategy, published in November 2020, and its endorsement of hybrid projects has led to increased market awareness and interest in hybrid projects, such as NSWPH's hub-and-spoke concept.
2. This is further supported by the Net Zero targets and European Green Deal, as well as European Hydrogen Strategy, which bring the elements of ambitious targets, interconnectivity and sector coupling to the forefront.
3. High domestic ambitions in a number of key countries with well-functioning offshore wind markets, including Denmark, the Netherlands, Germany and other North Sea countries are further increasing market confidence in commercial ventures in the North Sea.

Altogether, the North Sea is an area of high strategic interest for a number of market actors in Europe. All parties involved in the engagement see the commercial potential of such projects in the North Sea, as well as foresee room for cooperation with TSOs, governments and other actors, in order to create synergies and an efficient roll-out for all, which optimises socio-economic benefits and commercial viability.

The participants support support NSWPH's initiative and endorse the hub-and-spoke concept as a key enabler for the energy transition and a critical element in enabling a large-scale roll-out of offshore energy in the North Sea by 2050. Additionally, the participants maintain openness and a non-discriminatory approach to other concepts.

The voice of offshore wind developers

Supporting statements



The hub-and-spoke concept facilitates the growth of offshore wind to achieve the ambitious targets by providing improved interconnectivity, addresses grid congestion and facilitates the possible transition to hydrogen as means to optimally utilise the produced offshore wind energy.

– Eneco

Europe needs offshore wind to play a leading role to meet a net-zero target by 2050. This will require build out of offshore wind at much larger scale, further ashore, and fully integrated across several markets. Building hybrids and large hubs is necessary to unleash the potential and meet our European targets.

– Ørsted

The NSWPH can be seen as a way to operationalise the EU renewable growth strategy which offers multiple business opportunities. We believe that multi-purpose interconnection solutions are likely to become one important system feature in the future.

– Vattenfall

The NSWPH Programme is an important step towards the massive offshore wind capacity that is implied in the achievement of net-zero targets and its ambition is completely aligned with Ocean Winds strategy.

- OW Ocean Winds

The voice of offshore wind developers

Supporting statements



RWE supports the NSWPH Programme and hub-and-spoke concept that, in parallel with other concepts, will work for the long-term build-out of offshore wind to achieve the 2050 targets.

– RWE

Hybrid projects are a game changer. They require vision and long-term commitment regarding the build-out, in order to enable the necessary infrastructure investments.

– Copenhagen Infrastructure Partners

Equinor is positive on continued engagement with NSWPH, with hybrid projects and interconnectivity becoming an increasing priority in European policy.

– Equinor

Shell believes large scale integrated build-out of offshore wind is key to enable achievement of the EU's 2050 carbon neutrality target. Interconnections and power to gas enabled by energy hub concepts are critical to deliver large scale offshore wind efficiently and will ensure increasing offshore wind capacities can reach customer renewable electricity demand. Increasing integration and demand for renewable electricity is essential to provide investment certainty and system stability.

- Shell

Market Setup

During the market engagement, NSWPH and the respective offshore wind farm developers have discussed the proposed market setups (Home Market and Offshore Bidding Zone), as well as the key considerations and barriers to address, in order to secure a viable market setup in the North Sea. In doing so, the following consensus has been reached:

A market setup approach, which ensures an enabling, transparent and fair distribution of revenue, cost and risk, is critical for driving investment and project initiation. This necessitates that work is promptly launched on further understanding and detailing the implications of the respective models.

Nice to know: The relevance of the Market Setup discussion

The market setup, which determines the allocation of offshore wind farms to specific bidding zones and the subsequent allocation of interconnection capacity between the bidding zones, is a crucial topic, where early decision making and clarity on the future market setup is necessary.

The current thinking on a European level is focused on two particular models applicable to hybrid projects, namely the 'Home Market' and the 'Offshore Bidding Zone'. A number of analyses on the initial implications of the two market setups have been carried out by the European Commission, TSOs, as well as offshore wind farm developers.

Market perspective on the discussion

The engagement indicates that the final assessment of the two proposed market setups is ongoing for the market actors involved. Many of the offshore wind farm developers have already expressed an indicative preference, which is contingent on the further detailing of the market conditions.

All market actors involved however require additional information on the possible setups, in order to finalise their assessment, and recognise the high importance of gaining more clarity and transparency altogether.

In the section below, we detail the consensus presented and the current market view on the proposed market setups, as well as reflect on the areas, where further engagement and work is necessary.

Key messages | The engagement shows that the participants are undecided on the preferred bidding zone model for hybrid projects. Here, the distribution of revenue and risk is considered to be the most critical consideration for the two models. More specifically, revenue and risk should be distributed in a way, which will adequately reflect the responsibility and exposure taken on by the respective parties in hybrid projects, and must provide incentives to all the stakeholders involved. This is deemed as a pre-requisite for enabling long-term certainty and project initiation.

Highlight

A market setup approach, which ensures an enabling, transparent and fair distribution of revenue, cost and risk, is critical for driving investment and project initiation. This necessitates that work is promptly launched on further understanding and detailing the implications of the respective models.

The engagement further suggests that the choice of market setup is largely perceived as a decision, which must be promptly taken by national policymakers. This decision requires additional work on detailing and analysing the implications of the respective models on the allocation of revenue, cost and risk, as well as identifying the necessary regulatory changes. This work must be launched, without delay, in order to allow market actors to gain the necessary clarity on the market setup and possible support schemes among others.

Where further work and dialogue is needed | The engagement shows that the parties involved believe that targeted analysis and further exchanges are necessary, in order to address:

1. The implications of the dual nature of the assets on the balancing setup, curtailment and forward markets, as well as on the subsequent tasks and risk exposure for the different actors.
2. Revenue allocation under the two market setup models (Home Market and Offshore Bidding Zone), necessary policy modifications, as well as the need for more clarity and alignment of support mechanisms available across the different markets.
3. The downward market pressure and anticipated electrification and its implications for the long-term incentives of the different market actors.

For a more detailed account of NSWPH's analysis, please refer to Discussion Papers "Market setup options to integrate hybrid projects into the European electricity market" (April 2020) and "Market setup options for hybrid projects", published in February 2021.



The voice of offshore wind developers



We need new models for allocation of costs and revenues of hybrids to ensure that incentives are aligned. The offshore wind farm developer should benefit from having access to several markets, and the transmission asset should benefit from serving as a feeder line for the offshore wind.

– Ørsted

It is important to discuss solutions that ensure a fair distribution of revenue and risk and promote a stable investment regime.

– Equinor

Priority ranking of consensus statements: Market Setup

The large majority of parties engaged agree that the market setup chosen for the North Sea should ensure*:

1. Fair distribution of revenue and risk between OWF developers, TSOs and third-parties, incl. through mitigating measures.
2. An efficient market setup considering the physical realities of the energy system.
3. Necessary incentives and a practical approach, enabling efficient system balancing and congestion management.
4. Necessary access of offshore energy production from the hub-and-spoke to the interconnectors.

Source: KPMG analysis

* The ranking indicates the relative priority among the themes and reflects the average prioritisation, based on the responses received.

Grid Development Planning and Integration

Building on the reflections from the Market Setup discussion, NSWPH and the respective offshore wind farm developers have discussed the necessary approach to grid development planning and integration.

Given the ambitious targets set on both a European and national level, we have focused on identifying critical elements, that need to be addressed, in order to secure sufficient and timely market clarity to enable the necessary deployment of offshore wind by 2050. In doing so, all parties have reached the following consensus:

Long-term energy grid development planning (10+ years) on a European level is a necessity and requires significantly enhanced political coordination and commitment on a European level. This has to be coupled with strategic cooperation between governments, transmission system operators and offshore wind farm developers.

Nice to know: The relevance of the Grid Development Planning and Integration discussion

So far, energy policies in Europe have been mostly nationally focused with international cooperation only recently picking up. Further acceleration of cooperation initiatives is required to realise the full potential of the North Sea – the increasing volume of inherently variable offshore wind electricity will be challenging to integrate, and there is no single silver bullet solution.

Key recent developments on European and national level

The need for a revised and cross-sector integrated approach to grid development planning has been a key focus area in both the Offshore Renewable Energy Strategy and revised TEN-E regulation published in late 2020. Both strategies have a clear focus on the implications of this necessary change, particularly for offshore wind, and include important insights on next steps and considerations. Their work is further complemented by the European strategies on Energy System Integration and Hydrogen.

This presents a key opportunity to work further on how these considerations can be realised on a European level, and needs to be complimented by work carried out by national governments.

In the section below, we detail the consensus presented and the necessary next steps for policymakers identified, as well as reflect on the areas, where further engagement and work is necessary.

Key messages | Both NSWPH and the offshore wind farm developers involved strongly welcome the ambition and progress made in the Offshore Renewable Energy Strategy and revised TEN-E regulation.

Without doubt, European and national policymakers play a highly critical role in achieving the Net Zero targets and the necessary deployment and integration of offshore wind energy – among others via grid planning processes. Hybrid projects and the hub-and-spoke concept require a significant change in the current approach followed for grid development. As a result, during the engagement, NSWPH and the offshore wind farm developers have agreed on a call for action directed to European and national policymakers, with focus on:

- 1. Increasing coordination and integrating a regional and a long-term perspective into European and national planning** | This needs to go beyond information sharing, and enable sufficient and timely market clarity on how offshore wind will be deployed jointly in Europe. This has to be coupled with sufficient and timely clarity on the implications of this on the regulatory and commercial setup. This is an urgent matter in light of the pressing timeline for the realisation of hybrid projects.
- 2. Enabling revised and/or accelerated processes** | The realisation of offshore wind deployment targets is contingent on efficient processes, which can enable project initiation. It is therefore critical to consider the options to significantly reduce the lengthy processes currently in place, and thereby enable an accelerated roll-out.
- 3. Ensuring necessary alignment of supply and demand** | It is crucial to ensure alignment between supply and demand, as well as timely visibility on the growth potential for demand. This will provide necessary incentives and signals to both the public and the market. (The next section on Sector Coupling discusses some of the necessary steps, in order to achieve this).

The engagement has further highlighted the centrality of increased involvement and cooperation between political and market actors, and in particular the importance of enhanced and strategic cooperation between governments, TSOs and offshore wind farm developers, in order to jointly address the key issues and challenges that lie ahead.

Where further work and dialogue is needed | This engagement has provided a starting point for further, targeted discussions on key issues identified, including the need for:

- 1.** Enabling an accelerated build-out, e.g. through parallel development of assets, and/or engaging in market dialogue on the associated risk exposure and solutions to mitigate this.
- 2.** Ensuring the right balance between standardisation, pre-investment and flexibility, in order to prevent premature lock-ins in a solution, which will not be socio-economically optimal and/or lack buy-in from market actors.

Highlight

Long-term energy grid development planning (10+ years) on a European level is a necessity and requires significantly enhanced political coordination and commitment on a European level. This has to be coupled with strategic cooperation between governments, transmission system operators and offshore wind farm developers.

For a more detailed account of NSWPH's focus on coordinated, cross-sector approach, and next steps for infrastructure and P2G, please see NSWPH Concept Paper 2021: Towards the first hub-and-spoke project.



The voice of offshore wind developers



Long-term planning, coordinated on European level, is key given the national focus today and the large differences in market environments and legislation across Europe.

– **Eneco**

Grid development planning and integration is a complicated, but necessary step, which requires national planning and significant cross-border political coordination.

– **OW Ocean Winds**

Offshore wind developers should at least be consulted in the grid development phase to align the technical and commercial requirements between wind and grid. There needs to be more co-ordination between TSOs, wind developers and potential MPI developers to align on planning requirements.

– **Vattenfall**

Priority ranking of consensus statements: Grid Development Planning and Integration

The large majority of parties engaged agree that grid development planning is a key prerequisite, in order to enable the necessary roll-out of offshore wind in an efficient/viable manner, and requires*:

1. Ambitious political build-out commitment to provide early investor clarity and trigger investment across the value chain.
2. Enabling regulatory framework for hybrid projects, with efficient approvals.
3. Focus on long-term energy system balance, ensuring best economic rational and efficiency.
4. Development that can accommodate increasing injection into the onshore grid.
5. Coordination across Europe, in order to maximise synergies.

Source: KPMG analysis

* The ranking indicates the relative priority among the themes and reflects the average prioritisation, based on the responses received.

Sector Coupling

During the engagement, sector coupling has been a natural continuation of the discussions on grid development planning and integration. NSWPH and the respective offshore wind farm developers have discussed the relevance of sector coupling for the European energy system, as well as the way and extent to which this needs to be prioritised in European policy making and have reached the following consensus:

Sector coupling is a critical element in the future European energy system. It requires immediate political action to align supply and demand and necessitates co-operation across actors and industries in Europe on key regulatory, commercial and technical issues.

Nice to know: The relevance of the Sector Coupling discussion

Sector coupling involves the increased integration of energy supply with end-use sectors and is highly relevant in the context of hard-to-abate sectors and the European electricity grid. More specifically, the conversion of electricity to another energy carrier (referred to as P2X) can enable the decarbonisation of energy users with strong reliance on fossil fuels. Similarly, sector coupling is critical in connection with the outroll of large scale (intermittent) renewable energy, enabling long-term/seasonal storage and less grid reinforcement. This is critical in the context of Net Zero targets, the European green transition, as well as European energy of supply and maximising of socio-economic benefits.

NSWPH perspective on the interplay between sector coupling and the hub-and-spoke concept

The hub-and-spoke concept aims to reduce mismatches between supply and demand, improve security of supply and support the decarbonisation of non-power sectors by adopting an integrated system approach, with:

1. Increased connections between countries.
2. Electricity conversion to other forms of energy that can be stored or used in non-power demand sectors.



For a more detailed account of NSWPH's view on system integration, P2X considerations and next steps for NSWPH, please consult NSWPH's Concept Paper, towards the first hub-and-spoke project

In the section below, we detail the consensus presented and the current, initial market view on sector coupling, as well as reflect on the areas, where further engagement and work is necessary.

Key messages | The engagement shows significant market agreement that sector coupling plays a central role in the European energy system. This is largely due to its contribution to the decarbonisation of sectors other than the power sector, as well as the increased flexibility it provides to the electricity grid.

During the engagement, NSWPH and the respective offshore wind farm developers have agreed on the need for targeted and immediate policy actions to be taken by European and national policy makers, ensure continuous alignment between supply and demand throughout the energy transition. Alignment of supply and demand, and market certainty on this is vital for further development, in order to prevent a potential deadlock.

The engagement further suggests that maintaining ongoing dialogue between policymakers and market actors, including offshore wind farm developers, is key, in order to secure co-ideation on e.g. technical standards and innovation and enable the necessary large-scale deployment of offshore wind.

Where further work and dialogue is needed | Given existing European strategies and the level of concept maturity, the following initiatives are supported by the majority of offshore wind farm developers and NSWPH, namely:

1. Specific policy initiatives and measures to ensure demand development in sync with renewable generation developments, with focus on hard-to-abate sectors, such as transport, and industry.
2. Coordinated planning across political levels (national, regional, and European).

Highlight

Sector coupling is a critical element in the future European energy system. It requires immediate political action to align supply and demand and necessitates cooperation across actors and industries in Europe on key regulatory, commercial and technical issues.

The voice of offshore wind developers



Replacement of fossil based power generation with vast amounts of renewable energy requires careful forward planning to ensure that supply, transmission and demand are aligned at all times.

– Copenhagen Infrastructure Partners

Sector Coupling is a critical enabler to deliver climate neutrality in the EU by 2050. Investment certainty, demand stimulation, support for supply and integrated and aligned policy and regulatory frameworks at EU and MS level is essential.

– Shell

Developers require a stable and effective support framework, where grid regulation and incentives for stimulating hydrogen demand & supply are in place. Industrial offtakers need to be sure their use of green hydrogen can be accounted for in their carbon footprint. These measures combined with long term planning security are preconditions for investments.

– RWE

Priority ranking of consensus statements: Sector Coupling

All parties engaged agree on the centrality of sector coupling, as well as on the need for political action to enable the following *:

1. A shift in demand towards electrification and P2X.
2. Maintaining ongoing dialogue with the industry to enable large-scale deployment.
3. A roadmap for the future of Sector Coupling before 2030.
4. Integration of a cross-sectoral energy system planning approach.
5. Coordination across sectors and subsequently viable cross-sector regulation.

Source: KPMG analysis

* The ranking indicates the relative priority among the themes and reflects the average prioritisation, based on the responses received.

3 Final perspectives and next steps

Background | With the new ambitions and goals set by the European Union and national governments, and the pressing timeline towards 2050, Europe has embarked on a very complex, but necessary green journey. The North Sea will be central in enabling Europe to deploy the necessary offshore wind capacity, ensure security of supply and socio-economic benefits as well as decarbonising hard-to-abate sectors.

Political decision makers on both a European and national level are considered to be critical for Europe's ability to reach Net Zero and the 2050 deployment targets. Targeted and coordinated political action is an absolute necessity, in order to provide the market with the necessary confidence and frameworks to accelerate deployment and realise hybrid projects – largely considered a game changer for the European energy system and decarbonisation.

In this Market Engagement Report, we therefore jointly issue a call for action directed to European and national policy makers, with focus on amongst others the following themes and next steps:

- 1. Market Setup |** The choice of market setup and bidding zone is ultimately a political decision. This should prioritise an efficient setup, which ensures a fair distribution of revenue and risk and provides incentives to all stakeholders involved, enabling long-term clarity and project initiation. This requires that additional work is launched, in order to further analyse and detail the implications of the different models for the market actors involved, as well as identify the necessary regulatory changes.
- 2. Grid Development Planning and Integration |** The green transition requires a radical change in grid development planning and integration. More specifically, it necessitates enhanced European commitment and coordination, as well as long-term planning (10+years) and ensuring alignment of supply and demand. This has to be coupled with accelerated and more efficient processes, as well as strengthened and strategic cooperation between governments, TSOs and offshore wind farm developers moving forward.
- 3. Sector Coupling |** The parties involved in the engagement recognise the significant potential of sector coupling in the European energy system and call for targeted and immediate policy actions to ensure alignment between demand and supply. Lastly, this has to be coupled with further work and cooperation within co-ideation on e.g. technical standards and innovation, in order to enable the necessary large-scale deployment.

NSWPH stands ready to continue facilitating this discussion and engage with policymakers and market actors, in order to realise the first hub-and-spoke project in the early 2030s.

Highlight
Targeted and coordinated political action is an absolute necessity, in order to provide the market with the necessary confidence and frameworks to accelerate deployment and realise hybrid projects.



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