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TRANSMISSION INVESTMENT

COORDINATED OFFSHORE TRANSMISSION

An examination of the construction delay risk implications of moving from the 'Generator Build' model to an 'OFTO Build' model in order to facilitate offshore coordination in transmission

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Contents

1. Executive summary

The introduction of coordination between offshore wind generation projects appears to be becoming an imperative to delivering the UK's aspirations towards Net Zero whilst minimising the impact on affected communities and the environment.

However, the current framework for delivery of the offshore transmission network in the UK is not suited to delivering the complexities of shared and integrated transmission infrastructure. To date, the cost economies of scale associated with this concept have not been sufficient to overcome the technical and commercial risks inherent in these arrangements.

The delivery framework must therefore evolve, but one of the key challenges which must first be solved is how to accommodate the dependence of one project on another in their timely delivery of commercial operation, namely project-on-project construction delay risk.

This paper seeks to frame the problem to be overcome in the context of the status quo and future key drivers, drawing on comparators from other jurisdictions, and to provide a sense of the scale of the measures required to put in place a framework that will deliver on the UK's targets for offshore wind.

A recommendation is made to commission a study to better appreciate the balance between Offshore Wind Farm (OWF) and transmission project financing structures, and consumer exposure in informing policy in this area.

2. Impact of Offshore Transmission Network Review on GB Offshore Transmission Delivery

2.1. Offshore Transmission Network Review

The UK government's Department for Business, Energy and Industrial Strategy (BEIS) launched their Offshore Transmission Network Review (OTNR) in July 2020. The stated aim of the OTNR is to

"Ensure that the transmission connections for offshore wind generation are delivered in the most appropriate way, considering the contribution offshore wind is expected to make towards net-zero by 2050. This will be done with a view to finding the appropriate balance between environmental, social and economic costs."

The key objectives set out in the OTNR are to:

a) Facilitate the timely delivery of offshore wind generation to meet net-zero by 2050;

b) Minimise environmental impact (offshore and onshore);

c) Increase local stakeholder/public acceptability; and

d) Reduce costs to the network users that pay TNUoS charges and ultimately consumers.

These four objectives do not easily coexist and pursuing one is often to the detriment of others. The expectation is that introducing coordinated or shared transmission infrastructure for OWF generation (including infrastructure shared with electricity interconnectors) will address these items. The expectation is that inherent in coordinated solutions will be the requirement for transmission assets to be servicing more than one generator and that anticipatory investment for these assets may well be required. This article will explore one of the main challenges associated with building such a shared transmission infrastructure.

The OTNR is split into three workstreams, focusing on the immediate (Early Opportunities), the period to 2030 (Pathway to 2030) and longer-term (Enduring Regime) timeframes. The focus here is on the design for the Enduring Regime to be applied to projects connecting after 2030. The crucial challenge will be to ensure that the Enduring Regime model continues to encourage the appetite and ability of OWF generators to bring projects forward to meet Net Zero.

2.2. The Generator Build Model

2.2.1. Development and Construction Delivery

Under the existing framework, the OWF generator develops and builds the project transmission element of the OWF, known as the Generator Build model. In the UK, by law, electricity transmission systems have to be operated under a transmission licence. Transmission licensees are required to meet certain requirements, in particular separation of ownership of transmission and generation interests. Transmission systems built by OWF generators are therefore transferred to a licenced Offshore Transmission Owner (OFTO) following a competitive selection process run by the regulator, Ofgem.

2.2.2. Operational Availability

Once connected and operational, OFTO availability is incentivised through the revenue bonus/malus provisions within the regulatory regime. The availability incentive mechanism is designed to both provide strong incentives on OFTOs to maintain availability and to enable the use of non-recourse project finance. It does this through limiting penalties for poor availability in any one year to 10% of base revenue, but allowing poor availability in one year to affect revenues for several consecutive years. Debt interest and principal repayments are therefore largely protected from poor availability, whilst equity is strongly incentivised to maximise availability. This regime has delivered high system availabilities since inception and the annual system availability for 2019-20 was 99.20%[1].

In contrast to unavailability of the onshore transmission system, OWF generators do not receive any compensation for OFTO unavailability. In theory, this could lead to significant uncompensated loss of revenue for an OWF generator during extended periods of OFTO unavailability caused for example by an offshore cable fault. Some OWF generators have sought to mitigate this risk through the use of contingent business interruption (CBI) insurance (triggered by damage to the OFTO assets). Others have not taken out CBI insurance and yet have managed to attract funding, and notably non-recourse project finance debt, for the OWF during construction and operation.

2.2.3. Anticipatory investment under the existing framework

Anticipatory investment is sought to be facilitated within the existing framework in two principal ways. The first is the Wider Network Benefit Investment (WNBI), and the second is through the Generator Focussed Anticipatory Investment (GFAI) regime.

WNBI is investment intended to produce a benefit to multiple parties, both onshore and offshore and including generation and demand. In relation to WNBI, NGESO is responsible for developing a needs case and assessing the options before making a gateway submission to Ofgem for approval. However, WNBI has to date not been used in relation to an OWF connection.

GFAI relates to investment in offshore transmission infrastructure to support the later connection of specific offshore developments. National Grid considered in 2014/2015 whether there was a need to develop user commitment arrangements for GFAI. They identified a number of potential framework and licence changes that could be brought forward to protect consumers from the risk of funding stranded assets. However, National Grid ultimately concluded that the

1. https://www.nationalgrideso.com/document/177156/download; National Electricity Transmission System Performance Report, 2019-20, page 35.

Connection and Use of System Code (CUSC) modification process for these could be complex, involve considerable industry resource, and may not result in a solution that covers all eventualities. Accordingly, they did not consider it appropriate for changes to be brought forward at that time. GFAI has therefore never been used.

The result is therefore that there is currently no workable framework for funnelling the necessary anticipatory investment into developing a more complex offshore transmission network. Greater clarity and certainty on the recovery of anticipatory investment is likely to be required in the context of the OTNR and the move away from single customer OWF connections. This is particularly true in the context of Multi-Purpose Interconnector (MPI) developments where anticipatory investment regimes will need to address not only connections to OWFs, but also allow for investment in combined OWF and interconnector projects.

2.2.4. Conflicts of interest under the Generator Build model

Notwithstanding the lack of a comprehensive regime for anticipatory investment, the Generator Build model faces significant challenges in fulfilling the objectives of the OTNR. In particular, if transmission assets are to transition from serving a single customer to becoming shared transmission assets, conflicts of interest must be managed appropriately.

The potential for conflicts arises with respect to the OWF generator who had developed and is seeking to use the transmission asset, where subsequent generators seeking to connect to the transmission asset would have to take on the risk of the transmission asset having insufficient capacity to meet the demand of all generators connected to it. While the revenue stream of OFTO projects is not based on OWF demand, the revenue stream of OWF projects is entirely contingent on the availability of OFTO assets to transmit the electricity generated by the OWF. Investment into OWF projects is greatly disincentivised if OWF generators are required to take on the risk of offshore transmission assets having insufficient capacity because they were developed by a competing OWF generator who was the first to connect to the particular transmission asset.

The OFTO also faces additional risks of stranding or underutilisation if some potential users' projects are abandoned, delayed, or materially modified.

2.3. The OFTO Build Model

The alternative to the Generator Build model to date has been the OFTO Build model whereby an OFTO would be selected to carry out the detailed design, procurement, finance and construction. This is a choice that has been made available to the OWF generators but which none have adopted. The key concern of the OWF generators is that a lack of suitable control over project development and the construction activities of the OFTO Build would lead to late delivery of the OFTO assets, and that this late delivery would not be sufficiently mitigated by suitable delay liquidated damages. Given the radial nature of OWF connections to date, late delivery of the OFTO assets means that there would be no route to market for the OWF. The project risk required to be taken on by the OWF generators is therefore high, and presently there is no incentive to do so.

The work on the OTNR to date has brought the OFTO Build model back into focus where it has been identified that anticipatory investment and conflict of interest concerns may mean that there is a case to be made for the separation of the delivery of the generation and transmission elements of the offshore wind projects.

Terminology

The "Generator-Build" model, referred to throughout this paper, means a project development model where the OWF developer has responsibility for construction of the transmission assets.

The "OFTO-Build" model refers to a project development model where an independent entity, be it a regulated monopoly TO or independent transmission company, has responsibility for construction of the transmission assets.

2.4. Models being considered by BEIS (& Ofgem)

As a consequence of the arguments set out above, Ofgem are currently considering a number of alternative delivery models for offshore transmission under the Enduring Regime. These include the Generator-Build model (delivery model 6) which is considered business as usual (BAU), but also includes 5 alternatives, all of which have the project development and construction carried out by a third party to the generator. Each of these 5 alternative models will require a solution to the barriers which has to date prevented these models being implemented.

These are set out in Figure 1 below.

DELIVERY MODEL	HOLISTIC NETWORK DESIGN	DETAILED NETWORK DESIGN	PRE-CONSTRUCTION (EG CONSENTING)	CONSTRUCTION	OPERATION
1. TO Build and Operate	ESO	TO	TO	TO	TO
2. TO Build > OFTO Operate	ESO	TO	TO	TO	OFTO
3. TO Design > OFTO Build and Operate	ESO	TO	TO	OFTO	OFTO
4. Early OFTO Competition	ESO	ESO **or** TO	OFTO	OFTO	OFTO
5. Very Early OFTO Competition	ESO	OFTO	OFTO	OFTO	OFTO
6. Generator design and build, OFTO operate	ESO	Offshore Generator	Offshore Generator	Offshore Generator	OFTO

Figure 1: Delivery Model Options

Key: Dotted line = Ofgem OFTO selection tender

Under OTNR, the options are also being assessed in terms of different delivery timeframes; in particular their ability to bring delivery of the transmission earlier so as to reduce the risk to the generator of late delivery of the connection. One suggestion is to tender for the OFTO works in advance of a Crown Estate leasing round such that the OFTO works are consented and approaching FID at the time the preferred bidder status is confirmed for the generator (ie in advance of the agreement for lease for the sea bed). This would provide considerable comfort to generators, as this would provide valuable schedule slack to the connection date. However, this concept would require early investment. An alternate suggestion would be for the OFTO selection, development and construction to run in parallel to the OWF project(s), which would increase the risk of late delivery. Suggestions based on intermediate positions between these two extremes are also being considered.

Section 2 Summary: The key challenges

The challenges outlined in this section 2 demonstrate the key disconnect between the commercial and regulatory frameworks which underlie the Generator Build and OFTO Build models. OWF generators are wholly reliant on the offshore transmission assets for their revenue stream and debt servicing, and as such, the Build models by TO or OFTO entail unpalatable commercial risks for the OWF generator which they are not incentivised to take. In circumstances where the generator is not compensated or incentivised to accept project-on-project risk associated with the construction of transmission assets by third parties, such risks may make future developments un-financeable. Greater clarity and certainty on the recovery of anticipatory investment is also likely to be required to create a more complex and interconnected system of offshore transmission, but the Generator Build model would create significant conflicts of interest in a shared transmission system. To avoid such conflicts, an alternative delivery model is required, and must be commercially incentivised in order to drive the transition to a complex, shared transmission system.

3. The OFTO Build Challenge: Project-on-Project construction delay risk

OWF generators are not incentivised to take on the project-on-project construction delay risk inherent in offshore transmission assets being developed by a third party. If a generation project is not able to operate commercially due to the late delivery of the transmission project they depend upon, they will seek to be 'held whole' – to be unaffected commercially by a risk they had no control over. European precedent shows historically some impact has been borne by the generator but only to a limited degree (c. 10%). If the delivery of a transmission project is delayed, those responsible for the delay will expect to incur a commercial impact in the form of delay damage payments in keeping with the scale and complexity of the transmission project.

As seen above, project-on-project risk is one of the key challenges which the UK is facing in designing a new model for the delivery of a coordinated and shared offshore transmission system. To put this into context, we have looked at the scale of delay compensation in place and how this challenge is addressed in other jurisdictions and applications.

3.1. European Offshore Transmission

3.1.1. Germany

From 2006, the Energy Industry Act (EnWG) required the responsible transmission system operator (TSO) to connect the offshore wind farms to the national grid at its own expense and risk. However, there were a number of key uncertainties in this model, including the timing from which such obligation applied, and whether and the extent to which the TSO would be reimbursed for the costs incurred in the event of a delay or non-realisation of the project.

For this reason, a new offshore compensation regulation was created. Under this new regulation, the relevant TSO with the connection obligation must compensate affected offshore wind farm investors both in the event of delays in the grid connection beyond the binding connection date, and also in the event of longer disruptions due to operation-related maintenance work. Compensation is limited to 90% of the lost EEG feed-in remuneration and in principle is available only for a certain period of time. As the EEG remuneration decreases as OWF are opting for a 'partial or no subsidy' regime, this compensation may in practice reduce further or fall away, respectively. In addition, a statutory limitation of liability for unintentional property damage was introduced, which limited the TSO's liability to 100 million euros per damaging event.

3.1.2. France

France has implemented a number of measures to address the risk of transmission connection delays in the financing and development of offshore wind projects.

OWF generators are required to enter into a number of agreements with the transmission system operator, Réseau de Transport d'Electricité (RTE), the most critical one (for our purposes) being the grid connection agreement. This agreement provides the relevant deadline for the connection, and sets out the costs for the connection works.

In 2017, legislation established a compensation regime for delays in grid connection beyond the agreed connection deadline, and will provide compensation for generators to cover (at least in part) additional financing and build costs resulting from connection delays, for up to a maximum of three years. This compensation may be superseded by compensation available to generators under the competitive tendering procedure.

Responsibility for building and operating the offshore substation and connection works for projects constructed following completion of a competitive tender process lies with RTE. Delivery of such connection works must be completed by the date specified in the relevant offshore tender. Where the generator has been selected through a competitive tender process, RTE will bear the connection costs corresponding to the specifications set out in the tender, and the generator will bear the costs of any changes specifically requested. Following a competitive tender, where RTE bears the connection costs, RTE is then required to compensate the generator for delays or any total or partial failure of the transmission system. The amount of such compensation due to the generator is capped at 90% of the generator's loss.

3.1.3. Netherlands

In the Netherlands, the transmission system operator (TenneT) is responsible for the development and operation of the offshore grid.

For each offshore wind tender, TenneT has responsibility for construction of the offshore platform and transmission cables up to a guaranteed capacity level. The Dutch government establishes a central development framework, planning offshore grid design and construction, describing its functional and technical requirements, and also establishing the sequence and timetable of development. TenneT is required to set its investment plan and timetable based on this development framework.

Each OWF generator is required to enter into both a realisation agreement and a connection and transmission agreement with TenneT. The realisation agreement, amongst other things, sets out the key terms and conditions for the development of the connection to the OWF. Under this agreement, TenneT is required to deliver the connection on or before the date set in the development framework. After the

connection is built and delivered, the ongoing relationship of the parties is governed by the connection and transmission agreement.

The Electricity Act 1998 and the Ministerial Order Offshore Electricity Grid Compensation Rules set out the liability regime applicable to TenneT in case of a delay in the completion of the offshore grid or the unavailability of the offshore grid. Pursuant to this liability regime, the OWF may be compensated for delayed revenues and consequential damages.

3.1.4. Denmark

There are two procedures for grid connection for OWFs in Denmark. Under the open-door procedure, OWF generators will construct and then operate the transmission links for their wind farms up to the onshore grid connection point. The construction of this system up to the grid connection point is at the OWF generator's own cost.

The second procedure is the state-run tender procedure, under which the grid connection point will be located offshore. In this procedure, OWF generators will construct and operate their system only up to the offshore grid connection point, while Energinet, the TSO, will then be responsible for construction and operation of the remaining connection. Under this procedure, the tender specifications will set out the detailed interfaces and obligations of each party, and will also set out compensation rights.

Under the tender procedure, if the OWF generator fails to construct and connect the wind farm to the grid in accordance with the tender specifications, the generator can be held liable for Energinet's losses flowing from such failure. In turn, Energinet will likewise be liable to the generator if it fails to meet the deadline for grid connection set out in the tender specifications.

Furthermore, if there are defects in the transmission connection works, for generators connected under the tender procedure, Energinet is required to compensate the generator for losses incurred due to transmission reduction. The right for such compensation applies for 25 years from the date on which the wind farm received its licence and had at least one turbine in operation.

3.1.5. Summary

As the preceding sections show, a number of developed electricity transmission markets in the EU provide for a comprehensive compensation regime in respect of losses incurred by the OWF generator as a result of delays in the construction of offshore transmission assets, or their subsequent damage. While varying amounts of compensation are available in respect of such delays, the common theme is that it is common for a transmission entity (often owned, at least in part, by the state) to plan and develop the offshore transmission system and connections, and then also bear responsibility for late delivery. What is less clear is the degree to which the damages provided to the OWF generator are solely borne by the transmission entity, or if they are able to recover all or part of these from consumers through their regulated business arrangements.

3.2. GB Onshore Transmission

3.2.1. Delay incentives on monopoly TOs in GB

Under current rules for connection to the GB electricity transmission system, very limited delay liquidated damages are payable by the TO (via the ESO) to a connecting party for delays to connection. In practice, while there is scope for such damages to be applied (on a case-by-case basis), a premium is then added to the cost of the connection, such that this is only available where the customer has elected to pay the relevant premium to mitigate this risk. These damages are also only applied to the cost of the connecting assets being constructed by the TO which tends to be very small or sometimes zero. On the other hand, the connecting party is also exposed to delays to the wider works being constructed by the TO. Liquidated damages would not normally be sufficient to cover the connecting party's losses as a result of the delay. However, once all consents have been obtained, onshore transmission construction is only subject to a relatively low level of construction delay risk outside of the TO's control, and the track record of delivering connections on time is therefore very good. Connecting parties, and their funders, therefore rely on this track record and the scheduling of the connection some time ahead of need.

3.2.2. Proposals for delay incentives on Competitively Appointed TOs (CATOs) in GB

Whilst the CATO regime in GB has yet to be implemented, the Late Model being developed by Ofgem assumed 'Payment on completion' (CATO revenue stream starts once construction is complete) but no further incentives.

The Early Model being developed by the ESO assumes no penalties but provides for a shorter revenue stream (ie the same end date) thereby reducing returns for equity. Clearly the impact of this will depend on the base term of the revenue period which is supposed to match the need for the asset and could vary from circa 10 years to up to 40 years.

3.3. Global Onshore Transmission

Aside from the UK, competition in electricity transmission is well established in Brazil and India and there is significant experience developing in other Latin American countries (Colombia, Chile, Peru, Uruguay), North America (both USA and Canada) and in Australia. Whilst competition, per se, is not the defining common factor across the 5 alternative models under consideration by Ofgem and BEIS, these jurisdictions provide some visibility into the commercial implications of being selected to build, own and operate transmission in these areas (although we note that having a competitive element as part of this process does not guarantee the function of the transmission system as a whole).

Reviews of these processes show that any delay damages associated with these transmission projects are designed with suitably incentivising the delivery of the transmission project in mind, and not on providing compensation to those customers seeking to make use of the assets once operational. Typically competitively appointed transmission companies are exposed to delay liquidated damages in the region of 5-10% of the transmission project capex, although with the risk of contract termination should the cap be reached, say after 12 months' delay.

3.4. Comparable model in other sectors

Mechanisms to manage delay and interface risks are found across projects in all sectors; from simple construction to the development of complex cross-border projects, there are common elements to manage and mitigate the same underlying risks. In considering parallels with offshore wind coordination, we look in particular at the interfaces of complex projects where additional project management and structuring is required to mitigate against "project-on-project" risk compounding these issues.

3.4.1. Risk for whole project delivery

Large-scale onshore power projects are typically structured with an EPC contractor delivering under a lump-sum "turnkey" solution, delivering a complete facility performing to the specified level, for a guaranteed price, by a guaranteed date and in return the EPC contractor takes most of the project risks. It is therefore natural that the EPC contractor seeks to pass a number of these down through their supply chains; but sub-dividing responsibilities down to too small a level can introduce interfacing delays in latter stages of a project.[2] While single EPC contracts are less common in offshore transmission (due to the increasingly large scale of the projects involved, and inability of any one contractor to accept risk for delivery of the whole), an analogy can be drawn between EPC contractors and an entity managing delivery (such as an OFTO) for offshore connections. Such an entity will want to ensure that it can set suitable boundaries on what it is controlling, and conversely will only accept risks it can itself manage. Whether this requires delivery risk being pushed down to sub-contractors or externalised into alternative forms of revenue protection (depending on the level of risk it is being asked to accept), is a matter that will link to the delivery model chosen.

Large scale oil and gas projects are usually of such a critical nature to the project owner that control is rarely relinquished to a third-party contractor. In such cases, this often does not match the underlying contract terms, where the contractor does in fact take on delivery risk for the project. For complex projects such as these, the route to successful delivery will be setting clear boundaries on project design, and allowing for sufficient flexibility in the management of the asset delivery. If the entity responsible for delivery is prevented from managing the project activities, then it cannot also be expected to take on full responsibility and risk for the underlying project delivery.

3.4.2. Incentivising delivery and penalising delay

We may also consider common methods of incentivising delivery and penalising delay in various types of contracting models, as elements which might be incorporated into an overall delivery model in order to minimise delay and interface risk between different delivering entities.

Where delays are experienced during a contractor's performance of works, rights to extend contract deadlines are often limited, and a contractor may be exposed to liquidated damages in the event of late completion. To apply this to the delivery models, we might consider whether an element of the delivering entity's revenue should be contingent on on-time delivery of the offshore connection, and whether this mechanism would provide sufficient protection on a stand-alone basis, or should be combined with liquidated damages for delay. In either case, suitable protection would need to be permitted for contingent events, and delays by third parties would need to allow for concurrent extension to milestones for transmission delivery. Simple construction or "project management" delays not due to the other licensees or government entities involved with the project might see a portion of the ultimate revenue stream at risk.

Conversely, to mitigate against external delays (these vary from project to project, but from a contractor's perspective may be focused on not obtaining relevant access rights at the scheduled time, being required to work under restricted access conditions, or being required to undertake additional and unforeseen work) contractors may request the ability to claim escalation of fees if they are subject to external or excusable delays, or seek to set a "sunset date" set, after which a contractor has an ability to renegotiate its bid price. Once again applying this analogy to the delivery models, beyond an extension of time mechanism as described above, it may be relevant to consider allowing the delivery entity to claim for additional revenue where the delivery entity is exposed to delays from other licensees or government entities which fundamentally risk project commencement.

A further option to consider from wider mechanisms of project management is the management of delay through staged acceptance of completion prior to total completion, and subsequent delivery of punch list items. For the purposes of designing a successful delivery model, this could be reflected in sectional completion releasing staged elements of revenue, with the completion of additional sections or connections to the system triggering milestones for additional revenue rights, maintaining the incentives on the delivery entity to complete all elements of the work.

2. Construction delays in the power and energy sector. Const. L.J. 2021, 37(5), 292-298

Section 3 Summary: Project Delay Risk

The penalties for delays to on-time delivery of onshore electricity transmission projects are typically designed to provide incentives to transmission project developers, and not to provide compensation to users that may be affected by any delays or for increased system costs as a result of delays.

If the developers of transmission assets are required to compensate users for their losses (or 90% of them as in the case of German and French offshore wind farms) then these penalties would have to increase significantly. If such penalties were not (at least partially) borne by wider users, they would significantly increase the risks transmission developers are exposed to, increasing costs and potentially making electricity transmission projects uninvestable.

As the preceding sections demonstrate, this is recognised in other offshore electricity transmission markets in Europe, and parallels can also be drawn with comparable large-scale energy projects. As such, in order to incentivise uptake of alternatives to the Generator Build Model, a comprehensive framework is necessary to mitigate the impact of the project delay risks associated with the generator relinquishing control over the construction of offshore transmission assets to a third-party transmission company, the OFTO.

4. The Delay Damages Shortfall

As set out in the preceding sections, OWF generators will be concerned that they may not be adequately compensated for lost revenue due to delay in the construction of offshore transmission works being delivered by a third party under any of the Ofgem delivery models 1 to 5. This section provides a simplistic worked example to illustrate the issue and put into context the scale of the potential gap between the compensation an OWF generator may require (to meet its funding requirements) and that which may be available solely from the relevant transmission development company and its contractors (ie without passing through compensation costs to wider transmission system users).

We consider a very simple scenario whereby transmission is to be delivered by an OFTO to connect an offshore wind farm, and the capital cost of the transmission element (£1bn) is a third of the capital cost of the offshore wind farm (£3bn). We assume that offshore wind farm revenue expectations are approximately 10% pa of capex, and so £300m pa, and that avoided costs in the event of a delay are 10% of revenues.

Given the nature of offshore construction works, it is credible that delays of 12 months or longer could occur. Table 1 shows the compensation required in order to keep the OWF whole due to various lengths of delay in the construction of offshore transmission works, both in £m and as a % of the transmission works capex.

Transmission x Delay	OWF revenue loss	Compensation to 'keep OWF whole'	
	£m	£m	As % of Transmission Capex
4 months	100	90	9.0%
6 months	150	135	13.5%
12 months	300	270	27.0%
18 months	450	415	41.5%

Table 1: Delay Damages Worked example

In theory the OFTO could be made wholly liable for the delays under its control. If the OFTO were exposed to the full cost of the delay, on the example above it would add 27% or more to its contingent funding requirement during construction. This appears to be a much higher level of exposure than is typically required in order to incentivise an OFTO to deliver on time, and a higher level of exposure than we have seen traditional transmission companies willing to accept. Asking an OFTO to accept this level of risk would increase the costs of transmission, and such costs would be ultimately borne by consumers.

Similarly, in theory the compensation afforded to the OWF generator could be below the 'keep OWF whole' level, leaving the OWF generator exposed to delays outside of its control. This would impact on the financial structure of the OWF generator, again increasing its costs, ultimately paid for by the consumer.

The increased damages on the OFTO and the reduced compensation is simplistically illustrated in Figure 2 below:

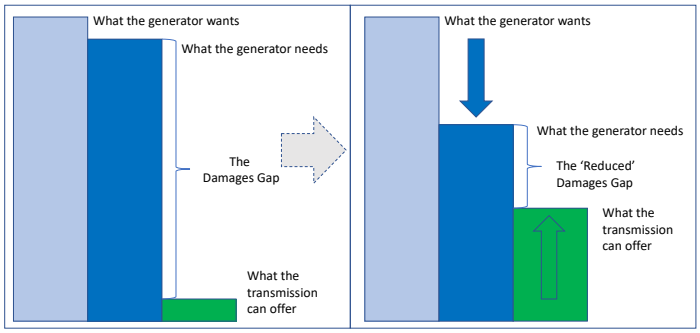

Figure 2: The Damages Gap

Offshore generation and competitively tendered transmission businesses have been continuously optimised to deliver the lowest cost of lifetime performance which in one form or other is passed to consumers in due course (for example, through the CfD or OFTO regime, etc).

Significant shifts away from this optimised financial structure to reduce the damages gap would certainly increase costs to consumers; however if part of the delay risk was passed to consumers, in order to maintain the financial structures of the generation and transmission projects, this would only mean a risk of increased cost to the consumer, rather than a certainty of such increase.

Consequently, the consumer may be asked to take some of this risk. In such case, appropriate incentives would need to be retained for the OFTO to deliver on time, OWF generation and transmission costs would be kept as low as possible, and consumers would only be taking on risks that they could more efficiently bear.

A study to better appreciate the balance between OWF and transmission project financing structures, and consumer exposure would be beneficial in informing policy in this area.

5. Conclusion

The UK government recognises a coordinated and shared transmission infrastructure for OWF as a critical part of the journey to achieving net zero, but there are challenges to this vision. The business-as-usual delivery model is not achieving coordinated delivery of transmission infrastructure. There are conflict of interest issues associated with generator delivery of shared transmission for multiple generators and therefore an OFTO would be needed. However in order to shift delivery models away from the Generator Build concept, the issues of project-on-project delay risk, and the scale of funding gap in mitigating that delay risk will need to be addressed.

In other jurisdictions, we see that the common route to bridging this risk is for transmission entities (backed by government) to fill the gap, with consumers socialising the risks associated with construction delays. This risk can be addressed in a variety of ways, and there are many creative solutions possible. The critical element for the industry, with the support of Ofgem, will be to find an acceptable means of managing the project-on-project risk for both OWF generators and transmission developers, placing an appropriate balance of risk and reward on each side, and finding the most efficient and consumer cost effective means of closing the damages gap between these parties, such that the development of these vital clean energy projects remains financeable.

Appendices

OWF Project Finance

- OWF projects typically involve financing for a discrete asset which is owned by the borrowing entity, typically a special purpose vehicle (SPV). This establishes a set of limited and definable risks for lenders.
- Wind projects are generally single-asset projects with a certain amount of redundancy built into project design so as to facilitate de-risking for lenders.
- In order to sufficiently enable de-risking for the lenders, the borrower itself must be sufficiently de-risked, with the maximum risk possible taken by the contractor(s), and minimum residual risk taken by the SPV. The passing of risk to the contractor(s) requires the developer to strike a delicate balance between contract pricing and retaining project management responsibility with respect to delivery and interface risk.
- The lenders will require security over both the physical project assets and the cashflows associated with the project. Accordingly, they will expect to be fully paid out in most default scenarios.
- Long term revenue certainty may be provided through a Contract for Difference, with the Low Carbon Contract Company serving as a credit worthy counterparty
- A reliable route to market is required. This requires both the physical transmission assets and the monetisation of the electricity produced by the generation assets. As such, the Generator Build model ensures that the OWF generator has full control over the delivery of the transmission assets and therefore the monetisation of the generation assets.

OFTO Project Finance

For the project financing of OFTO assets, many of the OWF Project Financing elements are similarly critical.

- As for OWF projects, the financing for OFTO projects is typically provided for a discrete asset, which is owned by the borrowing entity, typically an SPV. Once more, this establishes a set of limited and definable risks for lenders.
- At present, OFTO project financing occurs at the point when the transmission assets are sold by the developer and transferred to an OFTO, so there is a high degree of certainty regarding the construction works, which are typically complete by the time of the transfer. Along with a suitable package of construction warranties from the contractors, this greatly facilitates de-risking.
- Naturally, the lenders still require a security package. Although security cannot be granted over the transmission assets without approval from Ofgem due to licence condition restrictions, it can still be granted over the shares, contractual rights, and cashflows of the SPV. Through enforcement of the security, the lenders again expect to be fully paid out in most default scenarios.
- Like OWF projects, OFTO projects require a reliable route to market. However, the revenue stream in respect of transmission assets is dependent on the availability of the transmission assets rather than demand for service from the OWF, with protection built into the revenue stream for exceptional events and regulatory/governmental policy changes. This is granted for the term of the licence, which provides a stable cashflow to enable debt servicing, and allows for debt optimisation. National Grid Electricity System Operator (NGESO) is a credit-worthy counterparty which again supports project financing.

OFTO v OWF Project Finance

OFTO projects, unlike OWF projects, have a more reliable route to market. This is largely because their revenue stream is not contingent on demand from the OWF generator, there is an annual floor to the revenue stream in nearly all circumstances, and because the government guarantees revenue lost for lack of availability which is outside the control of the OFTO. By contrast, OWF generators are entirely dependent on the completion and availability of offshore transmission assets to service their debt. There is therefore little incentive for an OWF generator to take on the risks associated with leaving completion and availability of the assets to a third party.

Contacts

Herbert Smith Freehills

At Herbert Smith Freehills we understand the energy sector because it has been at the heart of our business since the early 1970's. We have advised global corporations, governments, independents, national energy companies and energy services companies across every stage of the energy value chain.

As we have grown so has our reach and we now advise clients across the globe, in Europe, Africa, the Middle East, the Americas, Russia, South East Asia and Australia.

Our energy team is fully integrated across both non-contentious and contentious matters. This combined with our scale and reach mean that we are one of the few global law firms that can offer a true one-stop-shop for energy clients. Assisting and advising at every stage of a projects life cycle.

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Transmission Investment

Transmission Investment is a leading independent transmission business in the UK. We provide specialist services to investors in high voltage electricity assets covering technical and commercial assurance, and development, construction and operations management.

Although we cover all forms of electricity transmission and distribution, we are particularly active in the transmission of offshore renewable energy and the development of international electricity interconnectors.

Working with investor partners, we develop, procure, construct, own and operate transmission assets. In particular, we work through our joint venture company Transmission Capital Partners to acquire and manage offshore wind farm connections under the UK's Offshore Transmission Owner (OFTO) regime.

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