

Blake Clough

CONSULTING

Project Title: Annex 9: Consideration of consumer impact of DRCE Treatment as Generation Assets

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Calculation of Potential Reactive Power Payments for Dynamic Reactive Compensation Equipment in Offshore Wind

This Annex considers the consumer impact of enabling offshore wind farms to retain the Dynamic Reactive Compensation Equipment (DRCE)¹ they install rather than transferring these assets to the OFTO at OFTO transaction. While this is not the solution proposed within CMP 418, this analysis aids in evaluating how permitting offshore wind farms to receive equivalent treatment to onshore wind farms, allowing them to retain their DRCE, and receiving reimbursement for reactive power services from the associated DRCE, impacts consumers. A review of National Grid Electricity System Operator's (NGESO's) market information is provided in Blake Clough's main report and this Annex considers:

- Reactive power requirement trends.
- Reactive power provision by onshore wind farms
- Potential payments for Obligatory Reactive Power Service (ORPS) due to offshore windfarms in the future, accounting for offshore wind deployment estimates.
- A comparison of impact on Wider TNUoS tariff arising from (i) CMP 418 Workgroup solution (as set out in Blake Clough main report) and (ii) a situation where offshore wind farms are allowed to keep the DRCE and are remunerated for Obligatory Reactive Power Service (ORPS) (funded by Balancing Services)

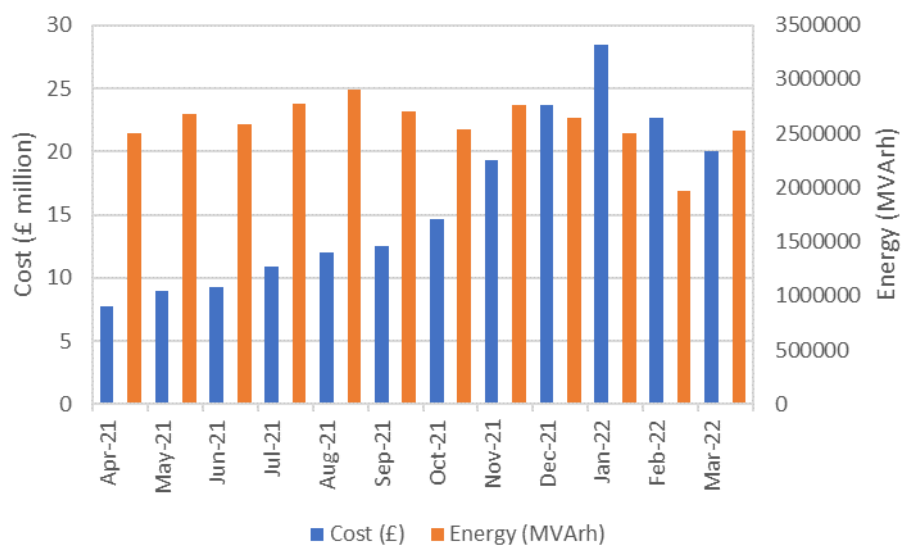


Figure 1: Monthly cost and amount of reactive energy provision for the 2021–2022 financial year. Adapted from Monthly Balancing Services Summary report for March 2022²

Under the Electricity Ten Year Statement (ETYS) scenario for 2025, the total reactive power capabilities of different technologies varied as shown in Figure 2. According to the report by NGESO, wind power (onshore plus offshore³) currently provides and is expected to provide significant MVar capability to the power grid at 10.00% ($\pm 0.27\%$) of the total in 2025.

¹ Specifically, DRCE refers to 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.

² Monthly Balancing Services Summary (MBSS), 2018–2023

³ The NGESO report considers reactive provision from offshore wind farms as if the DRCE was not transferred to the OFTO

Example – 2025, all providers MVAR injection capability (accessible today + additional capability from known assets)

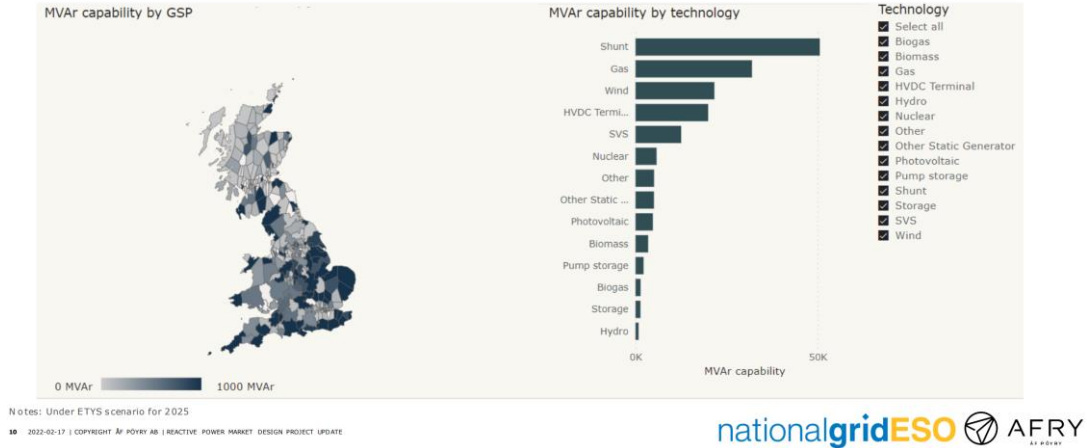


Figure 2: Future of Reactive Power Project Commercial and Technical Conclusions Workshop⁴

Considering wind (onshore and offshore) is expected to contribute around 10.00% ($\pm 0.27\%$) of MVAR capability in 2025, we can assume that wind *would* receive 10% of total reactive power payments if DRCE was considered as offshore wind generation assets. If we use the most recent financial year value of £369.02m, 10% of this would be £36.90m $RP_{tot,wind}$ paid to wind annually. The total installed wind capacity $E_{tot,wind}$ at the end of 2022 was 28,760MW⁵. The average reactive payment per MW per annum (RP_{MW}) for wind would then be:

$$RP_{MW,wind} (£/MW) = \frac{RP_{tot,wind} (£)}{E_{tot,wind} (MW)} = £1,283.03/MW \text{ p. a.}$$

The reactive power service payments are funded through the Balancing Service Use of System (BSUoS) charges⁶. However, there are not currently reactive power payments for DRCE associated with offshore wind. If all DRCE were owned by offshore wind, this would be the case. As per Blake Clough's main report, it is necessary to add approximately 24.5GW of offshore wind to meet the government's targets of 40GW of offshore wind capacity by 2030. The total annual payment required for 24.5GW of offshore wind would therefore be:

$$RP_{tot,wind} (£) = 24,500MW \times £1,283.03/MW = £31.4m$$

As per Blake Clough's main report, at a 7.5% discount rate commonly used for offshore wind, the 24.5GW generation translates to £105.3m needed to be recovered by offshore wind per annum for Static Var Compensators (SVCs)^{7,8}. Offshore wind would receive £31.4m of this investment back through reactive power payments which would be charged directly to consumers through the BSUoS charges⁹. The remaining £73.9m annual cost to be recovered would be charged indirectly to the consumer via higher Contract for Difference (CfD) prices. It should be noted that the actual payment received per MW for each offshore wind farm would vary between each project.

⁴ Future of Reactive Power Project: Commercial and Technical Conclusions Workshop, 2022

⁵ Energy Trends 2023: Table 6.1. spreadsheet

⁶ [Balancing Services Use of System \(BSUoS\) charges | ESO \(nationalgrideso.com\)](https://www.nationalgrideso.com/balancing-services-use-of-system-bsuos-charges)

⁷ SVCs are referred to here; however, the more expensive STATCOMs are sometimes used. Using other forms of DRCE, which are invariably more expensive, would not change the conclusions and would simply increase the costs of each proposed solution proportionally.

⁸ [Integration of Wind Systems with SVC and STATCOM during Various Events to Achieve FRT Capability and Voltage Stability: Towards the Reliability of Modern Power Systems \(hindawi.com\)](https://www.hindawi.com/integration-of-wind-systems-with-svc-and-statcom-during-various-events-to-achieve-frt-capability-and-voltage-stability-towards-the-reliability-of-modern-power-systems)

⁹ [BSUoS Charging Reform | Talk Power \(edfenergy.com\)](https://www.edfenergy.com/bsuos-charging-reform)

At 28.2 million households in the UK¹⁰, the additional £31.4m BSUoS charge would increase the average household annual electricity bill attributable to BSUoS by £1.11.

Summary of Findings

In this annex, we consider the treatment of DRCE as generation assets. Currently reactive power payments are not received by offshore wind generators, so this analysis estimated the reactive power payments offshore wind farms would potentially receive if they owned the DRCE assets. Costs for SVCs were considered, though the analysis also applies to other forms of DRCE. The purpose was to show the potential financial impact on the consumer resulting from this change.

Using recent reactive power service payments in £m, the relative capability of wind (onshore and offshore), and the total installed wind capacity (onshore and offshore), the estimated reactive service payment was obtained as £1,283.03/MW/annum.

The £1,283.03/MW/annum value was multiplied by the additional 24.5GW offshore wind required by 2030 to meet government targets, resulting in an estimated £31.4m to be paid out annually from 2030 (before inflation adjustments).

By comparing the 4% rate of return required by National Grid to the 7.5% typically required by offshore wind farms, the difference in costs to the consumers were calculated. Practically, the more expensive options to consumers would be them paying the extra rate of return interest to funders/investors. The annual costs for the two considered options are below:

- Proposed socialisation of costs (CMP 418): £67.3m
- Treatment of DRCE as generation assets: £105.3m

The solution considered in this annex is ultimately the most expensive of the two options.

¹⁰ [Families and households in the UK - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk/families-and-households-in-the-uk)