ENTSO-E Position on Offshore Development

Assessing Selected Financial Support Options for Renewable Generation

2 November 2021

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ENTSO-E Mission Statement

Who we are

ENTSO-E, the European Network of Transmission System Operators for Electricity, is the **association for the cooperation of the European transmission system operators (TSOs)**. The 42 member TSOs, representing 35 countries, are responsible for the **secure and coordinated operation** of Europe's electricity system, the largest interconnected electrical grid in the world. In addition to its core, historical role in technical cooperation, ENTSO-E is also the common voice of TSOs.

ENTSO-E **brings together the unique expertise of TSOs for the benefit of European citizens** by keeping the lights on, enabling the energy transition, and promoting the completion and optimal functioning of the internal electricity market, including via the fulfilment of the mandates given to ENTSO-E based on EU legislation.

Our mission

ENTSO-E and its members, as the European TSO community, fulfil a common mission: Ensuring the **security of the interconnected power system in all time frames at pan-European level** and the **optimal functioning and development of the European interconnected electricity markets**, while enabling the integration of electricity generated from renewable energy sources and of emerging technologies.

Our vision

ENTSO-E plays a central role in enabling Europe to become the first **climate-neutral continent by 2050** by creating a system that is secure, sustainable and affordable, and that integrates the expected amount of renewable energy, thereby offering an essential contribution to the European Green Deal. This endeavour requires **sector integration** and close cooperation among all actors.

Europe is moving towards a sustainable, digitalised, integrated and electrified energy system with a combination of centralised and distributed resources.

ENTSO-E acts to ensure that this energy system **keeps consumers at its centre** and is operated and developed with **climate objectives** and **social welfare** in mind.

ENTSO-E is committed to use its unique expertise and system-wide view – supported by a responsibility to maintain the system's security – to deliver a comprehensive roadmap of how a climate-neutral Europe looks.

Our values

ENTSO-E acts in **solidarity** as a community of TSOs united by a shared **responsibility.**

As the professional association of independent and neutral regulated entities acting under a clear legal mandate, ENTSO-E serves the interests of society by **optimising social welfare** in its dimensions of safety, economy, environment, and performance.

ENTSO-E is committed to working with the highest technical rigour as well as developing sustainable and **innovative responses to prepare for the future** and overcoming the challenges of keeping the power system secure in a climate-neutral Europe. In all its activities, ENTSO-E acts with **transparency** and in a trustworthy dialogue with legislative and regulatory decision makers and stakeholders.

Our contributions

ENTSO-E supports the cooperation among its members at European and regional levels. Over the past decades, TSOs have undertaken initiatives to increase their cooperation in network planning, operation and market integration, thereby successfully contributing to meeting EU climate and energy targets.

To carry out its **legally mandated tasks**, ENTSO-E's key responsibilities include the following:

- Development and implementation of standards, network codes, platforms and tools to ensure secure system and market operation as well as integration of renewable energy;
- Assessment of the adequacy of the system in different timeframes;
- Coordination of the planning and development of infrastructures at the European level (Ten-Year Network Development Plans, TYNDPs);
- Coordination of research, development and innovation activities of TSOs;
- Development of platforms to enable the transparent sharing of data with market participants.

ENTSO-E supports its members in the **implementation and monitoring** of the agreed common rules.

ENTSO-E is the common voice of European TSOs and provides expert contributions and a constructive view to energy debates to support policymakers in making informed decisions.

Table of Contents

Executive Summary

The European Commission's ambitious targets for the deployment of offshore renewable capacity by 2050 will prove key to delivering the objectives of the EU Green Deal. A key driver for achieving these objectives will be unprecedented investments in developing the offshore grid.

Until now, these have primarily consisted of single-purpose solutions, such as radial connections of offshore windfarms (OWFs) and submarine interconnections between bidding zones. In the future, both single-purpose solutions and dual-purpose solutions that connect both markets and wind to shore ('offshore hybrid projects') will be developed.

While the former solutions are well-established in the existing market framework, the deployment of the latter must consider possible effects on market functioning, safe system operations, and willingness to invest in both OWFs and offshore infrastructure. To ensure that offshore hybrid projects can be efficiently deployed, the European Commission has suggested that incentives for TSOs and offshore wind developers may need to be aligned. Specifically, the EC proposes to reallocate a share of congestion income (CI), which in most cases constitutes the allowed revenues of TSOs to recover their costs, alongside network tariffs.[1]

1 In a few countries, the CI is not part of the TSO's allowed revenue but is used to cover dedicated system costs.

The present paper develops overarching principles to assess the EC's proposal for reallocating congestion income and underlines the following messages:

- **Reallocation of CI is one of several options to support offshore wind farms and further investigation is needed to assess the value to the market without disturbing it.**
- **The European Commission's assumption that CI and wind farm revenues are inversely correlated in the Offshore Bidding Zone setup may not be that straightforward. This assumption is even more doubtful when considering the application of Advanced Hybrid Coupling in the Nordic and Core regions by the time offshore hybrid projects are deployed.**
- **Reallocation of CI to support wind farms is inconsistent with the principles underlined by the Internal Energy Market (IEM), specifically tariff-setting principles, cross-subsidies, independence of NRAs, and RES remuneration rules.**
- **Specifically, the two main approaches being considered by the EC (ex-post CI transfer and ex-ante via FTRs) face many issues, making them unsuitable for efficiently supporting offshore renewables.**
- **Other existing support mechanisms, such as state-funded support schemes, awarded via competitive processes, appear to be a much more efficient and transparent solution which is compatible with the rules of the IEM. These should be further investigated and enhanced to reflect the cross-border nature of offshore hybrid projects.**

Both TSOs and ENTSO-E are eager to further investigate and discuss with decision-makers and stakeholders all relevant open questions relating to the development of future offshore hybrid projects, including the implications of Advanced Hybrid Coupling as well as considerations for designing efficient and transparent support schemes that are suited to hybrid-connected offshore renewables.

1. Introduction

The policy objective stated by the EC in its Offshore Renewable Strategy is to reach 300 GW of installed offshore wind capacity by 2050. This will demand a massive change of scale for the offshore sector, equivalent to multiplying offshore renewable energy capacity by a factor of almost 30.

In this respect, the future offshore grid infrastructure will, besides today's single purpose solutions such as point-to-point interconnectors and radial connections of offshore generators, also comprise dual-purpose solutions such as offshore hybrid projects and multi-terminal offshore hubs:

- Offshore hybrid projects (also referred to as offshore hybrid interconnectors) combine two functionalities, namely i) connecting two Member States or bidding zones (and their respective electricity markets) to each other and ii) connecting windfarms to the shore.
- Multi-terminal offshore hubs connect multiple platforms and two or more Member States or bidding zones (with or without offshore wind) into a meshed network. A multi-terminal offshore hub is in principle several hybrid projects combined into a meshed grid.

These solutions will be key for achieving offshore renewable energy targets in a cost efficient and sustainable manner through the stepwise development of a meshed grid. A central issue will be how to integrate these new grid solutions with onshore markets in the most efficient manner. In this regard, ENTSO-E advocates applying a holistic view to maintain compatible rules both offshore and onshore. Moreover, it is worth noting that the necessary massive network infrastructure capable of connecting and integrating offshore renewable energy will require a concomitant capital investment.

ENTSO-E's earlier publications[2] have described the main features and challenges of the deployment of dual-purpose solutions and how these can be approached, particularly with regards to market design, interoperability, and system operations. Building on these insights, this paper continues to focus on dual-purpose setups which, alongside the classical, single-purpose solutions (i.e., separate radial connections and interconnectors), will efficiently help integrate large amounts of offshore wind capacity.

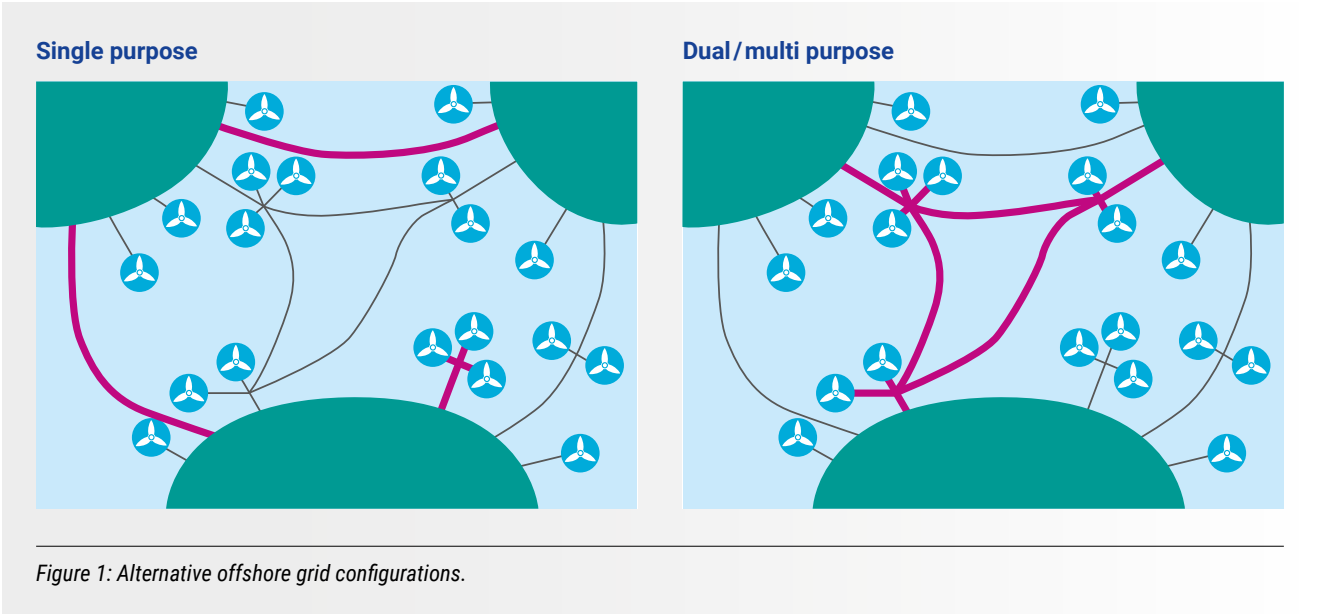


Figure 1: Alternative offshore grid configurations.

2 Find earlier four position papers on offshore development on ENTSO-E's offshore site

Notably, recent discussions on dual-purpose setups have stated that for some cases, offshore renewable developers may face insufficient economic viability and thus lack incentives to connect to an offshore hybrid project. The viability of these projects, and more generally the realisation of RES targets, depend on a multitude of factors. While the choice of a specific market design is only one of these factors, it may be the case that market revenues earned by offshore wind farm (OWF) developers are in some cases insufficient, making it necessary to find additional financial support.

This publication focuses on these cases and offers the views of TSOs on how an adequate economic framework can best ensure the rapid deployment of renewable energy sources[3], particularly in the case of separate offshore bidding zones[4].

Contents of this paper

The European Commission is considering amending legislation on the allowed use of congestion income to provide an option for Member States to reallocate congestion income to offshore renewable energy producers, arguing that under the preferred market option (Offshore Bidding Zones) there might exist a redistributional effect from generators to TSOs compared to the Home Market option.

To assess whether a different allocation of congestion revenue of the type proposed by the EC would be an option to support offshore generation, it is first necessary to adequately investigate whether there is an underlying redistribution between TSOs and OWFs in offshore hybrid projects, taking into account the relevant gradual evolution of electricity markets by the time these projects are deployed (Section 2.1). Subsequently, Section 2.2 addresses the underlying dynamics behind congestion income allocation. In Section 2.3, the impact of a possible reallocation of congestion income to OWFs on network tariffs is addressed. Section 2.4 assesses some of the concrete options recently proposed by the EC and highlights various risks and barriers posed by these proposals. Chapter 3 highlights the need for any remuneration of offshore renewables to be compatible with the principles of onshore market and grid operation, and thus suggests as a possible way forward to discuss how existing support schemes may be enhanced to suitably support future offshore renewables. The final conclusions of the paper are drawn in Chapter 4.

3 This paper does not deal with multi-purpose solutions (i.e. integration of both electricity and gas assets). This will be addressed separately.

4 In the ENTSO-E Position Paper Offshore Development: Market and Regulatory Issues', ENTSO-E specified its position relative to the two currently discussed market design options, namely the Home Market and the Offshore Bidding Zone design: 'From the current perspective, the OBZ concept seems to be a promising concept for future offshore hybrid projects and meshed HVDC projects, when considering the efficiency of markets and system operations. However, the OBZ solution is expected to reduce revenues for offshore wind farms (compared to the HM concept) when market flow is towards the home market. […] The conclusion has the label "tentative", as further analysis is required in several areas.'

2. Congestion income allocation

On 19 November 2020, the European Commission (EC) released its **Strategy on Offshore Renewable Energy**, in which the EC indicates Offshore Bidding Zones (OBZ) as being the preferred market design solution for offshore grids. This is generally aligned with the preliminary findings of the second ENTSO-E Offshore Position Paper on Market Design[5], but also poses additional questions with regards to ensuring sufficient revenues for offshore wind farms (OWFs). ENTSO-E agrees that sufficient profitability for OWF developers and a stable investment outlook are key to rapid offshore RES deployment in the framework of offshore hybrid interconnectors, which will play a central role in efficiently transporting vast amounts of renewable energy to onshore consumers.

In the Offshore Strategy, the EC proposed the following key action:

The Commission will propose amending legislation[6] on the allowed use of congestion income to provide an option for Member States to give a more flexible allocation of congestion income with regard to offshore hybrid projects (2022).

In the accompanying Staff Working Document, the EC suggests there would be three main benefits to reallocating congestion income to renewable energy producers that are active in an offshore bidding zone:

- **First**, 'it could reduce the level of subsidies needed through support schemes'.
- **Second**, 'it could enable a transition for producers to market participation once the support scheme ends'.
- **Finally**, 'it could limit the need for support schemes entirely by enabling projects to come forward in a market-based way'[7].

However, any financial re-allocation of congestion income must consider the impact on TSOs, who will bear the responsibility for the future planning, development, ownership, maintenance, and operation of offshore hybrid projects. Congestion income, as a part of TSOs' allowed revenues (in most cases[8]), will contribute to covering the costs related to the massive investments and operating costs of the required new transmission infrastructure.

Therefore, ENTSO-E and TSOs are eager to participate in the discussion around finding the best way to support future offshore generation projects, one that provides sufficient safeguards for investments in transmission infrastructure.

The next sections investigate whether allocating congestion income differently than today would be beneficial.

5 ENTSO-E (2020). Position on Offshore Development: Market and Regulatory Issues. Retrieved here.

6 Article 19 of the Electricity Regulation (EU) 2019/943, OJ L158, 14.6.2019

7 EC (2020). Commission Staff Working Document, SWD(2020) 273 final. Retrieved here

8 In a few countries, the CI is not part of the TSO's allowed revenue but is used to cover dedicated system costs

2.1 Assumed link between market design, congestion income and OWF revenues

The EC's proposal to re-allocate a share of congestion income to offshore wind generators follows from the assumption that there is a revenue redistribution effect resulting from choosing the OBZ market design for offshore grids:

> *"[…] producers of offshore renewable energy are likely to receive the lower electricity market price from the markets to which they are connected to secure dispatch. […] For projects with significantly lower electricity market revenue, this occurs as congestion in the grid makes the congestion income earned by TSOs proportionately higher. This redistribution effect must be addressed to align incentives and to enable offshore hybrid projects to come forward by allowing the total value of the project to be captured. […] Although investors should bear the market risk, a portion of the risk and insufficient revenue from market prices can be compensated through support schemes, in line with State aid rules, to ensure that offshore renewable energy projects are scaled up as necessary."*

The EC Staff Working Document additionally mentions that

> *"it is clear that in an offshore bidding zone configuration, there will be a redistribution of part of the revenue from offshore electricity producers to transmission system operators"*[9].

Some studies have attempted to quantify the effect of offshore bidding zones on consumers, TSOs, and offshore wind generators[10] [11]. They found that when comparing the Home Market and the Offshore Bidding Zone solutions, global congestion income in the system increased in proportion to the decrease in wind farm revenues in an OBZ setting, suggesting there is indeed a redistributional effect from generators to TSOs or tariff payers. Under this assumption, it would appear fair to consider reallocating the congestion income that may have been implicitly redistributed through the BZ configuration.

However, ENTSO-E believes that the situation is not as straightforward as this argument would suggest.

- **First,** higher congestion income under OBZ should be considered as reflecting the value of cross-zonal transmission via congestion income. Higher congestion income under OBZ thus indicates an efficient market choice. In the OBZ market design, the distribution of revenues between transmission and generation seems to be efficient, since congestion income better reflects physical congestions and flows than other market designs and improves competition for capacity between market flows and RES evacuation[12]. Therefore, the notion of 'redistribution', using the Home Market design as a reference, appears to be misleading.

- **Second,** these discussions are based on an oversimplified model. In general, it is indeed the case that OWF revenues might be lower under the Offshore Bidding Zone setup if the offshore BZ is connected to only two onshore bidding zones. However, in the case of three or more onshore connections, OWFs can under some circumstances capture a higher price under the OBZ model. In particular, this is the case if the home market prices are lower than the lowest OBZ price.[13]

- **Furthermore,** these considerations were all based on Net Transfer Capacities values, assuming both that 100 % of nominated exchange capacities may be used and that the exchanges over each border are independent from one another. This does not consider the gradual evolution in Europe away from ATC (Available Transfer Capacity) and towards Flow-based capacity calculations under Advanced Hybrid Coupling, which will affect market prices, and therefore revenues for both OWFs and TSOs.

9 https://ec.europa.eu/energy/sites/ener/files/staff_working_document_on_the_offshore_renewable_energy_strategy.pdf

10 Thema (2020). Market Arrangements for Offshore Hybrid Projects In The North Sea. Can Be Retrieved From: https://op.europa.eu/en/publication-detail/-/publication/28ff740c-25aa-11eb-9d7e-01aa75ed71a1/language-en

11 https://northseawindpowerhub.eu/sites/northseawindpowerhub.eu/files/media/document/NSWPH_Market-setup-options-for-hybrid-projects_Discussion-paper-2_final.v2.pdf

12 See ENTSO-E (2020). Position on Offshore Development: Market and Regulatory Issues, p. 11. Retrieved here.

13 For an analysis of the revenue effect of market model choice for OWF, see the Afry report https://northseawindpowerhub.eu/sites/northseawindpowerhub.eu/files/media/document/NSWPH-Study_AFRY-Background-Report_Oct-2020_v500_FINAL.pdf p. 15

In light of this gradual evolution towards Advanced Hybrid Coupling (see Textbox "Introduction of Advanced Hybrid Coupling in the Core and Nordic CCRs"), the prices available to offshore wind farms connected to offshore hybrid projects are determined not only by congestion on the border but also by congestion on the onshore grid (in the countries to which the offshore hybrid project is connected or elsewhere in the coupled area) and the impact of the offshore injection on the onshore grid (PTDF matrix[14]). As a result, the OWF captures a price that can be outside the bounds of the connecting markets: it may be equal to either of the two onshore BZ prices or even higher or lower than both onshore BZ prices.

Considering that offshore hybrid projects are expected to be deployed in the North and Baltic seas from 2025 onwards, these will be subject to AHC, which will be implemented on all borders of the Nordic and CORE regions by that time. It therefore makes little sense to estimate the distributional effect of the OBZ regime on the concerned actors using values for Net Transfer Capacities. Thus, when considering the AHC model, there is not necessarily or automatically a loss of revenue for an OWF connected to an offshore hybrid project (compared to a radial connection), and the level of this revenue evolves separately from the level of the congestion income. The assumption of proportionality inherent in the EC's assumption that *"the congestion income earned by TSOs (will be) proportionately higher"* will not be valid under AHC. Both congestion income and OWF market revenues will become more volatile and decorrelated from one another.

While it is questionable to what extent the notion of a **redistribution effect** will take place in reality, and how it can be linked to the actual level of congestion income, ENTSO-E and TSOs are ready to support discussions with policymakers and other stakeholders to better understand the actual impact of AHC on the positions of the concerned actors.

Introduction of Advanced Hybrid Coupling in the Core and Nordic CCRs

TSOs in the Nordic and Core CCRs have been working on a target solution that fully considers the influences of the adjacent Capacity Calculation Regions (CCR) during capacity allocation, i.e. the so called **Advanced Hybrid Coupling (AHC) concept**, relying on the use of virtual hubs* to couple HVDC infrastructure to the AC grid.

Applying an AHC approach also allows neighbouring CCRs to take advantage of the flow-based methodologies developed in the Nordic and Core CCRs. In the case of Hansa**, for instance, this makes it possible to consider the limitations in the meshed AC onshore grids, while the effective interconnector capacities are addressed individually within the Hansa CCR.

Under this model, the flow on the interconnector is not determined according to the classical rules of the ATC (Available Transfer Capacity) model but according to the flow-based market coupling approach.

* Virtual hubs represent the impact of an exchange over the HVDC interconnector on the relevant Critical Network Elements / Contingency combinations (CNECs).

** Advanced Hybrid Coupling is not projected to be implemented in the Hansa region, but will be of relevance since it will be implemented in the neighbouring regions.

KEY MESSAGES

- **A higher level of congestion income under OBZ should be considered as reflecting an efficient market choice and the notion of 'redistribution' (relying on a comparison with a market organisation such as HM using NTC values) appears not to encompass all relevant aspects of the future electricity market, and thus could be considered misleading.**
- **In particular, the proportionality between an increase in congestion income and a decrease in wind farm revenues does not seem straightforward, especially under the Advanced Hybrid Coupling (AHC) model, which will be implemented in the Core and Nordic regions to integrate DC interconnectors into the FB area by the time hybrid projects are deployed.**

14 Power transfer distribution factors, which estimate the influence of any zone-to-zone transaction on a particular grid element.

2.2 Understanding the dynamics behind allocation of congestion income

First, offshore hybrid projects will be built when they produce higher socioeconomic welfare than radial OWF connections combined with separate point-to-point interconnectors between Member States. To properly understand the notion of allocation of congestion income and the underlying dynamics, it is important to first distinguish between the different parties that are involved in building offshore hybrid projects.

The parties considered here include OWF developers, Member States, TSOs, and *in fine* the taxpayers or electricity consumers of the Member States, who may contribute to a support scheme for developers if necessary.

OWF developers

First, the implemented scheme should provide an adequate (financial) business case for developers that build the offshore wind generation assets. If a project – whether hybrid or radial – does not provide an adequate return on investment for developers of offshore wind, the developers will not submit a tender bid for the offshore wind concession unless a support scheme is set in place to ensure the required level of profitability.

The profitability of a generation project in turn depends on many parameters, such as size, water depth, wind expectation and other natural conditions. It also depends on the cost of connecting to the grid, how that cost is reflected in the network tariffs, and on the expected market revenue, which is itself conditioned by the market design in place. Additional remuneration is needed to enable investments only in cases where, under these specific conditions, OWF profitability is considered insufficient. However, any support granted should not distort price signals, but rather be granted in a neutral and non-discriminatory manner. This ensures that relative profitability and value to society are left unaffected, so as to effectively integrate large volumes of offshore RES as efficiently as possible.

Member States:

If financial support is needed, it usually comes from public funds. Until now, direct subsidies to radially connected RES generators have consisted of operating or investment support financed through the state budget and subject to state aid rules.

Member States thus need to choose, from among the available support schemes, which will be the most effective and cost effective, in accordance with State Aid rules, and how to allocate this cost: either to taxpayers via the tax bill, or to consumers via a surcharge added to the electricity invoice.

TSOs and Network Grid Users:

As shown in Figure 2 below, TSO revenues include transmission tariffs and, in most cases, congestion income. This means that currently congestion income is used to cover a share of infrastructure or operational costs which would otherwise need to be included in network tariffs.

If, by amending Article 19 of the Electricity Regulation (EU) 2019/943, a share of CI collected by a TSO is used to support OWFs as a complement or an alternative to public funds, this will subsequently affect the tariffs paid by the users of the grid, since the level of tariffs will increase by an amount equal to the share of CI used to cover OWF developer costs.

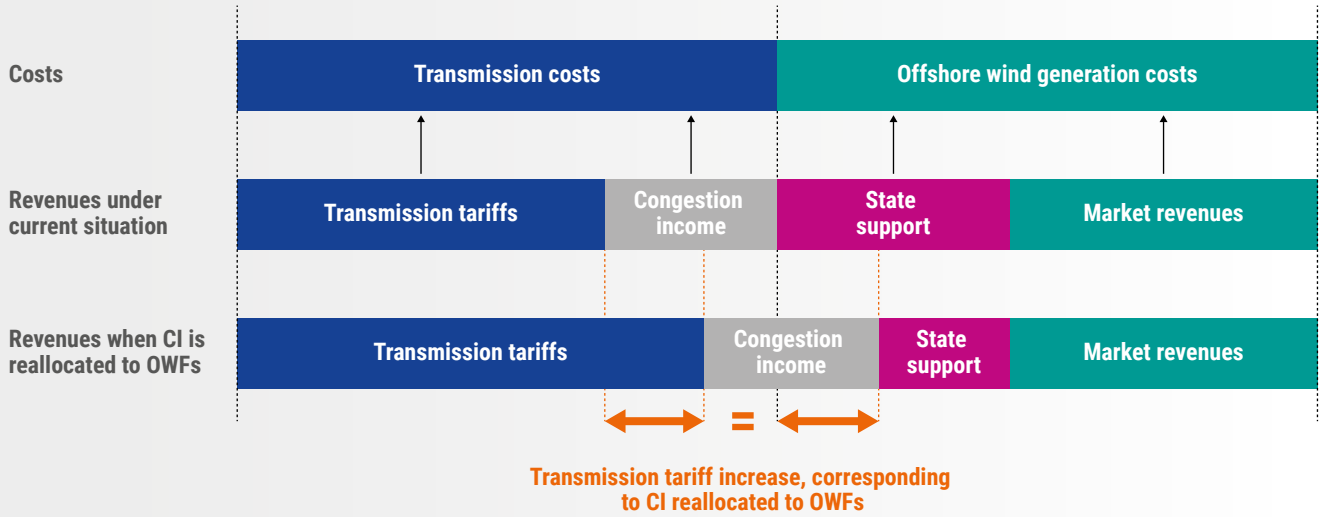


Figure 2: Reallocation of congestion income from transmission to offshore generation

Taking the above into account, TSOs would like to recall that to achieve an optimum level of investment in both generation and grid capacity, it is important that both the market and the tariff regime give the right economic price signals. The next section investigates the consequences that CI reallocation might have on key principles for network tariffication.

2.3 Impact of congestion income re-allocation to OWF on network tariffs principles

National tariff legislation may vary somewhat between European countries. However, recent EU legislation given by Article 18 of Regulation (EU) 2019/943 sets the overall legal framework for tariffs. In this context, ENTSO-E and TSOs would like to emphasise the following key principles taken from Article 18:

> *"Charges applied by network operators for access to networks, including charges for connection to the networks, charges for use of networks, and, where applicable, charges for related network reinforcements, shall be cost-reflective, transparent, take into account the need for network security and flexibility and reflect actual costs incurred insofar as they correspond to those of an efficient and structurally comparable network operator and are applied in a non-discriminatory manner. Those charges shall not include unrelated costs supporting unrelated policy objectives."*

It is clear from current EU regulations that charges for networks cannot be used to support other policy areas, but rather must be used to promote efficient use and development of the grid through cost-reflective and non-discriminatory grid charges. This is in line with established economic principles that promote efficient use and development of the network and send efficient price signals to the users of the grid.

Assuming that hybrid interconnectors are owned and maintained by TSOs, these assets then constitute a part of the national TSOs' cost base for transmission tariffs, along with other TSO assets[15].

Tariffs to cover the necessary transmission costs are paid by consumers and generators within the limits of national and EU regulation. EU regulation 838/2010 places a cap on the level of tariffs charged to generators[16]. These caps may limit the possibility of setting cost-reflective and non-discriminatory charges, as also is required by EU regulation. Given that generators already pay a relatively low or no network tariff, it would seem unjustified if OWFs also were to receive a portion of the congestion revenue. In addition, reallocating congestion income to OWFs would tend to increase transmission tariffs paid by consumers (see Figure 2). There is thus a considerable risk that such a reallocation of income would challenge acceptance from industry and other consumer groups paying for the transmission costs.

Economic Principles for optimal tariffication

Cost reflectivity
For efficient use and development of the grid, as far as practicable, tariffs paid by network users should reflect the cost they impose on the system both in the short term and the long term, thereby providing appropriate incentives to optimise future costs. Following this principle will mean that market offers and decisions around access to and use of the network will not be unduly distorted.

Cost recovery
TSOs should be able to efficiently recover incurred costs.

Non-discriminatory
There should be no undue discrimination among network users.

Transparency
The methodology for calculating tariffs should be transparent and accessible to all stakeholders.

Predictability
It is important that network users be able to effectively estimate the costs of their use of the transmission system, facilitating efficient long-term investment by network users.

Simplicity
As far as possible tariffs should be easy to understand and implement. The simpler the tariff, the easier it is for network users to respond to.

15 If and only if an exemption from the Electricity Market Regulation is granted to a merchant interconnector, the corresponding cost base may be covered by congestion income instead of tariffs. Such exemptions are granted to new interconnectors under strict conditions laid down in Article 63 of Regulation (EU) 2019/943.

16 Annex Part B of Commission Regulation (EU) No 838/2010 introduces a cap on transmission charges paid by producers. Such charges (excluding charges related to connection to the system, ancillary services, and system loss) shall be within ranges of 0 – 0.5 €/MWh in most countries. ENTSO-E's Overviews of Transmission Tariffs in Europe show that the G-charge is 0 in around 50 % of European countries, and that the average of the shares of network costs paid by generation is only around 7 %.

2.4 Assessing proposals to use congestion income to finance offshore generation

2.4.1 Ex-post reallocation of congestion income via amending Article 19 of Regulation (EU) 2019/943

Article 19(2) of Regulation (EU) 2019/943, building on the principles initially set by Article 16(6) of the repealed Regulation 714/2009, ensures that **congestion income is not a windfall profit for TSOs, but rather is used to fund cross zonal-related activities to the benefit of the network tariff payer**. The Regulation sets out two priority objectives for the use of congestion income:

> (a) guaranteeing the actual availability of the allocated capacity including firmness compensation; or
>
> (b) maintaining or increasing cross-zonal capacities through optimisation of the usage of interconnectors by means of coordinated remedial actions, where applicable, or covering costs resulting from network investments that are relevant to reduce interconnector congestion.

In practice, this means that CI shall be used either to cover operational costs for cross-zonal trade or to improve the network to reduce congestions by adding transfer capacity from new transmission investments that maximise total economic welfare (increasing both net producer and net consumer surplus).

Amending Article 19 to allow the reallocation of congestion income to offshore wind generators, as proposed by the Commission, arguably implies adding a third priority objective to 19(2). It implies that the priority objectives would no longer ensure that congestion income is used to the benefit of network tariff payers, but is also used to the benefit of a specific kind of generator (offshore generators connected to dual-purpose offshore grid solutions). Section 2.1 has shown that the amount of congestion income under the OBZ market setup reflects an efficient market design. By reallocating a share of this amount to OWFs, thus reducing the amount available to TSOs, it may impede building the necessary massive network infrastructure able to connect and integrate offshore renewable energy.

As mentioned in Textbox "Status of offshore hybrid interconnectors", such infrastructure clearly belongs to transmission activities: if less congestion income is left available, building and operating the required infrastructure may come at the expense of a potentially unsustainable increase in transmission tariffs.

Additionally, as explained in Section 2.3, any such support scheme raises concerns about compatibility with Article 18(1) of the Electricity Regulation which stipulates that **network charges shall be cost-reflective and shall not include unrelated costs supporting unrelated policy objectives**. EU regulatory requirements and sound economic principles imply that congestion income resulting from network activities shall be used only to cover transmission costs, including investments in new interconnection capacity (including hybrid interconnectors). Where congestion income is used for policy-related objectives, network tariffs will include the corresponding opportunity costs. Widening the scope of Article 19 might lead to tariffs no longer being cost-reflective, since they would not only reflect transmission costs, but would indirectly include a share of OWF costs, as shown in Figure 2.

Additionally, it is questionable whether this would be compatible with Article 59,1 (j) of Directive (EU) 2019/944, which stipulates that one of the NRA's duties is to ensure that there is no cross-subsidisation between transmission and other electricity activities. Transferring CI, that is, money coming from transmission activities, to generation activities would constitute a breach of this article, since network tariffs would comprise costs which are not network related.

Allowing the reallocation of CI to specific electricity producers would probably necessitate a different governance approach compared to the process that is foreseen by the UCI methodology today[17]. Since any given financial support scheme must ensure a certain level of stability and reliability, ENTSO-E expects that it would be necessary to prioritise the allocation of CI to producers over other objectives for the use of congestion income. That implies that the leeway for NRAs to decide on alternative uses of congestion income, which is clear in Article 19(4) and the associated UCI methodology, would diminish: since using CI to support electricity

17 Pursuant to the UCI methodology, TSOs propose to their respective NRA how they intend to fulfil the priority objectives set by Article 19 of Regulation (EU) 2019/943, though ultimately NRAs may deliberately decide how congestion income shall be used with respect to the distinct cost categories that are admissible under the UCI methodology.

producers would constitute an alternative to public support schemes that otherwise would have been funded by taxes or surcharges, the government of every Member State, not the NRA, would in practice decide if reallocation shall be included into the allowed uses of CI. This would add a new player to the UCI methodology, and might be not compatible with Article 57, 4 (b) of Directive (EU) 2019/944, which stipulates that *"Member States shall ensure that, when carrying out the regulatory tasks conferred upon it by this Directive and related legislation, the regulatory authority (…) do not seek or take direct instructions from any government or other public or private entity when carrying out the regulatory tasks"*.

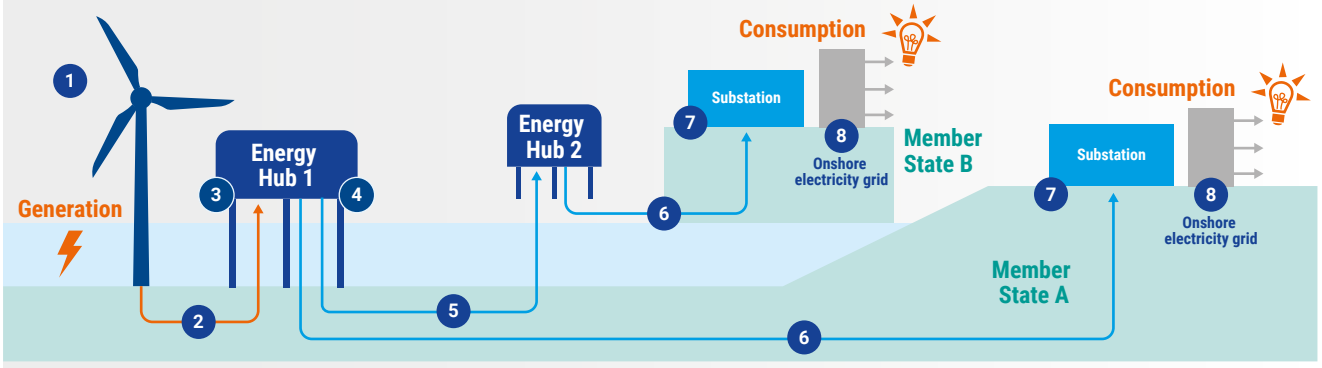
Finally, as explained in Section 2.1, under Advanced Hybrid Coupling, the correlation between congestion income and OWGs' revenue is not as straightforward as it seems, meaning that reallocating congestion income would potentially be based on arbitrary and non-market-based principles.

Status of offshore hybrid interconnectors

EC Regulation 2019/943 defines an "interconnector" as *"a transmission line which crosses or spans a border between Member States, and which connects the national transmission systems of the Member States"*. As an interconnector it can be part of the regulatory asset base of the respective TSO and be regulated as a regular transmission asset or be operated as a merchant interconnector if an exemption from the Electricity Market Regulation is granted.

Similarly, network elements used to link bidding zones (referred to as *"cross-zonal capacity"* in the Electricity Regulation (EU) 2019/943), even when not crossing Member State borders, also already have a clear regulatory framework established in the various electricity Network Codes and Guidelines as well as in the Clean Energy Package legislation. This regulatory framework establishes rules to be followed by TSOs regarding cross-zonal capacity.

Taking the above into consideration, transmission assets of clear cross-border and cross-zonal relevance such as interconnector cables (be it from hub-to-shore 6 or hub-to-hub 5), onshore reinforcements, or even potentially offshore energy hubs 3, should be considered as transmission assets comprising the offshore hybrid project. As such, they should therefore be subject to the existing requirements to unbundle transmission and generation aiming at guaranteeing transparent and non-discriminatory access to the grid for all market actors.



Asset List:

1. Offshore wind farm
2. Inter-array cables from offshore wind farm to hub
3. Energy Hub (island, platform, jacket or caisson)
4. On hub assets
5. Interconnector cables from hub to hub
6. Interconnector from hub to shore
7. Onshore Substation
8. Onshore Grid Reinforcements

KEY MESSAGES

› ENTSO-E considers congestion income reallocation via amending Article 19 of Regulation 943/2019 would fundamentally conflict with several main principles of the common rules for the European internal market for electricity and would in ENTSO-E's view not constitute an appropriate tool.

2.4.2 Ex-ante reallocation of congestion income via Financial Transmission Rights

The EC's proposal to support offshore wind farms by re-allocating Congestion Income could also be performed on an 'ex-ante' basis, whereby OWFs are awarded with Financial Transmission Rights (FTRs). Under this proposed approach, FTRs would be allocated under preferential conditions (for free or at reduced cost) during the Long-Term Transmission Rights (LTTR) allocation process. OWFs could then choose whether to keep the FTRs and receive the Day-Ahead Market price spread between the OBZ and the onshore BZ times the volume of FTRs or alternatively resell the FTRs on the secondary markets. This proposal raises several important issues, since FTRs are a particular instrument of electricity markets, which ENTSO-E does not consider fit for purpose for an efficient and effective development of OWFs.

First

this proposed solution would rely on allocating FTRs under preferential conditions, which goes against the fundamental principles enshrined in the FCA Guideline. The functioning of the Internal Energy Market strongly rests on the fundamental principle under which TSOs are to provide network users with non-discriminatory access to their networks. To achieve this, transmission right allocation methods (be it FTRs or other equivalent hedging mechanisms) must follow a non-discriminatory market-based approach.

Secondly

the product of LTTRs is inherently the wrong instrument to cover the perceived disadvantages for the OWFs. LTTRs are baseload products where the allocated volume is constant over time, completely unlike the production of RES. Any volume of LTTRs will either overcompensate or undercompensate the OWFs, requiring an ex-post agreement on the adjustment of the LTTR pay-out. This raises the question of whether it is not better to skip the pre-allocation altogether and instead rely on a fit-for-purpose financial instrument such as a bespoke two-sided Contract for Difference.

Thirdly

this 'ex-ante' approach to reallocating congestion income via FTRs seems to ignore the contradiction between their actual purpose and design and the objectives of supporting offshore RES, which should be de-risking low-carbon investment without distorting market signals. The risk of over- or under-remuneration mentioned above would be further exacerbated by the fact that preallocating FTR options at zero or reduced cost would imply defining the volume and length of FTR options, which would need to be carried out administratively (even if these rights are allocated on a competitive basis through auctions)[18]. Any administrative (price-based) estimation of RES remuneration, as opposed to a price-finding mechanism based on competitive bidding (e. g. via auctions), is highly subject to a risk of inadequate remuneration, lack of cost effectiveness, and incompatibility with onshore market signals. Moreover, even if the exact need for additional revenues were known to TSOs / NRAs, it would be impossible to determine the volume of FTRs necessary until the Day-Ahead Market had taken place (since the Day-Ahead Market spread determines the value of FTRs).

Next

any LTTR sold by TSOs is a hedging product backed by physical capacity. This means that TSOs only put a certain capacity up for auction based on system security parameters and, in the future, a full-fledged coordinated capacity calculation. In turn, TSOs guarantee (unless in exceptional circumstances) the capacity to be available in the DA timeframe. As such, there is no inherent financial risk for the TSOs given that the DA congestion income covers the pay-out to the holders of the LTTRs. A predefined volume of LTTRs on hybrid interconnectors which are preallocated to OWFs would imply either a financial risk for the TSO (in the worst case having to curtail the capacity) or a physical risk (congestion resulting in costly remedial actions).

18 Even if the award of FTRs on a preferential basis could somehow be done via tender, this would most likely deviate from usual market auctions as it would not be based on market prices, but on the expected costs and profitability of specific generators. This would most likely incur distortions to efficient price signals in the wholesale market.

Finally

the definition of the length of the pay-out is also a point of concern. While wind farms would require long-term revenue stability (e.g. 10, 15 or 20 years) to ensure lower cost of capital, most transmission rights between pricing zones are only auctioned for a year or other shorter time periods, since any longer timeframe would further complicate the task of TSOs to estimate the available capacity to be sold in long-term auctions (e.g. taking into account maintenance planning). Guaranteeing FTR pay-out for OWFs over longer time periods would thus, again, imply physical risks for the safe operation of the interconnected system and require TSOs to perform costly remedial actions. This would also likely contradict the FCA guidelines and the related capacity calculation methodologies in the different CCRs by setting a minimum bound on which capacity should be auctioned. This would further require a long-term commitment from TSOs (and NRAs) affecting the tariffs, while tariff levels are typically determined for periods of 4 – 5 years or less.

KEY MESSAGES

› **ENTSO-E considers preallocation of FTR options to OWFs to be discriminatory and an inappropriate tool for the problem at hand since they fail both to de-risk OWFs' output and to ensure sufficient market and system operations compatibility. TSOs question whether an ex-post settlement agreement or purely financial hedging instruments are not better suited for the problem at hand.**

Summary of Chapter 2

Based on the assessment of the proposed options presented above, it appears that no approach proposed thus far under which congestion income would be reallocated to offshore wind farms seems to provide adequate support to generators while also safeguarding against possible market distortions, cross-subsidisation and other policy risks.

Furthermore, the statement according to which the level of public subsidies that are needed to support these private investments would be reduced if congestion income were to be reallocated is debatable[19]. While it is arguably true that direct State Aid would be reduced, this ignores the fact that reallocation of congestion income is just another form of support, funded indirectly through tariffs rather than taxes.

Finally, it seems contradictory that projects would allegedly come forward "in a market way", while the additional remuneration they receive does need not comply with the same criteria as do traditional support schemes: ensuring competitive bidding processes, transparency, cost-efficiency, and having appropriate safeguards to avoid potential negative impacts.

For these reasons, ENTSO-E and TSOs believe that the discussion on how to enable investment in offshore wind generation connected to offshore hybrid projects should focus on how to further build upon existing experiences with RES support schemes. These offer several advantages, such as stability for investors, compliance with State Aid rules, and design option flexibility, which can thus better ensure their scalability to cross-border RES projects, including in a multi-terminal hub-based offshore grid.

19 European Commission (2020): SWD/2020/273 final

3. Enhancing existing schemes for the realisation of offshore hybrid projects

While support for certain generators would be necessary to ensure that offshore hybrid projects are realised, any subsidies to OWFs should be given in an open, non-discriminatory and transparent way, and not distort price signals via market prices or tariffs. The opposite would lead to market distortions or establishments that are not desirable from the perspective of society.

ENTSO-E therefore strongly recommends that any solution with respect to RES remuneration should be compatible with the principles of onshore market and grid operation (which are already applied to radially connected offshore wind farms), where efficient support schemes are linked to wholesale market prices, supplemented by a state-funded competitive premium revealed under an auctioning mechanism. This is particularly relevant to ensuring scalability of support under an Offshore Bidding Zone solution.

In this regard, ENTSO-E and TSOs stress the importance of offshore RES support measures following the same rules as onshore renewables, defined in the Guidelines on State aid for environmental protection and energy 2014 – 2020 (EEAG)[20]. The EEAG rules outline clear principles for efficient, transparent, and successful integration of RES to the system, which can easily be transposed to future OWF developers while connecting to dual-purpose solutions. Below are some additional considerations.

Ensuring cost-efficiency and transparency

The level and form of support awarded can be determined either administratively by a central institution (government or regulator) or competitively through auctions.

Instead of fixing payment levels administratively, renewable energy auctions are expected to reveal the most efficient price level, as policy makers simply determine a volume of electricity (kWh) or given capacity (kW) that they would like to procure, while the strike price is determined through a competitive bidding process among project developers.

Following the criteria set out in the EEAG, establishing financial support through a competitive process also provides a transparent and objective means for identifying the recipients of this financial support. Achieving both economic efficiency and transparency in the roll-out of OWFs is key to ensuring public acceptance, even more so when considering the installed offshore renewable capacity target to be met by 2050, which will imply considerable costs for society.

In this regard, ENTSO-E concludes that tenders for offshore production facilities and transmission assets (when these are not developed by TSOs) must be conducted separately, as this will ensure that only the most mature and economically efficient renewable projects are selected and awarded the premium. At the same time, the manner in which this competition is organised should ensure compliance with the defined targets and the reliability of project timelines.

20 Communication from the Commission — Guidelines on State aid for environmental protection and energy 2014 – 2020 OJ C 200, 28.6.2014, p. 1–55. *Currently under revision*

Limiting distortions to electricity markets

Given the volatility of market revenues to which OWFs would be exposed, and which might be even further exacerbated with the application of Advanced Hybrid Coupling, financial support should mainly aim to provide a revenue stabilisation mechanism. In this sense, two-sided Contracts for Difference (CfDs) may be suitable since they would offer several advantages for addressing these long-term revenue risks. CfDs also offer more safeguards against overcompensation compared to other subsidies, such as variable premiums, and are less risky for investors compared to a fixed premium or upfront investment support, hence resulting in lower financing costs.

While balancing the need for sufficient investment stability with that of avoiding overcompensation is a key priority for policymakers, the biggest challenge for TSOs is to ensure the continuous security of supply and the stability of the electricity system, in a context where intermittent RES penetration is increasing while the share and competitiveness of conventional generation units is declining. In this regard, the design of support schemes should consider possible direct or indirect impacts on market and system integration aspects.

Most critically, support mechanisms may not distort market signals, especially in situations with a global excess of electricity, resulting in negative prices and in situations with a local excess of electricity, resulting in the need for curtailment. Financial support should therefore be awarded based on specific conditions to avoid situations where generation units may face incentives to further exacerbate these distortions.

The impact of a competitively awarded two-sided CfD on these market distortions will depend on the design of the scheme, creating the right conditions for premium or subsidy to be awarded. Specific design options can provide meaningful incentives for RES units to provide system services, including balancing, as well as non-frequency ancillary services, and to correctly forecast their production. Furthermore, if the relevant market value (which is used to calculate the premium) is an average value (e. g., a monthly or yearly average) then market distortions are likely comparable to fixed premiums. However, if the relevant market value is the hourly price, then the CfD corresponds to a fixed feed-in tariff and is more distortive than a fixed premium.

Cross-border cooperation on offshore renewables

Cross-border support schemes, especially auctions, will play an important role in the future for promoting cooperation frameworks between Host and Contributing Member States with regards to cost allocation and the sharing of the corresponding RES statistics. As explained in a recent AURES report[21]:

> *[T]aking a cross-border approach to the deployment of renewables can allow Member States to first and foremost reduce the costs of support for renewables by:*
>
> 1. *tapping into better natural resource potential of the cooperating country,*
> 2. *accessing higher market values in cooperation countries,*
> 3. *providing access to lower costs of capital and better financing conditions that reduce overall investment needs, and*
> 4. *increasing competition in a domestic auction scheme.*

Joint projects and joint support schemes, if well designed, may be particularly well suited to address new challenges that require closer bilateral or regional coordination, including the deployment of OWFs connected to two or more countries via hybrid interconnectors. By facilitating cooperation between countries to ensure security of supply and better alignment with grid development, cross-border auctions can help effectively support the realisation of such large-scale complex projects. However, differing regulatory frameworks across countries can further exacerbate possible distortions to competition, for which distributional effects may need to be limited. Careful design of such schemes is therefore needed to avoid perverse incentives and to guarantee a level playing field between bidders.

Despite the provisions relating to cross-border participation in RES schemes contained in the Renewable Energy Directive recast (RED II), few countries have effectively introduced a cross-border element in their national support instruments. ENTSO-E welcomes the recent efforts at the EU level to encourage closer cooperation on renewable projects, notably through the introduction of the EU RES financing mechanism[22], but also encourages policymakers to carefully consider design elements when implementing cross-border auctions.

The Role of EU instruments for facilitating cooperation

While national (and potentially cross-border) support schemes will be key to providing adequate remuneration for OWFs and ensuring sufficient revenue stabilisation for developers to have an interest in connecting to offshore hybrid projects, this may not be sufficient to trigger the necessary cooperation between countries and between actors.

Access to European funding (through instruments such as the Connecting Europe Facility, the EU renewable energy financing mechanism, or the Multiannual Financial Framework), for offshore infrastructure projects, including offshore hybrid projects, will be crucial for lowering the transaction costs of cross-border cooperation for such large scale and complex projects. This will be key to balancing the different potential between Member States and thus aligning incentives among Member States both for energy infrastructure investments (hybrid interconnectors) and cross-border projects in the field of renewable energy (OWFs connected to the offshore hybrid projects). However, sufficient coordination will be necessary to avoid the possibility that combining national or joint support schemes with EU financial assistance leads to adverse effects, such as overcompensation and market distortions.

ENTSO-E stands ready to support upcoming discussions on the development of support schemes that are compatible with cross-border offshore renewables and on how these should be aligned with grid development and operations.

21 http://aures2project.eu/wp-content/uploads/2021/06/AURES_II_D6_4_guidance_document.pdf

22 Article 33 of the Governance Regulation (EU) 2018/1999

4. Conclusions and way forward

In this paper it was demonstrated that:

- **Given the expansion towards a meshed offshore grid, avoiding adverse incentives in the development of offshore transmission infrastructure is key to supporting a timely and cost-efficient deployment of offshore renewables.**

- **The notion of a redistribution effect from OWFs to TSOs, based on which the European Commission has proposed to reallocate a share of congestion income, is not as straightforward is it may appear when one considers that the level of congestion income under OBZ reflects an efficient market choice, and that advanced hybrid coupling will already be implemented by the time the next offshore hybrid projects are commissioned.**

  Specifically, ENTSO-E and TSOs stand ready to further investigate and discuss the implications of Advanced Hybrid Coupling for future offshore hybrid projects.

- **Reallocation of congestion income to support OWFs is inconsistent with the principles that underlie the Internal Energy Market, particularly tariff-setting principles and RES remuneration rules.**

- **Specifically, the two main approaches under consideration by the EC (ex-post CI transfer and ex-ante via FTRs) face many issues, making them unsuitable for efficiently supporting offshore renewables.**

- **State-funded support schemes, awarded via competitive processes, appear to be a much more efficient and transparent solution which is compatible with the rules of the IEM.**

  ENTSO-E and TSOs are eager to support discussions on establishing sound support schemes for cross-border renewables.

ENTSO-E and TSOs will continue to analyse how the objectives in the EC's Offshore Renewable Strategy can best be achieved while maintaining efficient market functioning and safe system operations, as well as complying with European network tariff principles. Further insights will be produced with regards to assessing the implications of multi-purpose offshore solutions, on both a cross-border and cross-sector basis.

ENTSO-E also encourages the EC and Member States to adopt a holistic "one-system" approach, which will be key to providing a robust framework and financial security for investors. ENTSO-E further asks policymakers to carefully consider all possible implications of the choice of options to finance RES support, including the impact on onshore tariff payers.

Finally, TSOs actively encourage relevant stakeholders to collaborate in driving the development of full-scale demonstration projects, to drive a common understanding of the suitability and scalability of market and regulatory solutions.

List of Abbreviations

Acronym	Meaning
ACER	Agency for the Cooperation of Energy Regulators
AHC	Advanced Hybrid Coupling
ATC	Available Transfer Capacities
CACM	Capacity Allocation and Congestion Management
CEP	Clean Energy Package
CfD	Contract-for-Difference
CI	Congestion Income
CCR	Capacity Calculation Regions
CORE CCR	Capacity calculation region as defined in ACER's Definition of the Capacity Calculation Regions in accordance with Article 15(1) of the Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a Guideline on Capacity Allocation and Congestion Management and which covers France, Germany, Belgium, the Netherlands, Luxembourg, Austria, Poland, the Czech Republic, Slovakia, Hungary, Romania, Slovenia and Croatia
EEAG	Guidelines on State Aid for Environmental Protection and Energy
FTR	Financial Transmission Right
Hansa CCR	Capacity Calculation Region which covers the Netherlands, Denmark, Germany, Poland, and a part of Sweden
HM	Home Market, where the generator gets the market price of the bidding zone where it is physically located
IEM	Internal Energy Market
LTTR	Long-Term Transmission Right
Nordic CCR	Capacity calculation region which covers Denmark, Sweden, and Finland
NRA	National Regulatory Agency
NTC	Net Transfer Capacities
OBZ	Offshore Bidding Zone, where the generator gets a price specific to the offshore generation area where it is located
OWF	Offshore Wind Farm
TSO	Transmission System Operator
UCI methodology	Methodology for the use of congestion income for the purposes referred to in Article 19(2) of Regulation (EU) 2019/943 in accordance with Article 19(4) of Regulation (EU) 2019/943

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