

Operation of Dynamic Reactive Compensation Equipment (DRCE) in the NETS and TNUoS Charges

Proposal to refine the allocation of DRCE costs at OFTO transfer

DATE: 08 June 2023



Reactive Compensation Compliance

- ❖ Reactive power is crucial for ensuring voltage levels remain within acceptable limits and is required for the reliable and efficient operation of the National Electricity Transmission System (NETS)
- ❖ The Grid Code sets out the mandatory reactive compensation requirements for offshore generators and offshore transmission owners (OFTO) :

CC.6.3.2(e)(i) – Offshore generator requirement:

- Radially connected offshore windfarms are required to **maintain zero reactive transfer at the Offshore Grid Entry Point**
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- Generators typically use the reactive capability of the WTGs to compensate for the inductance of the inter-array cables and achieve zero reactive transfer at the offshore grid entry point. Shunt reactors/switched reactors are used to compensate for the offshore export cables.

CC.6.3.2 (c) – OFTO requirement:

- The OFTO is required to **maintain 0.95 power factor lagging and 0.95 power factor leading at the Onshore Interface Point**
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- This is achieved via the installation of Dynamic Reactive Compensation Equipment (DRCE)¹. The absorption or delivery of reactive power from the DRCE is continuously adjusted to meet the requirement for reactive power flow

- ❖ The requirement for reactive compensation is placed on the OFTO and not the wind farm because it is not efficient to comply with the normal generator dynamic reactive compensation requirements offshore due to the long Offshore Export Cable (OEC) lengths
- ❖ In a generator build OFTO exercise (all OFTO transfers to date), the generator bears the cost to comply with both reactive compensation requirements by installing shunt reactors offshore and the DRCE onshore

1. Plant and Apparatus capable of injecting or absorbing Reactive Power in a controlled manner which includes but is not limited to Synchronous Compensators, Static Var Compensators (SVC), or STATCOM devices.

OFTO Transfer and TNUoS charges

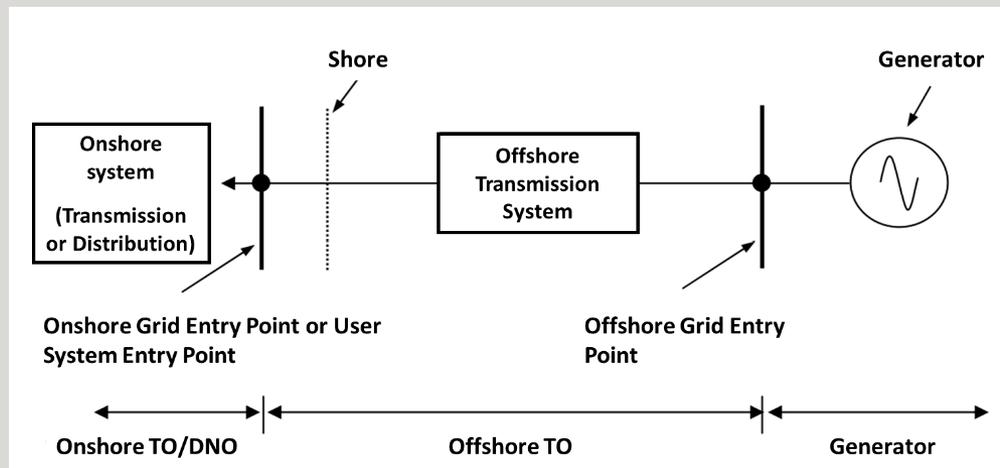
- ❖ After the OFTO transaction, the DRCE is transferred to the OFTO and paid via the Final Transfer Value (FTV), which forms the basis for the Tender Revenue Stream (TRS)
- ❖ NGESO uses the TRS, including the cost of DRCE, to calculate the TNUoS offshore local circuit tariff paid by the generator to the OFTO for the lifetime of the asset
- ❖ The cost of the DRCE falls into the local circuit tariff, and is ultimately born by the generator after OFTO transfer
- ❖ The cost allocation of DRCEs is neither codified nor specifically mentioned in the CUSC document, and implementation of costs is an interpretation applied by NGESO

Cost allocation	Tariff	Asset/Cost category
Offshore Generator	Circuit Tariff	Cable
		Cable Assets
		Reactive Equipment
		Harmonic Filtering Equipment
		HVDC Converter Station
	Substation Tariff	Transformer Assets
Switchgear Assets		
Platform		
		Auxiliary Supply Equipment
Socialised	Onshore tariff	Onshore Substation



Defect

- ❖ After the OFTO transaction, an offshore wind farm's point of connection (POC) is offshore, and the DRCE is not used for compliance at this POC
- ❖ Consequently, the generator pays, via the TNUoS offshore local circuit tariff, for an asset located within the onshore transmission system that is used for OFTO reactive compensation compliance rather than wind farm compliance
- ❖ The DRCEs is not used for offshore export cable compensation. Therefore, while it is intuitive that the shunt reactor costs fall into the local circuit tariff, it should not follow that DRCEs treated in the same way
- ❖ The DRCE provides valuable reactive compensation services to the grid and wider users. However, under current arrangement generators bears 100% of the costs whilst the value of this benefit does not flow back to the generator



Proposed solution

Cost allocation	Tariff	Asset/Cost category
Offshore Generator	Circuit Tariff	Cable
		Cable Assets
		Reactive Equipment
		Harmonic Filtering Equipment
		HVDC Converter Station
	Substation Tariff	Transformer Assets
		Switchgear Assets
Platform		
	Auxillary Supply Equipment	
Socialised	Onshore tariff	Onshore Substation

- ❖ The status quo fails to meet the CUSC charging objective (b) of charges accurately reflecting the costs incurred by transmission licensees
- ❖ This highlights the necessity for a fairer approach that is more consistent with CUSC objectives
- ❖ The proposal is to amend the calculation of TNUoS by allocating the cost of DRCE to the socialised onshore tariff

Terms of Reference

Workgroup Term of Reference	Initial assessment
a) Consider EBR implications;	EBR was reviewed and no interactions were found
b) Consider any cross code impacts and interactions, specifically with the STC, Grid Code and CM085;	Confirmed no interaction with CM 085 Chair as this mod does not consider allocation of costs
c) Confirm whether the change is proposed to be retrospective or to apply only to future plant;	Only applies to future plants
d) Consider whether changes are required to Section 11 via a separate modification;	Section 11 – Interpretations and Definitions. Potentially required to address classification of 4 set ups (G)
e) Consider the extent to which the revenue recovery requirements need to be codified to provide clarity for parties;	To consider codification in 4.1.2 in Section 4 of the CUSC
f) If SVC asset costs are socialised, or alternatively if they are not socialised, consider whether parties who bear the costs of those assets as a consequence should also receive Balancing Services revenue for the associated reactive provision.	Our proposal refers to the set up whereby the OFTO controls onshore volts and wind turbines compensate for the cable. In these instances, and within our proposal, the SVC will continue to be transferred to the OFTO. OFTO's ability to recover mandatory reactive power service costs is not codified. Discussions with a TO confirmed that they are unable to recover this cost, but WG discussion is required to confirm this dynamic.
g) Consider the impact of the change on the different OFTO set-ups and if this change is likely to impact future design set-ups;	<p>a) OFTO controls onshore volts, wind turbines compensate for the cable (the situation we are addressing, which is the majority of offshore wind farms to date, and it will be the large majority of wind farms that will be deployed, as the SVC installation is required when farther from shore)</p> <p>b) OFTO controls onshore volts and compensates for cable, wind turbine does nothing (In this case it's the OFTO that would be receiving compensation, to be confirmed)</p> <p>c) wind turbine does everything (Very rare as only available in configurations with very short cable lengths. In this case there is no SVC (or the SVC is not transferred to the OFTO? Point TBC) but the generator is remunerated for the provision of reactive power)</p> <p>d) OFTO and wind turbines together control onshore volts (In this case if the SVC is required and is transferred then this falls into CMP418)</p>
h) Consider aligning the definitions used with the Grid Code;	Will be aligned
i) Consider the impact on other Dynamic Reactive Compensation Equipment.	To be discussed