



CBA for STC CM085

October 2023

3. Cost benefits to the end consumer

Ofgem send back letter:

3. The cost benefits to the end consumer because of the proposed modification.

- a. Amount of reactive power unlocked by the proposals that could be relied upon by NGENSO in discharging their operational obligations and relevant TOs in discharging their obligations under the SQSS.
 - i. £48m - £65m in investment savings for 2027, more in future years
 - ii. Reduced investment would free up space for new connections
- b. Cost that NGENSO would expect to incur to procure the reactive power that could otherwise be unlocked through this modification
 - i. Unquantifiable, however the Pennine Pathfinder contract could have reduced utilisation costs in the region by £20m in 2022/23
 - ii. East England region accruing ~£8m per quarter in utilisation and synchronisation costs
- c. Additional operation and maintenance costs that would be incurred by the OFTO in providing this service and any consequential impact on an OFTOs tender revenue stream
 - i. OFTOs have not provided this information

CBA focuses on resolving high voltages as they are mainly experienced during periods of low wind i.e. somewhat linked to the <20% rated MW output condition for this modification.

A. Volume of reactive power unlocked to meet obligations

Investment benefit

Currently, power system studies do not account for reactive power provision when wind output is <20%, as per STC requirements.

This means that often asset investment is identified, even though reactive capability exists but isn't accessible. Access to this reactive capability at <20% output would reduce the need for asset investment and save the consumer ~£8m per reactive asset.

Reducing the need for investment would also free up space for new connections.

Reactive demand is declining which is increasing the need to absorb reactive power, requiring new capability.

ETYS future capacity 2023/24 to 2031/32:

There are 26 OFTOs with additions to reactive compensation equipment in ETYS appendix B 2022.

2,540 MVar capacity has been declared so far across 3 windfarms.

A. Volume of reactive power unlocked to meet obligations

ETYS 2022/23 existing capacity

17,168 MVar absorption capacity

Barrow	Gwynt-Y-Mor	Rampion
Beatrice	Hornsea One	Robin Rigg E&W
Burbo Bank	Hornsea Two	Sheringham Shoal
Dudgeon	Humber Gateway	Thanet
East Anglia	Lincs	Triton Knoll
Seagreen	London Array	Walney 1&2
Galloper	Moray East	Walney Extension
Greater Gabbard	Ormonde	West of Duddon Sands
Gunfleet	Race Bank	Westermost Rough

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A. Volume of reactive power unlocked to meet obligations

We have completed power system studies, including the reactive capability from OFTOs which would be made available by this modification.

We did not use the reactive capacity included in ETYS as future OFTO reactive capacity is not included yet. Instead we have used the STC obligation which is linked to size of windfarm.

The obligation for reactive absorption is 0.33pu down to 50% rated MW.

From 50% to 20% rated MW, there is a linear reduction from 0.33pu to 0.12pu.

Table shows an example of reactive power obligation for a 100MW windfarm.

As reactive power is generally provided from separate assets to the wind turbines e.g. reactors and SVCs, we have completed two power system studies to assess the impact of accessing this reactive power capability.

1. Assuming 0.33pu can be provided at <50% and <20% rated MW.
2. Assuming 0.12pu can be provided at <20% rated MW.

MW output (%)	Reactive (pu)	Reactive (MVar)
100%	0.33	33
50%	0.33	33
20%	0.12	12
>0%	0.05	5

A. Volume of reactive power unlocked to meet obligations

We have looked at our 2027 network model as the baseline. This model considers the most credible onerous scenario on the system, which assumes 0MVAR from windfarms (onshore, offshore and OFTOs) due to low wind.

In 2027, there is 21GW of OFTO offshore wind (excludes 132kV connections). At 0.33pu per OFTO, this translates to ~6800MVAR of reactive power absorption.

This volume was made available in the system study and it reduced the residual requirement significantly. The table shows the impact of accessing this reactive power capability.

Reducing the residual requirement would remove the need for investment by the TOs in reactive compensation assets. The reduction in reactors is based on the reduction in residual requirement per region i.e. it is not based on the national total.

Scenario	Regions impacted	Reactor reduction
0.33pu	5	8
0.12pu	5	6

NGET costs for the Pennine Pathfinder were assessed to be £8.1m for a 200MVAR shunt reactor.

Cost Benefit to the consumer is therefore £48.6m - £64.8m in avoided investment costs

B. Expected ESO costs to procure reactive capability elsewhere

Pennine Pathfinder

In 2022 we ran a voltage pathfinder, reactive power tender, to gain access to 24/7 reactive absorption capability.

Dogger Bank C (DBC) was awarded a 10 year¹ contract to provide 200MVA_r.

This capacity must be available 24/7 and is offered independent of MW.

The assessed contract cost over 10 years was £11.9m.

DBC will have the effect of reducing reactive utilisation in the E_Corridor region by ~1/3.

Utilisation costs in E_Corridor in 2022/23 were ~£60m. Therefore we can assume that DBC would have reduced utilisation costs in the region by ~£20m.

Access to existing reactive capability in excess of STC requirements could have similar impacts in other areas of the network. Humber, East Midlands and East England would benefit from existing reactive capability and as new windfarms connect.

¹ the contract will not novate to the OFTO

B. Expected ESO costs to procure reactive capability elsewhere

East England

Reactive Power costs in the East England region have been high since Jan 2022 at ~£5m per quarter.

With some large windfarms connected/connecting at Walpole, Necton and Norwich Main, costs could be significantly reduced.

This region has also seen increased costs synchronising generation to access reactive power at ~£1m per month Jan 23- Aug 23. Some of this cost would be reduced.

C. Expected operation and maintenance costs

Not provided