

Taskforce conclusion from Sharing sub group

Background

1. Sharing at its simplest form looks across a boundary between two zones and using multiple loadflow representing all times of year establishes the cost and duration bids will be taken to manage flows.
2. Analysis showed that if there is a balanced (50/50 say) mix of carbon and low carbon behind a boundary bids are relatively low cost as carbon pays (avoided fuel cost) to reduce output. This sets the efficient build level for the boundary at significantly less than the sum of TEC in the zone.
3. In zones that have lots of low carbon bids are expensive (highly negative) as the marginal cost of reducing output is high and output tends to be highly correlated to physical factors. This sets the efficient build level closer to the sum of TEC in a zone.
4. The current sharing arrangements take account of the efficient build size and splits the boundary length into two elements shared and not shared.
5. The not shared element represents the minimum build size that is needed to accommodate low carbon element behind a boundary. The shared element represents the % of the boundary that can be shared with carbon plant. The higher the % of low carbon plant behind a boundary the lower sharing is possible.
6. Charging follows this with not shared being charged for at TEC¹ and shared at TEC x load factor recognising the strong relationship load factor has with efficient boundary size.
7. The TNUoS mode calculates the boundary size (km) between two zones and volume of carbon and lo-carbon behind the boundary. This sets the ratio of shared/not shared for the relevant zone.

Considerations

8. Fundamental approach to sharing.

- a. The task force was presented with technical analysis of the sharing approach using updated modelling at the 27th July 2023 by LCP/Frontier. This analysis concluded that

“From a conceptual perspective, the rationale for sharing still seems relevant under the current Year Round background, or any improved ‘Year Round’ background that intends to represent outcomes over a range of different scenarios that may. Therefore, while a discount remains appropriate in some circumstances, the sharing factors applied should only be considered as a representation of the concept and will not perfectly reflect the true extent of sharing.”

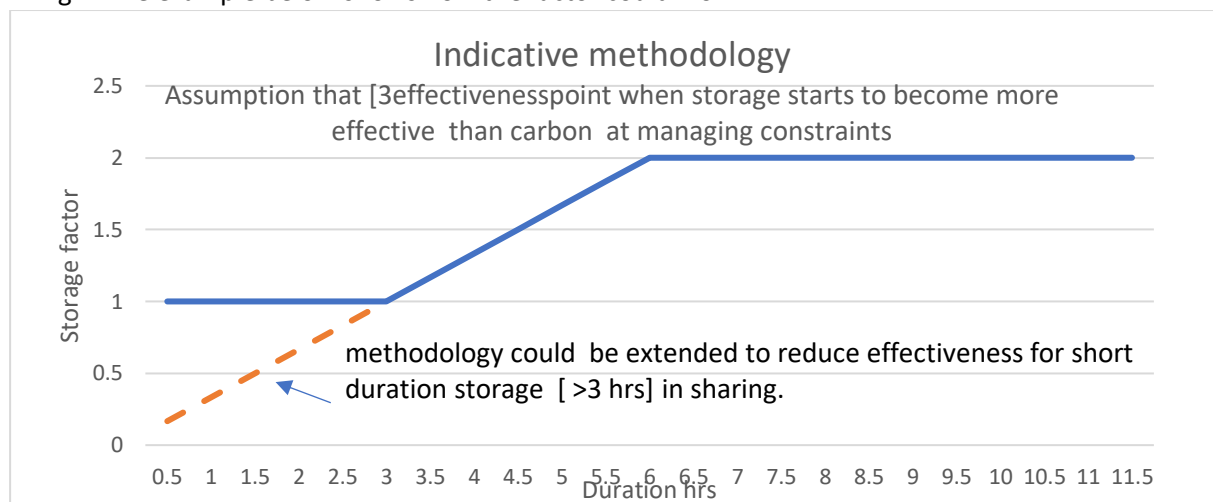
“One aspect where sharing may be currently less appropriate relates to storage. To the extent that storage can add to or draw on capacity (in addition to wind capacity), the sharing factors for low carbon generation may not currently be appropriate, such that an alternative approach to sharing that allows for this ‘double count’ of storage will be required”

¹ A subsequent change modified this so that carbon pays for this element based on load factor.

- b. Given this the presented analysis it was suggested a cross check should be made confirming the analysis had been based on CFD's and Market prices and BESS costs to establish/validate current approach and confirm this was included in the LCP modelling.

9. Storage

- Adding storage behind a boundary potentially changes the way that sharing could work by adding an additional element. Storage is currently classed as carbon historically its commercial characteristics are similar to those of carbon generators.
- Storage when operating as a demand sink has the ability to look similar to carbon with a bid price more attractive than those of low carbon generation ultimately they could approach the level of carbon bid prices in a zone.
- To incorporate storage in sharing one option that could be used would be to multiply storage TEC by a factor between 1 and 2². For very long duration storage (say > 6 hours) a factor of 2 could be used for short duration storage (>3 hours) a factor of 1 would be used.
- Analysis would need to be run to calibrate the storage multiplier a minimum level of 3 hours has been suggested for a factor of 1 rising to 2 based on (MEL+MIL)/MEL. The key parameter would be to establish the lower bound of the multiplier at [3hrs]. For a constant wind resource it is principally the change in demand behind the boundary (co-incident with the generation) in combination with the generation output that drive how effective storage can be.
- It would be useful for ESO to establish a proposal for the shape of the storage factor.
- Short duration storage is less useful in managing constraints and can potentially exacerbate them if the storage is "full" with no ability to discharge when the constraint is still active. The methodology could be extended to short duration storage where its effectiveness at offering bid prices to manage transmission issues diminishes.
- The example below shows how the factor could work.



10. Inter/cross zonal sharing

- The TNUoS model has an assumption that across all zones low carbon (principally wind) are active at the same time and drive constraints in the same way. The sharing methodology calculates the boundary size (km) between each zone and then splits

² The upper limitation would be based on the MEL/MIL ratio typical storage units have MEL and MIL the same and this drives a factor (MEL+MIL)/MEL of 2

this into shared and none shared based on the % of low carbon plant. The TEC of plant is used in this calculation.

- b. If it can be demonstrated that there is a high probability that output from low carbon plant is not co-incident in neighbouring zones/locations a reduced TEC could be used to represent lo-carbon [95% say] in the model. The effect of this would be to adjust the carbon/lo-carbon ratio with an increases in the % of the shared element being subject to load factor.
- c. The analysis would need to be based on the inter zonal corelation of wind to establish either one or many TEC reduction factors.

11. Non-firm Capacity and sharing

- a. Users who connect on a non-firm basis ahead of a full connection are included in the TEC that is used in the sharing calculation. As the cost to disconnect this type of plant will be small/zero it would not be appropriate to include these in the low-carbon TEC equation. Consideration should be give to removing this plant type from the sharing calculation.

Recommendations

1. Update transmit model to be based on CDF's and Market prices and BESS costs to establish/validate current approach and confirm this was included in the LCP modelling.
2. Establish shape of storage multiplier profile. This is complex and will need be done taking account of state of charge of storage in previous periods
3. Look at co-incidence of low carbon output and look to see if there is a minimum level of sharing in a zone [5% say] that recognises implicit sharing withing a zone of low carbon.
4. Work through the issue associated with non-firm connection and how they should be categorised in sharing.