

Harvesting

Europe's full offshore
wind potential

ELIA GROUP'S WHITE PAPER
ON PROMOTING HYBRID OFFSHORE INTERCONNECTORS

Content

1. FOREWORD	3
2. EXECUTIVE SUMMARY	5
2.1 Missed opportunities in offshore wind development caused by an uncoordinated approach	6
2.2 Four focus areas to promote offshore hybrid interconnectors	8
2.3 Clear-cut measures for scaling up offshore wind	11
3. DEEP DIVE	13
3.1 Introduction	14
3.2 Problem statement	15
3.3 Four focus areas to promote offshore hybrid interconnectors	16
Decreasing complexity and reducing risks by structuring projects according to their individual components	17
Securing a conducive investment climate for the speedy delivery of projects	18
Ensuring countries with different interests and baselines receive their fair share of benefits thanks to a straight-forward framework	20
Implementing offshore bidding zones to maximise socioeconomic benefits	23
4. COMPANY PROFILE	24



1 Foreword



In short

- Accelerating the establishment of a net zero society has never been as relevant as it is today. However, an important mismatch exists between Europe's sky-high ambitions and the few structural actions that are actually being undertaken.
- The combination of offshore windfarms and interconnectors could help Europe to harness the full renewable potential of the North and Baltic Seas while more effectively distributing the green electrons produced among its Member States.
- This white paper on hybrid interconnectors proposes a conducive investment climate and framework that would limit project risks and complexity and ensure that all involved parties (countries, developers and investors) could receive their fair share of the benefits.

Dear reader,

The Ukrainian war has returned a sense of urgency to the European energy debate. The geopolitical crisis and record-breaking energy prices are destabilising both our political and socioeconomic foundations. Short-term measures are being put in place to protect our citizens and economies from inflation and imminent scarcity.

Looking beyond the short term, the European Green Deal and the "Fit for 55" legislative package seem to include all necessary elements for ensuring that the Union's energy policy is made more independent, resilient and climate-neutral.

Given the current context, accelerating the establishment of a net zero society has never been as relevant as it is today. However, an important mismatch exists between the sky-high European ambitions and the few structural actions that are actually being undertaken.

Hybrid interconnectors hold promise of harnessing Europe's RES potential

This is the reason behind our white paper on hybrid interconnectors. Our proposals aim to provide incentives for countries with different amounts of renewable potential to collaborate and de-risk the investment provided by wind generation and transmission developers. If we manage to make it work, our recommendations will provide part of the solution for reaching Europe's goal of 300 GW of offshore wind capacity by 2050.

Indeed, the combination of offshore wind farms and subsea interconnectors holds promise of providing a solution. Together, they could harness the full renewable potential of the North and Baltic Seas while more effectively distributing the green electrons produced among European Member States.

The Kriegers Flak - Combined Grid Solution project (the world's first offshore hybrid interconnector realised by the German and Danish system operators 50Hertz and Energinet) has already proved that the societal value of hybrid interconnectors (relative to their cost) is much higher than that of radial (point-to-point) connections. Moreover, the further off the coast a hybrid interconnector is built, the more socioeconomic welfare it will deliver during moments of low wind infeed.

The rarity of hybrid interconnectors is caused by their huge complexity

Although hybrid interconnectors are presented to the market as a single project package, they involve different components which require very different skills and elements to come together (including huge amounts of investment capital, complex stakeholder management, and expertise related to developing wind farms far out at sea and robust grid integration). Moreover, uncertainty remains about the 70% rule, which requires 70% of an interconnector's capacity to be offered up to cross-zonal trading.

Wind developers and transmission system operators also have different project management approaches due to differing project lead times: realising an offshore grid connection and the necessary corresponding reinforcement of the onshore grid can easily take up to 10 years, whilst offshore wind farms are generally built in less than half that time.

Solutions which ensure a fair distribution of benefits lie within our grasp

Europe's ambition to become the first climate-neutral continent would become much more achievable if the aforementioned issues could be solved. We believe they can be addressed by implementing a few steps that would ensure that countries, developers and investors receive their fair share of the benefits associated with hybrid interconnector projects.

IF WE SUCCEED IN ENSURING THAT EUROPE ACTS QUICKLY IN THIS AREA AND, AS A RESULT, HYBRID INTERCONNECTORS ARE MORE WIDELY IMPLEMENTED, EUROPE WILL BECOME MORE ENERGY INDEPENDENT AND WILL BE ABLE TO DEMONSTRATE TO THE WORLD THAT A SUSTAINABLE FUTURE IS POSSIBLE.

We suggest Member States focus first on addressing the low-hanging fruit by completing the projects which are already in the pipeline. At least 7 European countries are currently developing hybrid interconnectors; these projects include our own Triton Link (a hybrid interconnector in the North Sea that will link Belgium with Denmark) and Bornholm Energy Island (a hybrid energy hub in the Baltic Sea that will connect Germany to Denmark).

These projects could be rapidly rolled out if a conducive investment climate were to be secured. This would provide all involved parties (wind developers, grid infrastructure developers, Member States, suppliers, etc.) with a framework that would limit project risks and complexity and would thus make them sufficiently attractive. By de-risking the investment, capital costs would decrease and innovation and competition would be able to play their full role in providing European consumers with green electricity in an efficient way.

Collaboration pays off

The 2019 Baltic Energy Market Interconnection Plan (BEMIP) study demonstrated the huge economic value of offshore wind in the Baltic Sea for the energy system. With high cross-border cooperation, this economic benefit will be four times larger than the benefit accrued through (mainly) national development alone. Once the initial projects mentioned above have been launched, Europe should therefore consider calling on its Member States and their system operators to map offshore concession zones out in their marine special plans and work with other countries on hybrid projects.

If we succeed in ensuring that Europe acts quickly in this area and, as a result, hybrid interconnectors are more widely implemented, Europe will become more energy independent and will be able to demonstrate to the world that a sustainable future is possible.

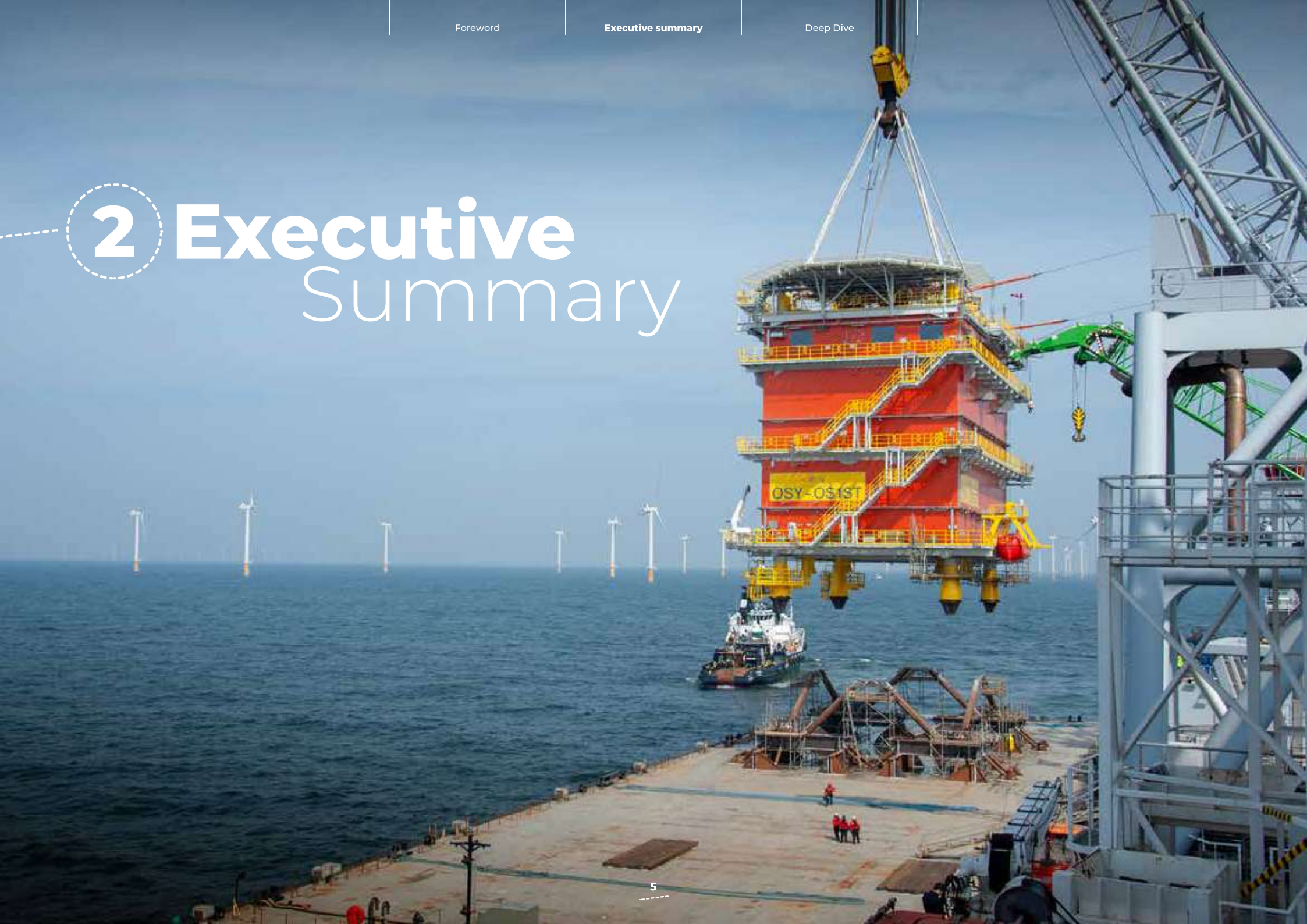
The topic should be made a priority if Europe truly intends to make its ambitions a reality.

Enjoy the read!

Chris Peeters

CEO Elia Group

2 Executive Summary



2.1 Missed opportunities in offshore wind development caused by an uncoordinated approach

There is an urgent need to connect large numbers of renewable energy sources (RES) to electricity systems in order to decarbonise society and increase Europe's energy independence. The need for this has become even more important given the war in Ukraine.

Today, there is a mismatch between Europe's "Fit for 55" ambitions and actual progression towards meeting its climate and energy targets. Considering the order of magnitude of the challenge ahead, the Green Deal will only be realised if Europe's renewable potential is fully harnessed and the resulting energy is efficiently brought to its consumption centres. Moreover, increasing cooperation between Member States will be necessary, since some countries have limited onshore wind and photovoltaic energy potential (due to a limited amount of space and limited load factors) and/or do not have sufficient access to offshore RES.



Hybrid offshore solutions are essential for reaching climate objectives, securing competitive energy prices and increasing Europe's energy independence.

The first hybrid project (Kriegers Flak - Combined Grid Solution) has already been completed and is demonstrating its value. However, hybrid projects are not yet being quickly scaled up. Many reasons lead to projects often being delayed or not coming to fruition, including the following: such projects are highly complex and require specialised skills and many stakeholders to be a success; there is no simple, convincing investment framework for the different parts of the value chain (transmission, generation); offshore wind potential is not spread equally across different Member States, meaning that some countries will be short on RES whilst others have too much RES, and meaning that purely national solutions will not be appropriate; market solutions for the cross-border dispatching of offshore energy are unclear (for example, the applicability of the 70% rule related to the cross-zonal capacity target); and no mechanism ensuring that costs are borne by the parties who benefit from the infrastructure is in place.



If offshore wind development is left to an uncoordinated country-by-country approach, a substantial part of Europe's 300 GW offshore wind potential would be left untapped and Europe is at risk of failing to reach the objectives of the Green Deal - both in terms of timing and in terms of volumes.

The 2019 Baltic Energy Market Interconnection Plan (BEMIP) study highlighted that up to €700-900 million per year in 2050 could be saved only with cooperation between states. If Europe finds a way to promote the use of offshore hybrid solutions, it will take huge steps forward in terms of reaching its RES targets, boosting the decarbonisation of society, increasing its energy independence, securing competitive energy prices and reducing environmental impacts.

The good news is that there is a way to ensure this happens if political decision-makers at European and national levels join forces.

Hybrid solutions will be rapidly scaled up if: their complexity and the risks associated with them decrease for all involved parties along the value chain; the investment climate for projects that create socioeconomic welfare ensures revenues are certain and reasonable enough to cover the business case of the interconnector and the offshore wind park; countries with different interests and baselines access their fair share of associated benefits; and the market mechanism for dispatching offshore electricity maximises socioeconomic benefits.

A world premiere

In short

The Kriegers Flak - Combined Grid Solution (CGS) connects the Danish region of Sjælland with Mecklenburg-Vorpommern in Germany. Built as an interconnector, the line is an innovation in the energy transition since it is the first hybrid offshore interconnector which not only connects wind farms in two countries, but which can also be used to transmit and trade energy in both directions. No comparable project has yet been accomplished anywhere in the world.

In October 2020, 50Hertz and Danish grid operator Energinet inaugurated the world's first hybrid offshore interconnector, integrating both German and Danish offshore wind farms. This allows CGS to transmit offshore wind power to Denmark and Germany. The line can also be used as an interconnector for cross-border power trading.



CGS connects Germany and Denmark via two offshore wind farm grid connections

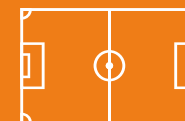


235 km
combined length

The line sections have a total combined length of around 235 kilometres.



The German and Nordic power grids do not operate synchronously, but are now connected through a double converter at the Bentwisch substation near Rostock.



The converter hall in Bentwisch is half the size of a soccer field and just under 15 metres high.



400 MW

starts at the 50Hertz substation

The interconnector, which has a transmission capacity of up to 400 MW, starts at the 50Hertz Bentwisch substation near Rostock and ends at Denmark's Bjaeverskov substation in the Sjælland region.



PCI

CGS is a joint project by Energinet and 50Hertz. It is co-financed by the European Commission as a project of common interest (PCI).

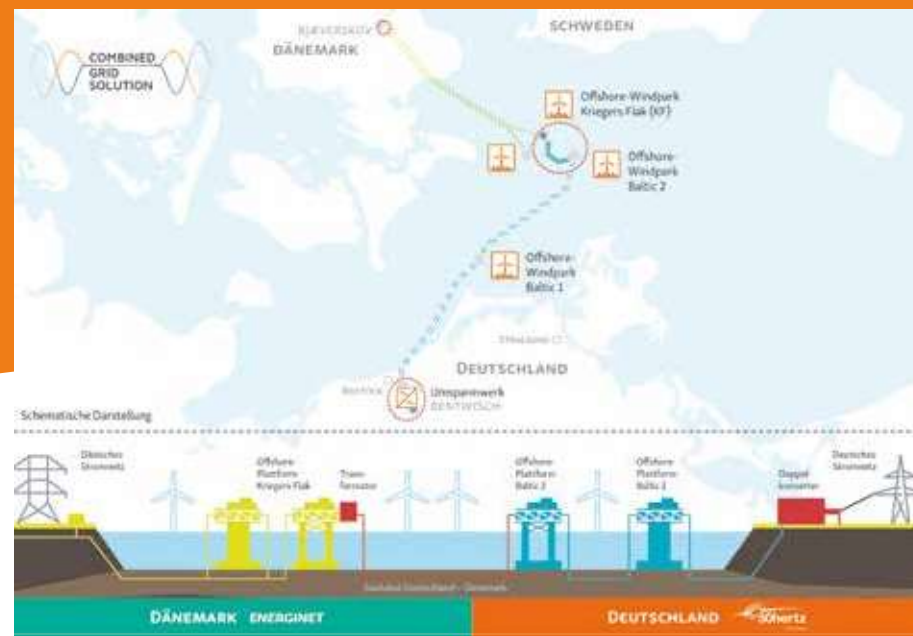


The interconnector is controlled by the Master Controller Interconnector Operator (MIO), installed at the 50Hertz Control Centre in Neuenhagen near Berlin.



2016/2017

Construction started in late 2016/early 2017.



2.2 Four focus areas to promote offshore hybrid interconnectors

HOW TO PROMOTE OFFSHORE HYBRID INTERCONNECTORS:

**1**

DECREASING COMPLEXITY AND REDUCING RISKS BY STRUCTURING PROJECTS ACCORDING TO THEIR INDIVIDUAL COMPONENTS

2

SECURING A CONDUCIVE INVESTMENT CLIMATE FOR THE SPEEDY DELIVERY OF PROJECTS

3

ENSURING A FAIR SHARE OF BENEFITS FOR COUNTRIES WITH DIFFERENT INTERESTS AND BASELINES THANKS TO A STRAIGHT-FORWARD FRAMEWORK

4

IMPLEMENTING OFFSHORE BIDDING ZONES TO MAXIMISE SOCIOECONOMIC BENEFITS

1



DECREASING COMPLEXITY AND REDUCING RISKS BY STRUCTURING PROJECTS ACCORDING TO THEIR INDIVIDUAL COMPONENTS

For multiple reasons, it makes sense to keep the development of the transmission and the generation components in the hands of separate, experienced entities.

Indeed, hybrid offshore projects comprise complex infrastructure built by different businesses that hold different types of expertise (i.e. large offshore wind generators which are located far from the coast on the one hand and long subsea cables which form part of multi-terminal connections to the onshore grid on the other hand). Splitting hybrid offshore projects into the different parts of the value chain (potentially through the use of standardised technical designs) allows the strengths of different players with regard to the development of efficient solutions to be used.

In addition, experience shows that the development and construction of these two key components (generation and transmission infrastructure) have different timelines: offshore transmission projects have longer lead times, given the need to mitigate risks and deal with increasing challenges relating to designing, routing, permitting and coordinating them with onshore reinforcement projects.

Instead of trying to make progress on hybrid offshore projects in a monolithic way, the transmission component of the project should come first.

This would spread the huge investment need, giving wind developers clear opportunities and comfort regarding their ability to “plug wind farms into the interconnector” - a frame which would allow them to de-risk their commercial project part. Offshore transmission infrastructure should be coordinated at an international level and developed to meet identified global needs, without waiting for investment commitments from specific offshore generation developers.



2



SECURING A CONDUCTIVE INVESTMENT CLIMATE FOR THE SPEEDY DELIVERY OF PROJECTS

Our proposed solution would ensure a fair remuneration for investors, in line with the risks every party has taken as part of a given project.

- 1) The interconnector**, requiring a sufficient and certain remuneration stream, would be financed via a grid tariff allowing for a fixed regulated return or a narrow cap and floor regime. The congestion rent generated by the interconnector would be reimbursed to the grid tariff contributors. Part of the investment costs could be covered by different types of existing and new EU funding sources to reflect additional socioeconomic benefits at the European level which would be achieved beyond the national boundaries of the states directly involved (these could include geopolitical independence, employment opportunities, additional RES to reach EU targets, avoiding CO₂...).
- 2) Offshore wind developers** could then develop a case based on the expected feed-in. Countries could put a contract for difference (CFD) mechanism in place to ensure revenue stabilisation that would lower financing costs (by covering the price risk) and avoid windfall profits.

On top of ensuring a fair remuneration for investors, awarding contracts for the development of each component should primarily aim to maximise the speed and reliability of project delivery. Relying on players in the transmission and generation sectors with the required execution skills and sufficient funding capabilities will be key.

3



ENSURING COUNTRIES WITH DIFFERENT INTERESTS AND BASELINES RECEIVE THEIR FAIR SHARE OF BENEFITS THANKS TO A STRAIGHT-FORWARD FRAMEWORK

Interconnectors linking European countries together usually serve several purposes simultaneously, such as reinforcing the electricity market to maximise socioeconomic benefits, integrating more renewables into energy systems, reinforcing system security and improving security of supply.

Two different dimensions need to be addressed. The state-driven dimension will allow progressing the first projects without waiting. The European-driven dimension will be needed to enable a sustained development towards the European ambition.

The state-driven dimension

Member States with complementary patterns of need should mandate their TSOs to develop a basic grid design outlining mainland connection points, interconnector routes for the optimal intake of adjacent offshore wind areas and basic technical concepts.

They should agree on splitting the cost/ownership of the transmission grid infrastructure. Countries will then be able to share their RES potential either by auctioning off jointly their offshore areas to developers (as part of the CFD auctioning) or by deciding (especially if they have a RES surplus) to sell a concession to another country that is lacking in RES. This other country, which would also benefit from the RES credits, would then hold the CFD auction.



The European-driven dimension

The development of hybrid projects driven solely by individual Member States will slow down, mostly because the latter will not identify sufficient national value in them (although these projects would offer added value at the European level). Europe's full RES potential will not be harvested if the European value is not reflected in the sharing of project costs.

The "Fit for 55" legislative package and "REPowerEU" initiative need to be applied with a European vision and a framework to finance these investments and facilitate collaboration with third countries (especially for development in the North Sea) in order ensure the necessary infrastructure is developed to meet European ambitions.

The "REPowerEU" proposal which advances the idea of assessing financing needs based on a comprehensive mapping of the needs of Member States and of cross-border investment needs for strong cross-border connection projects is a step in the right direction that must encompass hybrid offshore interconnectors.

4



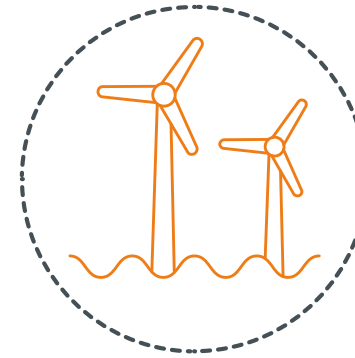
IMPLEMENTING OFFSHORE BIDDING ZONES TO MAXIMISE SOCIOECONOMIC BENEFITS

Implementing offshore bidding zones is an effective way to ensure efficient dispatching and the best usage of the offshore resources in terms of socioeconomic welfare.

This would provide a level playing field which avoids discriminatory approaches under which some parties would be given artificial priority access to the detriment of other parties. It would create trust in the overall functioning of the European integrated electricity market and allow the 70% rule for interconnectors to be maintained without the feed-in from offshore wind farms being negatively affected (as long as it is correctly implemented).

2.3 Clear-cut measures for scaling up offshore wind

Europe has proven during recent crises (including the COVID-19 pandemic and the war in Ukraine) that it is able and willing to act quickly and is determined to meet its targets. We have identified a number of measures which will allow Europe to stay on track. Each of these will support the delivery of projects that are either already underway or have yet to be started.



Accelerating the delivery of projects currently under development

WE URGE THE EU:

- to highlight and actively communicate the positive contribution of offshore hybrid projects to the delivery of the Green Deal;
- to include them in the list of Projects of Common/Mutual Interests (PCI/PMI) following proposals from hybrid offshore project developers;
- to review the criteria and increase the size of the CEF and other funds to support hybrid interconnectors that have positive socio-economic effects across Europe in order to match the scale of the enormous investment needed to reach Europe's Green Deal ambitions and to reduce dependency on fossil fuel imports (as a follow-up to the REPowerEU plan).

WE URGE MEMBER STATES:

- to simplify and to speed up permitting processes to halve their delivery time;
- to facilitate the establishment of agreements between project partners regarding the division of rights and duties concerning the ownership and operations of assets;
- to ensure regional/cross-border harmonisation of national marine regulations and facilitate cross-sectoral alignment with the fishing, shipping, military, environmental, recreational and other sectors;
- to develop regional win-win partnerships (via MoUs) concerning the most promising areas for concrete projects to be developed in.

Creating a framework for boosting the development of new projects

WE URGE THE EU:

- to set ambitious hybrid offshore interconnector targets;
- to call on Member States to decide on the development of the grid infrastructure which is necessary for harnessing Europe's offshore potential;
- to raise the importance of future hybrid offshore projects in the list of TEN-E projects;
- to set-up a Task Force of TSOs, OWP, industrial suppliers and regulators to standardise technical parameters for hybrid interconnectors and offshore wind farms within the next 12 months;
- to negotiate agreements with non-EU countries with whom to develop hybrid offshore projects.
- to initiate the reflection on the development of EU approaches to finance EU ambitions

WE URGE MEMBER STATES:

- to establish all their potential offshore wind areas;
- to mandate their national TSOs to develop hybrid grid plans (which are aligned with onshore grid development) with other TSOs from adjacent countries and to submit them in the TYNDP and their respective national grid development plans for approval;
- to develop the legal basis for selling/buying marine offshore wind concessions amongst countries;
- to extend national energy policies to allow for foreign developments to contribute to meeting national RES and CO₂ targets.

TRITON LINK

TRITON LINK INTERCONNECTOR TO BE BUILT

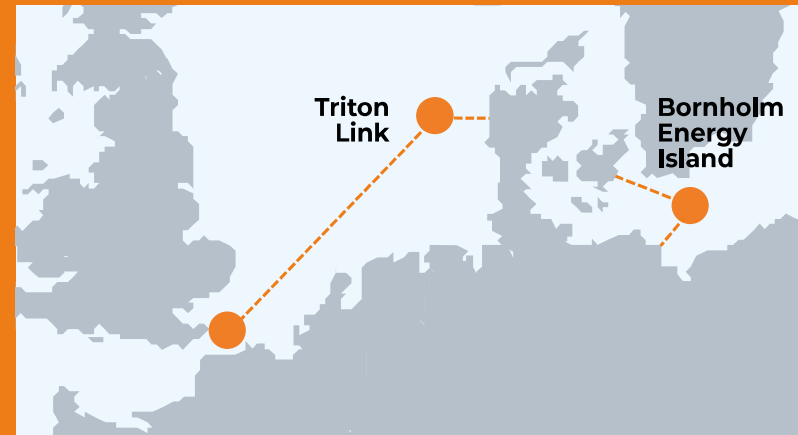
Elia and the Danish TSO Energinet signed a new cooperation agreement to continue collaborating on the implementation of what could become a world first: a subsea connection between two artificial energy islands. The Triton Link project will facilitate the exchange of power between the two countries and at the same time transport electricity from offshore wind farms to the mainland using hybrid technology. The new hybrid interconnector will be an innovative and challenging project, both because of the distance it will cover (more than 600 km) and the technology involved.



THE NEW COOPERATION AGREEMENTS BETWEEN THE ELIA GROUP AND ENERGINET WERE SIGNED DURING THE ANNUAL CONFERENCE HELD BY WINDEUROPE IN COPENHAGEN IN NOVEMBER 2021. MOREOVER, A PARTNERSHIP AGREEMENT WAS ALSO SIGNED BY THE BELGIAN AND DANISH ENERGY MINISTERS, TINNE VAN DER STRAETEN AND DAN JØRGENSEN (RESPECTIVELY).

SECOND HYBRID INTERCONNECTOR IN THE BALTIC SEA

50Hertz also signed a collaboration agreement with Energinet in preparation for the building of a second hybrid interconnector in the Baltic Sea: the Bornholm Energy Island project. As part of the first phase of the project, an HVDC interconnection will be built between both countries, stretching over a total length of 400 kilometres. From Bornholm Island, the subsea cable will run west towards the Danish island of Zealand and south-west towards the coast of Mecklenburg-Western Pomerania in Germany. As part of the second phase of the project, Danish wind farms being developed off the coast of Bornholm Island (which have a total capacity of 2,000 MW) will be connected to the interconnector using hybrid technology.



Deep 3 Dive

OSY-OS15

3.1 Introduction

The current situation in Europe has brought the question of energy security back into the spotlight. Increasing our energy independence can be achieved by developing our own renewable potential. This objective is aligned with the European Green Deal, which sets out Europe's goal to be the first climate-neutral continent in the world. This goal is accompanied by the target of net zero greenhouse gas emissions by 2050. Intermediate targets in the lead-up to 2050 also exist: by 2030, the continent hopes to have reduced its greenhouse gas emissions by at least 55% compared with 1990 levels and is aiming for renewables to make up 40% of its energy mix.

The extensive development of offshore wind is central to the achievement of greater energy security and European decarbonisation goals. The Commission's 2020 Offshore Renewable Energy Strategy includes the objective of having 60 GW and 300 GW of offshore wind capacity by 2030 and 2050 respectively, meaning that the current offshore wind capacity will have to quadruple by 2030 and increase twentyfold by 2050.

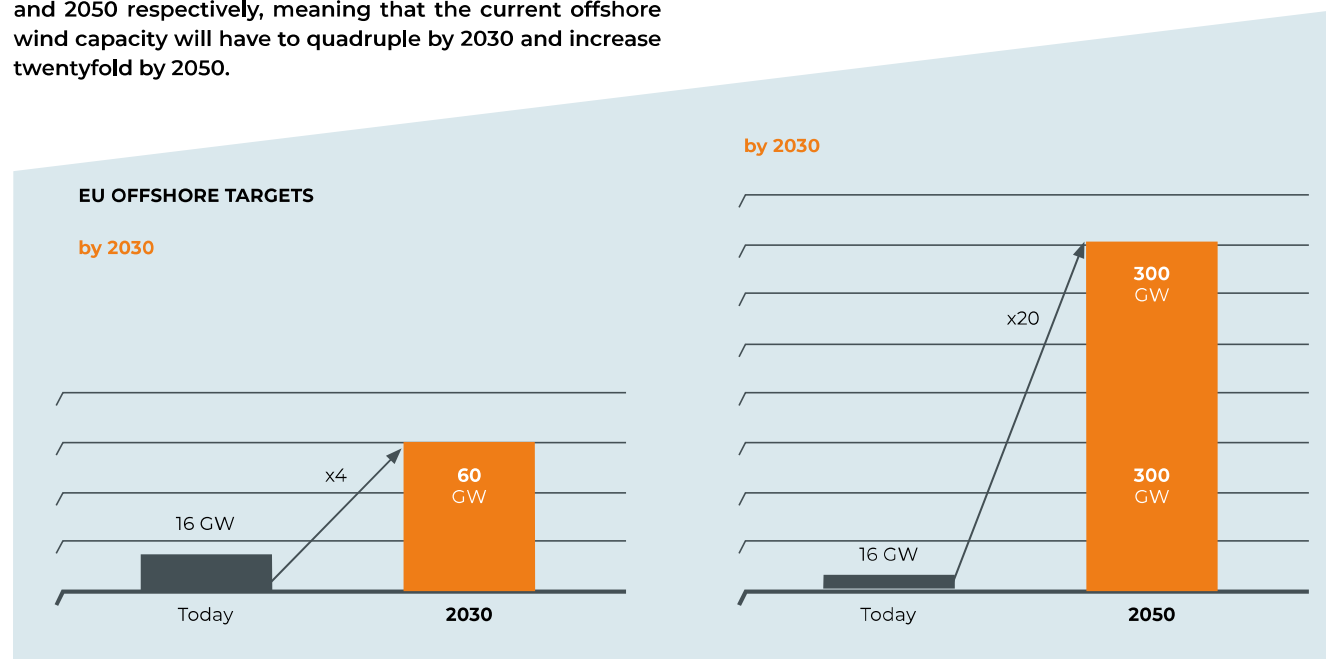
Hybrid offshore transmission solutions are critical for connecting offshore wind capacity to the grid. Existing offshore wind farms are generally located in nearshore sites and are linked to national onshore systems via radial connections. As suitable nearshore locations are becoming scarce, sites that are located further away from the coastline need to be developed to deliver the additional offshore wind capacity required by the Commission.

In this regard, radial connection solutions have major shortcomings. Firstly, they will be costly, given the distances involved and the cumulative offshore capacity required. Second, linking each individual project through a radial connection to a single onshore connection point could cause onshore congestion and the curtailment of wind farm output. Third, Europe's onshore connection potential is too meagre to allow for the 300 GW objective to be met through radial connections alone.

These issues can be addressed through the development of hybrid projects and, over time, the establishment of more meshed offshore transmission systems, to allow for more integrated connections for offshore wind to be built across Europe's sea basins. However, it is currently difficult to deliver hybrid solutions at the speed required.

Our vision is to unlock the potential of offshore wind development through the use of hybrid offshore transmission solutions and the creation of a framework that focuses on four areas.

- 1  **DECREASING COMPLEXITY AND RISKS BY STRUCTURING PROJECTS ACCORDING TO THEIR INDIVIDUAL COMPONENTS**
- 2  **SECURING A CONDUCTIVE INVESTMENT CLIMATE FOR THE SPEEDY DELIVERY OF PROJECTS**
- 3  **ENSURING COUNTRIES WITH DIFFERENT INTERESTS AND BASELINES RECEIVE THEIR FAIR SHARE OF BENEFITS THANKS TO A STRAIGHT-FORWARD FRAMEWORK**
- 4  **IMPLEMENTING OFFSHORE BIDDING ZONES TO MAXIMISE SOCIOECONOMIC BENEFITS**



With this vision in mind, this white paper identifies hurdles which must be overcome in order to deliver hybrid infrastructure at scale and provides a set of recommendations for surmounting them.

3.2 Problem statement

Hybrid solutions are not being delivered, despite the clear benefits they provide in terms of decarbonisation and the achievement of energy security goals.

Hybrid solutions have been discussed by industry and policy-makers for the last 10-15 years. Studies have highlighted their benefits for society and references to coordinated solutions are beginning to feature in regulatory discussions. However, a number of obstacles are impeding their widespread delivery, including regulatory and market design obstacles.

Current debates relating to regulation and market design issues focus on: the creation of separate offshore bidding zones (OBZ); the challenges related to meeting the 70% cross-zonal capacity target (which requires transmission system operators to ensure that 70% of an interconnector's capacity is offered for cross-zonal trading); and considering whether lower wind farm revenues should be compensated for via the sharing of congestion income.

Whilst relevant, regulatory and market design issues do not appear to be the only ones slowing down most of the decision-making related to investment in hybrid solutions. In our view, the obstacles outlined below should be addressed jointly as a matter of priority.



1 ISSUES LINKED TO PROJECT COMPLEXITY

Delivering hybrid solutions requires all involved parties to be aligned and agree on projects from the start. Even if the parties involved can see the benefits they will receive altogether, the actual delivery of a project needs all financial commitment decisions to be harmonised, creating an interdependency that means secure financial backing for projects can be difficult to achieve. Regulatory regimes are not necessarily aligned amongst cooperating countries. For offshore developers, this coordination adds complexity and creates interdependencies which are not present in the development of radial project solutions, potentially slowing down progress on a project and, ultimately, delaying its delivery.

2 ISSUES LINKED TO AN UNCERTAIN INVESTMENT CLIMATE

The benefits of hybrid solutions are not always accrued by the parties involved in the project. Even though hybrid projects may be of value to society, they will not be delivered if direct benefits to the parties and countries involved are not delivered or are not provided with political support. Moreover, hybrid project business cases are being considered through the lens of the revenue sources available for interconnectors and offshore wind farms today, which most notably include congestion income and electricity market revenues and renewable support payments respectively. These revenues are uncertain, particularly given the paradigm shift linked to decarbonisation and the long (20+ years) lifetime of the assets. It is anticipated that market evolution, regulatory changes and the development of other hybrid solutions may significantly change price formation and future revenue streams.

3 INTERNATIONAL COOPERATION CHALLENGES

Renewable energy sources are not evenly distributed across European countries to allow for decarbonisation goals to be met through purely national solutions alone. Some countries are rich in renewable resources, whilst others are not, creating a need for countries to cooperate and share them. Without a framework for cooperation being agreed on, a significant proportion of the 300 GW + of potential offshore wind capacity risks being left untapped.

4 UNCLEAR MARKET DESIGN

Many discussions related to a suitable market design for offshore interconnectors are taking place. The so-called Home Market Solution (HMS), which gives wind producers preferential access to interconnectors, stands in opposition to the Offshore Bidding Zone (OBZ) approach. Compensation for wind producers through congestion rent is a much debated topic. These discussions have created additional uncertainties and risks for investors, which are being added to their other concerns.

Hybrid projects are currently difficult to deliver, even if they are promoted. The focus remains on the business cases for the parties which are directly involved in the projects, with limited consideration of the wider benefits or future offshore wind development. Some hybrid projects may be able to go ahead, but delivery at scale will not be fast enough, will have a narrow focus and will only enable a small portion of the required offshore wind capacity and energy to be delivered.

3.3 Four focus areas to promote offshore hybrid interconnectors

HOW TO PROMOTE OFFSHORE HYBRID INTERCONNECTORS:

**1**

DECREASING COMPLEXITY AND REDUCING RISKS BY STRUCTURING PROJECTS ACCORDING TO THEIR INDIVIDUAL COMPONENTS

2

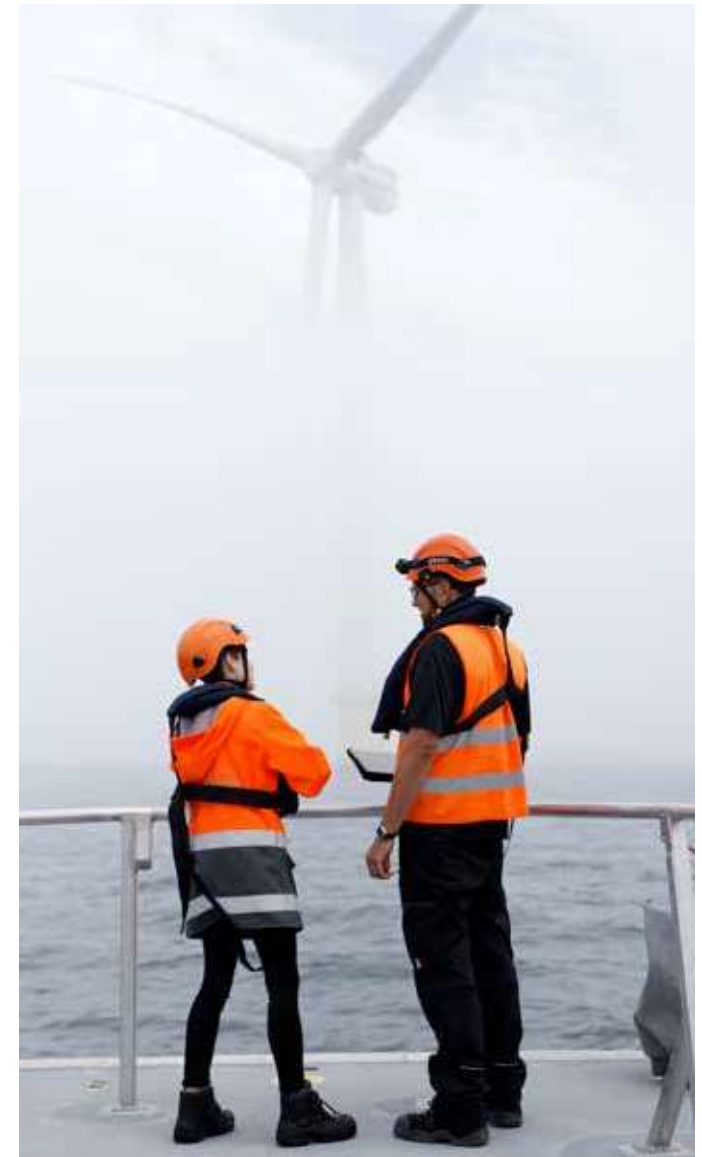
SECURING A CONDUCTIVE INVESTMENT CLIMATE FOR THE SPEEDY DELIVERY OF PROJECTS

3

ENSURING A FAIR SHARE OF BENEFITS FOR COUNTRIES WITH DIFFERENT INTERESTS AND BASELINES THANKS TO A STRAIGHT-FORWARD FRAMEWORK

4

IMPLEMENTING OFFSHORE BIDDING ZONES TO MAXIMISE SOCIOECONOMIC BENEFITS



1 Decreasing complexity and reducing risks by structuring projects according to their individual components

Investment decisions need to be simplified to support the delivery of hybrid projects.

Decoupling offshore generation and transmission components

Hybrid solutions are complex, integrated infrastructure systems involving investments in different parts of the value chain, each of which requires a specific set of specialist skills and expertise. Unbundling requirements mean that generation and transmission activities are carried out by distinct entities, each with the relevant know-how and experience related to their remit. The complexity of delivering hybrid solutions can be mitigated by maintaining this separation between generation and transmission activities and by developing standards for technical designs in terms of transmission and generation.

Decoupling the offshore wind farm development and offshore transmission components means that wind farm development and transmission provision can be undertaken by relevant experts, each with a more limited/discrete set of decisions to take. The intention is for wind farm developer decision-making related to a hybrid solution to be made comparable to decisions related to a radial connection at the same time as removing the added complexity and risks associated with having to also develop, finance and deliver the transmission component. Similarly, delivering the transmission component of the project can be managed by a transmission business, which can deploy its expertise to deliver the transmission infrastructure required for the associated offshore wind farm. Additionally, the separation of the two activities enhances the potential for competition related to the provision of transmission and generation elements.

Adopting a 'leading transmission approach'

As part of a decoupled approach, offshore wind developers will need reassurance that offshore transmission elements will be delivered for them to plug into. This requires the adoption of a 'leading transmission approach' for transmission development.

This will work as follows:

- 1. Coordinated planning** will occur related to offshore wind and associated offshore transmission requirements, as foreseen in the TEN-E Regulation. This planning will identify plans for offshore wind projects required to meet EU targets for offshore energy and decarbonisation. Based on this, the planning will also identify the transmission infrastructure needed to support the delivery of offshore energy to consumers and will include potentially evolving transmission needs over time as offshore wind capacity increases are taken into consideration. This offshore planning needs to be coordinated with complementary onshore system planning activities. The outcome of such planning must then be translated into national investment plans, in which TSOs have an important role to play.
- 2. Offshore transmission development activities will be initiated based on identified plans**, without the need to wait for commitments from specific offshore wind developers. This is specifically intended to reduce project-on-project financing risk. The intention is for the transmission infrastructure to be developed to meet the identified need stemming from coor-



ordinated planning, rather than being tied to the decision-making related to specific offshore generation projects. The earlier initiation of transmission activities also reflects the fact that transmission projects typically have a longer lead time than offshore wind farm projects. This approach will provide certainty regarding the anticipated transmission project delivery to potential offshore wind developers ahead of their own investment decisions. In particular, having the transmission elements of a project ready first will significantly reduce the risk of lost production from the wind farm owner's perspective. Additionally, if the transmission element is completed before the wind farm, it can be used as an interconnector in the interim.

- 3. Both components will in general be geared towards compatible delivery timescales**, so that offshore transmission infrastructure is appropriately delivered in anticipation of the planned commissioning of the offshore wind farm.

2

Securing a conducive investment climate for the speedy delivery of projects

Investors need revenue certainty to commit to a project. Transmission and generation responsibilities need to be assigned so that projects are delivered quickly and reliably.

Ensuring fair remuneration for transmission infrastructure providers

A clear framework for providing fair remuneration to transmission infrastructure providers is needed to support investment. Transmission providers will need clarity regarding potential sources of revenue so that they may earn a reasonable risk-adjusted return, with the following acting as potential revenue sources:

1. CONGESTION INCOME

As for other interconnectors, this is based on price differentials and flows between the price areas that the transmission infrastructure connects together. However, given the potential for price convergence linked to increases in both interconnection and generation with a common cost structure, reliance on congestion income is expected to be insufficient, creating a need for additional revenue streams as set out below.

2. AN INJECTION TARIFF

This will be paid by offshore wind farms which will connect to the interconnector.

3. A GRID TARIFF

This will be recovered from consumers.

These potential revenue sources can be incorporated into a regulated revenue framework which will deliver an appropriate return and provide incentives for the timely and efficient delivery of transmission assets.

Possible options include a price control for a regulated asset base (RAB) (as exists for onshore networks); a narrow cap and floor regime (taking the UK's approach to interconnector revenue as the starting point); or a guaranteed long-term revenue stream with a performance standards model (as used by UK offshore transmission owners, known as the OFTO regime). In this context, congestion income linked to cross-zonal flows can be netted off the residual cost recovery requirements.

Based on the defined revenue model, charging agreements will need to: (a) determine a tariff for the offshore wind farm, if it is to face a portion of the costs; and (b) recover remaining costs (net of any congestion income) from an appropriate charging base. The arrangements should provide assurance in terms of revenue for the transmission infrastructure provider if, for example, the commissioning of the wind farm is delayed beyond expected timelines.

Regulators will be tasked with designing the revenue model and the charging arrangements for their respective markets, making sure that solutions are in line with politically agreed objec-



tives and principles. These principles will include arrangements regarding the basis for splitting transmission cost recovery across different countries, as discussed in focus area 3.

To support investment, transmission infrastructure providers will be able to access funding from (for example) the Connecting Europe Facility (CEF). This is consistent with the intent of the CEF, which aims to support efficient interconnection with high societal value, and is in line with the promotion of the integration of renewables under the revised TEN-E Regulation. In addition, funding to assist early cooperation and studies is available under the new cross-border renewables projects strand under the CEF. This funding can be accessed to support the preparatory work to help reach agreement on topics such as the allocation of costs/benefits and cross-border support. Furthermore, access to funding via InvestEU can also be pursued, given its focus on sustainable investments, including projects that improve energy infrastructure interconnection levels. The EU Regional Development Fund and the Recovery and Resilience Facility, given their focus on the green transition, provide additional potential funding sources. Access to available EU funding sources is important for early-stage projects to help rebalance the fact that costs will be borne by the host nations, while the benefits will be felt across Europe.

Given the importance of offshore grid solutions with regard to the achievement of decarbonisation objectives, there is strong argument for increasing the funding available for hybrid projects under the CEF or other mechanisms.

Flexibility in the selection of transmission infrastructure providers

Several potential models are available for structuring responsibilities linked to transmission solutions. To date, different approaches have been taken with regard to the development of interconnector infrastructure in Europe: development has been certified either by TSOs as an extension of their regulated onshore activities or by commercial players having no onshore activities. We expect both approaches to remain as options.

The involvement of existing TSOs may help to ease the delivery of appropriate interfaces between offshore and onshore assets. TSOs are in a strong position to act as providers of future offshore transmission infrastructure, especially in cases where they have already developed significant experience in the design and construction of relevant technologies such as HVDC, subsea cables and offshore substations. TSO involvement is clearly dependent on them having sufficient funding for these additional activities.

In some cases, a competitive approach may be more suitable. Experienced offshore transmission developers can then compete for the rights to build and operate the offshore transmission assets. This will potentially allow for a faster development and construction of offshore transmission infrastructure, which would need to be developed in coordination with TSOs at the interface between offshore and onshore transmission.

At this stage, it is important to ensure that the approach is open to different solutions to allow the allocation of responsibilities to suit different situations, with a focus on selecting the players who are able to quickly deliver thanks to their experience and their available funding.

Competitive process for wind farm developer identification providing for stable income streams

With the 'leading transmission approach' philosophy supporting the delivery of required transmission infrastructure, offshore wind developers can focus on their investment cases based on expectations relating to future revenue potential relative to costs. Given the uncertainty regarding future capture price variability, a two-way contract for difference (CFD) can be offered to provide revenue stability. This revenue stabilisation will reduce risks and so, in turn, help to reduce financing costs for projects. Given the two-way nature of the CFD, payments can flow to or from the generator, depending on market prices. In turn, this provides a built-in solution to avoid windfall profits. Settlement of difference payments (positive or negative) will ultimately be distributed between involved countries in accordance with agreed principles.



The construction of an offshore wind farm requires (a) the allocation of concession rights in an identified area; and (b) the awarding of a support contract to a developer. A single, combined process is envisaged for the allocation of concession rights and support for hybrid interconnectors. This has the benefit of creating a competitive process for the support scheme, which may not be achieved if concession rights are awarded in advance.

Bidders for a CFD are expected to compete on the basis of their required strike price and possibly other criteria. To allow for informed bids to be made in this process, bidders will need a package of information to be available in advance. This should include information such as: (a) sufficiently detailed seabed surveys for the prospective wind area(s); (b) technical information relating to the planned offshore transmission assets, configurations and their capabilities; and (c) expected costs for transmission, such as an injection tariff, to be covered by the wind farm. This type of information will better enable bidders to specify and secure quotes for their own equipment needs and so allow for them to form a clear view of cost exposure. This will help to secure more robust bids as part of an allocation process and, in turn, reduce the risk of higher costs driven by risk premiums and/or project delivery issues. To provide for variations in outturn transmission charges, a mechanism which allows for strike price indexation to transmission charges may be appropriate.

Ministries are expected to lead the concession and support allocation processes. Lead responsibility may naturally reside with the ministry with jurisdiction over the offshore wind area, although cooperation regarding design and implementation is expected, especially when there is a transfer of concession ownership. These responsibilities need to be described in the cooperation principles shared by the concerned countries, as outlined in the following focus area.

3 Ensuring countries with different interests and baselines receive their fair share of benefits thanks to a straight-forward framework

Alignment regarding infrastructure development and routes for sharing costs and benefits is needed.

Early progress through national agreements: the state-driven dimension

Ahead of an established process for producing and committing to hybrid solutions on a pan-European, cross-border and multi-national basis, commitment will stem from political agreement between two (or possibly more) nations to work on discrete hybrid projects. This type of political agreement has provided the foundation for the development of conventional inter-connectors in the past and so is an established basis from which to develop cross-border projects. The elements below, which are expected to be led by the ministries of the relevant nations, form part of this commitment.

ELEMENT 1: Concept appraisal

A memorandum of understanding will be the basis for collaboration regarding concept development, and assessment will be undertaken to:

- (a) identify the potential options for hybrid solutions based on known offshore wind development zones, existing cable plans and potential additional cable routes linked to the involved nations. This can be completed in line with offshore infrastructure planning processes under the TEN-E Regulation, with one or more early-stage project options potentially undertaken in accordance with an expedited timeline as early adoption pilots;
- (b) appraise the benefits of hybrid solution options, taking broader electricity system impacts into account. Again, the assessment frameworks developed under the TEN-E Regulation can form the basis of this appraisal. Wider benefits can also be considered as part of this appraisal.

Based on this appraisal, a positive assessment is expected to act as a trigger for political commitments to taking the necessary steps to achieve the delivery of the identified hybrid project.

ELEMENT 2: Cooperation principles

To support the creation of arrangements that allow for the delivery and operation of the hybrid project, political commitments will include principles to be followed and applied in stages. This includes principles for:

- (a) the allocation of transmission development and operational roles, plus associated funding and revenue arrangements;
- (b) a possible agreement from one of the countries to sell an offshore concession to the other country, which would then benefit from the RES credits;
- (c) a selection procedure for the offshore wind developer(s) and support arrangements, which will typically be led by the country owning the concession;
- (d) principles for sharing the costs of the hybrid solution between the nations involved, with expected links back to the assessment work undertaken in Element 1 and forthcoming guidance to be provided by the Commission under the TEN-E Regulation on the sharing methodology to be applied to the deployment of integrated offshore network development and existing cost-benefit cost allocation providing an initial starting point for this;



- (e) governance frameworks for the shared infrastructure, with the potential for the sharing of principal responsibilities for different aspects of the arrangements (including the determination of possible concession fees and the organisation and design of the awarding mechanism to the offshore wind developer).

The up-front establishment of these cooperation arrangements will provide a clear principle-led basis upon which mechanisms for realising the identified hybrid project can be developed. There will be scope for nations without direct physical involvement in offshore infrastructure projects to be included in arrangements (typically landlocked countries). This will provide a route for such nations to contribute to costs and in so doing contribute to EU decarbonisation targets and any national carbon and/or renewable energy targets they may have.

ELEMENT 3: Delivery plan

Based on the joint commitment and shared principles, a clear delivery plan will then be needed in order to define the roles and responsibilities of each key stakeholder, such as regulators and transmission businesses, and a timeline for the project's completion.

Europe-wide approach needed to reach 2050 ambition: the European-driven dimension

Longer-term arrangements will stem from Europe-wide agreements to deliver hybrid offshore wind solutions as part of a coordinated process, within a common framework for delivering investment. These arrangements should seek to better reflect the European ambition related to the development of offshore wind, in turn demonstrating that the benefits of its delivery are widespread, evolve over time and extend beyond the countries which are directly involved.

Early-stage projects will need to be delivered within the existing frameworks, supported by efforts undertaken by the countries involved. This will allow some projects to be progressed on without waiting periods, which is required to meet the 2030 targets.

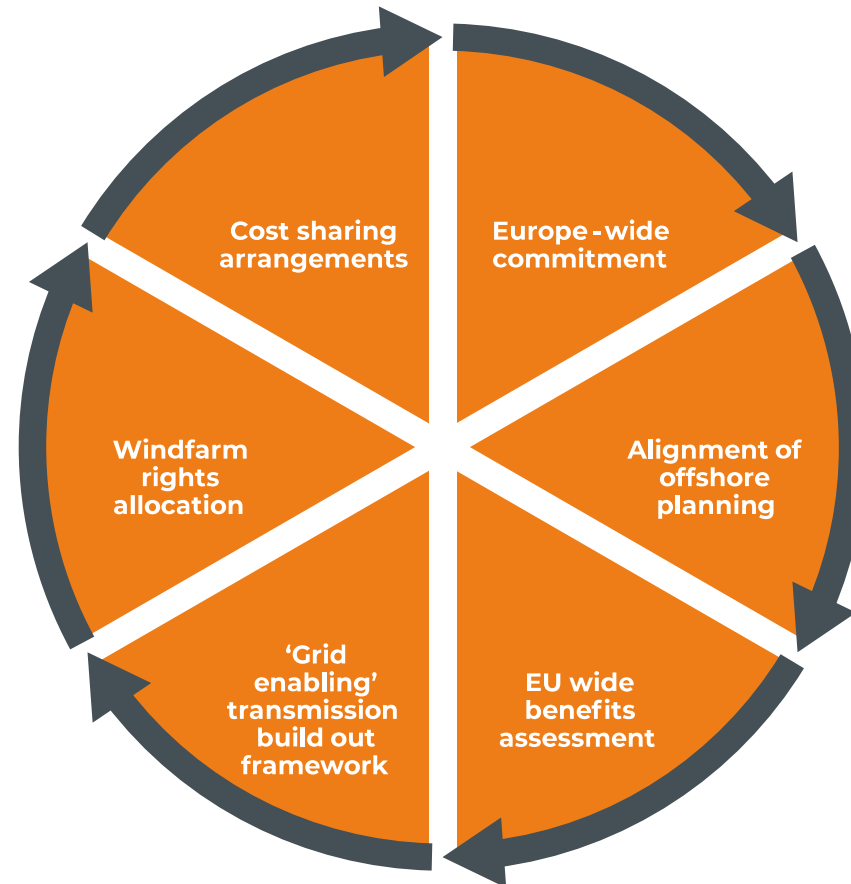
However, willingness to progress on projects and the public acceptability of bilateral solutions will dry up, because benefits will be accrued by Europe collectively, whilst the costs will only be borne by those parties who are directly involved. This arrangement also means resources in some regions may not be utilised, even though they may present an economic solution for Europe as a whole.

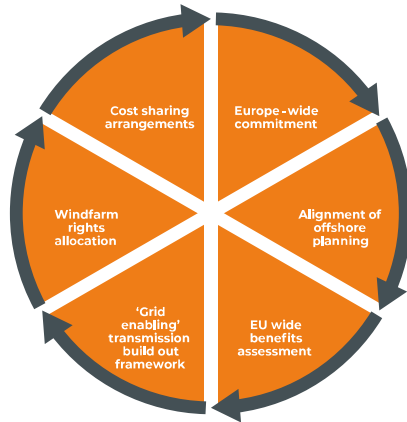
Bilateral solutions will not be sufficient and the offshore wind capacity needed to meet European decarbonisation goals will not be delivered without a revised approach, which creates a broader basis for commitment to offshore development and includes arrangements for the fair sharing of costs and a manageable risk exposure for investors.

In other words, an upgraded regulatory framework and the identification of new sources of revenue at EU level are needed. Developing this will take time, which further support the need for an early phase under which progress on projects is secured through national agreements.

The aim is to combine the individual listed elements below and create a cohesive framework for the delivery of offshore wind and supporting transmission infrastructure, which is needed to achieve Europe's decarbonisation targets.

ELEMENTS OF A MORE ENDURING APPROACH TO DELIVER HYBRID OFFSHORE WIND SOLUTIONS





Europe-wide commitment is needed to meet its decarbonisation goals. The objective of reaching 300 GW of offshore wind capacity by 2050 has been identified as a key foundation for achieving Europe's decarbonisation targets. Some form of collective commitment, including nations that are landlocked and/or located far from suitable offshore basins, will help to provide appropriate arrangements to cover the costs of the required investment and delivery plans to achieve the required offshore wind capacity. The latest revision of the TEN-E Regulation requires cooperation between relevant Member States regarding the goals for offshore renewable generation in priority offshore grid corridors, to be captured in a non-binding agreement. This is helpful, but its potential value could be enhanced if a firmer commitment could flow from it, including Europe-wide buy-in.

The alignment of offshore planning is needed to capture the benefits for society. To achieve the required offshore wind capacity target and allow society to reap the benefits of it, an increasingly meshed offshore transmission system is expected to develop over time. Achieving this will require a more coordinated, multi-jurisdictional and internationally focused identification of offshore wind potential, its benefits and supporting grid needs. Again, the existing frameworks are moving in the right direction, with the latest revision of the TEN-E Regulation requiring ENTSO-E to develop and publish high-level strategic integrated offshore network development plans for each sea basin. These will provide a high-level overview of potential off-

shore generation capacity and resulting offshore grid needs, including the potential need for interconnectors, hybrid projects, radial connections, reinforcements and hydrogen infrastructure.

An EU-wide benefits assessment is necessary. An economic appraisal of potential offshore transmission needs will be needed to assess different options and then focus on efficient solutions. However, this assessment needs to be better suited to the context. Critically, it needs to have an EU rather than a national focus to reflect the importance of offshore infrastructure for meeting Europe's decarbonisation and energy security goals. An updated assessment framework needs to focus on EU-wide impacts without seeking to disentangle costs and benefits for individual Member States or being unduly sensitive to input assumptions/scenarios.

In addition to allowing for a better reflection of the context across the Union, an EU approach will support faster progress on projects since it will reduce the burden on national decisions and increase coordination between them.

A clear framework for transmission build out is required. Following the steps above, transmission developments that are needed to support the delivery of wind farms and that have satisfied the EU-wide benefits assessment should be undertaken on a clear regulatory footing and with access to appropriate EU funding sources given the EU-wide benefits. The rights to develop and own particular transmission assets identified as beneficial through planning and assessment can be awarded through competitive processes, with a regulated revenue mechanism defined for the successful bidder. Funding opportunities that reflect the value of the transmission activities linked to the realisation of offshore wind delivery and the benefits that this entails for society should be available to support transmission projects.

Wind farm concession and support award processes should follow in the slipstream of transmission activities. With responsibilities and arrangements for delivering one or a cluster of enabling transmission assets in place, progress on wind farm concession and the allocation of support for associated offshore areas can be ensured. Support costs linked to CFDs need to be handled through EU level cost sharing arrangements, given the EU-wide benefits created by the wind farms, as outlined below.

Cost sharing arrangements or EU financing mechanisms are necessary. Reaching the scale of investment needed requires established arrangements for sharing the costs of projects, or to provide support directly at EU level. Coastal nations will be discouraged from engaging with projects if the costs are mostly borne by their consumers (or citizens) at the same time as the benefits of energy security and decarbonisation are being felt across the whole of Europe. Cost sharing, or EU-wide financing mechanisms, will reduce the risk of this and encourage other nations, including landlocked countries, to participate in the development of an economic solution for Europe as a whole. Therefore, alongside the need for a Europe-wide upfront commitment to delivering 300 GW of offshore wind, there is a need for sharing arrangements to allow each nation to pay a fair share of the transmission and offshore wind support costs, while also receiving credit for meeting their own decarbonisation and/or renewable energy targets (if any).

Finally, the development of frameworks for cooperation with third countries will be key. The UK and Norwegian wind resources in the North Sea are significant and are likely to play an important role in more integrated offshore developments. Collaboration with these partners will benefit from smooth and straightforward cooperation arrangements. The potential for cooperation between the EU and third countries is acknowledged in the latest iteration of the TEN-E Regulation, which includes provisions relating to Projects of Mutual Interest (PMIs).

A potential project can be considered as a PMI if it demonstrates significant net socioeconomic benefits at the European Union level and for at least one third country. While PMIs are not fully equivalent to Projects of Common Interest (PCIs) between Member States, PMIs can, for example, be factored into integrated offshore planning processes and receive EU funding (which can also be used for elements of the project which lie outside of the component of the transmission assets located in Member States). These provisions provide a starting point from which cooperation can at least be initiated, with potential for further enhancements in time.



Implementing offshore bidding zones to maximise socioeconomic benefits

While home market solutions may appear to be attractive for early investors in hybrid projects, it has a series of shortcomings from economic, technical and legal perspectives, which means it is not best suited to the necessary large increase in offshore hybrid interconnectors.

Need for a holistic approach

As mentioned earlier in this paper, discussions related to market design tend to feature extremely prominently in the debate surrounding the development of hybrid interconnectors. This is justified to some extent: market design does have an impact on the business cases for transmission and generation assets and needs to be clear from the start. However, even the most favourable market design for generation or transmission developers would not allow projects to be delivered if the other elements mentioned in this white paper remained unsolved. It is therefore important to keep a holistic view of the situation and make sure that progress is made on all items - not just on market design.

Offshore bidding zone versus home market solution

A key aspect of the market design discussion revolves around the issue of whether an offshore wind farm connected to a hybrid interconnector should be placed in a separate offshore bidding zone (OBZ), or whether it should benefit from guaranteed access to one of the surrounding markets through the home market solution (HMS).

HMS gives the offshore wind farm priority access to the interconnector's capacity. It allows wind developers to reduce their risk regarding the volume of injected energy by removing the possibility of the interconnector function being prioritised.

On the other hand, OBZ enables competition to emerge between the injection by the offshore wind generation and the exchanges that take place amongst the interconnected bidding zones. Typically, when one of the involved markets experiences negative prices and wind generation is bidding at a zero to low positive price, the interconnector function will be prioritised.



In our view, home market solutions (HMS) are not suited to support the wide use of offshore hybrid interconnectors because of the following reasons:

- **HMS is economically less efficient**

Priority access to the hybrid interconnector for wind generators may entail a loss of socioeconomic welfare when the price in the foreign market is lower than the bidding price for the wind energy. Furthermore, enabling a priority approach implies that TSOs have to forecast the level of wind generation in order to reserve the appropriate volume in their capacity calculation processes. Inaccuracies in the forecasting may lead to additional losses in terms of socioeconomic welfare, when too much capacity has been reserved. Such forecasts will be made more and more complex with increasingly complex topologies as a more meshed grid is established.

- **HMS blurs roles and responsibilities between market parties and TSOs, and is unfit for enabling an efficient functioning of the shorter-term market timeframes**

As explained above, an HMS approach implies that TSOs have to undertake very specific forecasts related to wind generation, on top of the market parties in charge of the wind generation that are doing it for the purpose of bidding into the market. This blurs roles and responsibilities and does not fit well with unbundling rules which are applicable to the EU internal energy market. This issue becomes more acute when moving closer to real time, in the intraday and balancing markets.

Despite HMS giving the impression that offshore generation can act freely within the bidding zone and can be part of the portfolio of balancing responsible parties, the physical reality means that whenever congestion occurs between the wind generation and the onshore part of the bidding zone, constraints will have to be imposed by TSOs. The (imbalance) price signals will lose relevance and the ability to balance the portfolio may disappear. Essentially, instead of having a market driven by prices, dispatching will frequently need to be driven by the TSO.

- **HMS is essentially a discriminatory model, which will negatively affect trust in efficient market functioning**

Giving priority access to one party necessarily implies the deprivatisation of another. This is another deviation with respect to a cornerstone of the EU internal energy market, since non-discriminatory access to the grid will not be ensured. Wind investors may themselves suffer under this approach when priority access is given to another party, which may negatively affect their access to the grid.

Some developers require an exemption from the 70% rule in order to facilitate the implementation of HMS for a specific project. The non-fulfilment of the 70% rule is actually not the only deviation from EU regulations that would arise from adopting an HMS approach, and many other derogations with respect to other rules would be required (if at all possible). Aligning with the key principles in EU regulations is more appropriate for fostering the development of hybrid wind generation projects and providing a stable and trusting investment climate.

Company profile

Elia Group acts as a holding company which owns two TSOs: Elia Transmission Belgium SA/NV and 50Hertz Transmission GmbH in Germany. The separation and ringfencing of the Elia group's regulated activities in Belgium from its non-regulated activities and its regulated activities outside of Belgium was undertaken to ensure that its future activities in Belgium and Europe would be aligned with its growth strategy. In 2021, this allowed the group to pursue its organic growth and has set the foundations for future inorganic growth.

REGULATED ACTIVITIES



Elia Transmission Belgium (hereafter referred to as Elia) is the Belgian TSO for high-voltage (30 kV to 70 kV) and extra-high-voltage (110 kV to 400 kV) electricity. It has a natural monopoly as Belgium's only TSO. It develops, builds and operates a robust electricity transmission system (both on- and offshore) and is responsible for devising services and mechanisms which support the development of electricity markets at national and European levels.

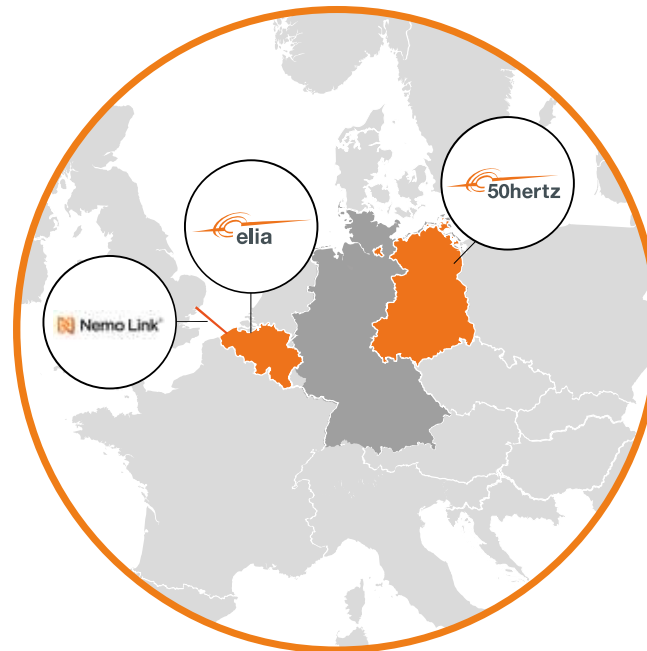


Elia Transmission Belgium is part of the Nemo Link joint venture with National Grid, the British electricity and gas utility company. Nemo Link is the first sub-sea interconnector to link Belgium to Great Britain, so allowing the trade of electricity between both countries: traders can buy up to 1,012 MW of capacity in auctions over a number of time frames.

The building of Nemo Link marked a crucial step in the integration of the electricity grids of continental Europe and the UK. The interconnector was commissioned on 30 January 2019, and operates in line with its specific regulatory framework.



50Hertz Transmission (hereafter referred to as 50Hertz) is a TSO which holds a natural monopoly in the north and east of Germany and is a crucial player in the realisation of the German 'Energiewende' - or energy transition. Its grid runs across a distance of around 10,325 km, supplying electricity to 18 million people in the states of Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt and Thuringia, and the city states of Berlin and Hamburg. In 2021, around 56.1% of electricity consumption in the 50Hertz grid area came from renewable sources; it aims to make this 100% by 2032. The shareholders of 50Hertz are Elia Group (80%) and the German state-owned investment and development bank KfW Group (20%).



NON-REGULATED ACTIVITIES

Our non-regulated business activities are allowing us to develop the key competencies we need to ensure a successful energy transition. They are helping us to embrace innovation, develop sustainable energy markets and shape growth opportunities that increase our societal relevance.



EGI offers consultancy and engineering services related to energy market development, asset management, system operation, grid development and RES integration. As a wholly owned subsidiary of Elia Group and 50Hertz, EGI is able to harness the expertise of two large European system operators, each with a solid track record in delivering high-quality projects and many decades of experience. Its clients are mainly comprised of TSOs, but EGI also supports regulators, public authorities and private developers.



In September 2020, Elia Group announced the official launch of re.alto, its very own corporate start-up and the first European marketplace dedicated to the exchange of energy data and services. The start-up enables the exchange of energy data through its innovative Application Programming Interface (API) platform, so enabling the energy industry to take a huge digital leap forward towards a more widespread adoption of Energy-as-a-Service business models, ultimately hastening the establishment of a low-carbon society.



Elia Group's newest legal entity, WindGrid, will focus on offshore development outside of its current regulated perimeters. In February 2022, the Board of Directors approved the formation of this new subsidiary, solidifying the group's commitment to accelerating the energy transition in the interest of society both in its home countries and abroad. WindGrid will deliver and unlock further revenue streams for the group, whilst enabling it to remain at the forefront of offshore wind development and maintain its relevance in the long term.

