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Distribution Network Options Assessment

Appendix B – Mitigating generation constraints using Flexibility Services

September 2024

Overview

The increase in generation connecting to the distribution network is creating a large number of constraints, some of which could potentially be mitigated through the use of flexibility services. While voltage constraints may not currently be manageable using flexibility, thermal generation constraints are able to be mitigated using demand turn up/generation turn down services (from a technical perspective). Allowing flexibility to be utilised to manage thermal generation constraints would significantly increase opportunities for the market, but there are a number of hurdles that need to be overcome to facilitate this.

The current flexibility analysis process is not set up to allow generation constraints to be assessed. Negative load values (i.e. export) cannot be input into the flexibility analysis tool. The tool could be updated to allow this; doing so would also require consideration of constraint management zones (CMZs) where the load profile crosses from net export to net import frequently.

There are many assets on the network that are constrained (or projected to be constrained) for both demand and generation. Where this is the case the current process treats these constraints as non-viable for flexibility. This is because reinforcement solutions add both demand and generation capacity, so deferring expenditure requires managing both the demand and generation constraints (so even if the demand constraint can be managed using flexibility, the generation constraint cannot in the current process).

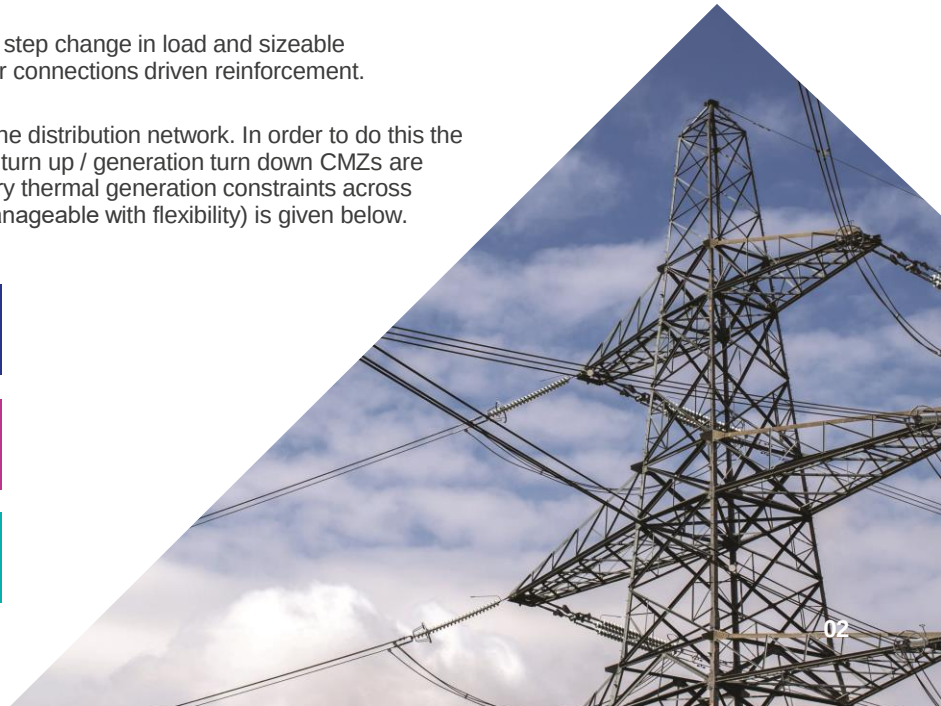
If flexibility were expanded to include thermal generation constraints, zones with both demand and generation constraints would need to be carefully assessed to ensure flexibility could be delivered to manage both constraints without risk of conflicts (as any flexibility used to reduce demand would exacerbate the generation constraint and vice versa if deployed at the wrong time). The use of flexibility in conjunction with Active Network Management (ANM) also needs to be looked into to ensure this is a viable option which can be employed without conflicts.

Generation constraints are predominantly driven by large new connections, which presents two issues. Firstly, a large step change in load and sizeable exceedances make flexibility less viable. Secondly, there is still some uncertainty in how flexibility can be used to defer connections driven reinforcement.

NGED are committed to expanding opportunities for the flexibility market wherever flexibility is capable of supporting the distribution network. In order to do this the flexibility analysis process is being developed to allow generation constraints to be properly assessed. Three demand turn up / generation turn down CMZs are being trialled to begin this process. These trial zones are discussed in more detail overleaf. The total number of primary thermal generation constraints across NGED's four licence areas identified as part of the Network Development Plan (many of which could potentially be manageable with flexibility) is given below.

Total number of primary thermal generation constraints	199

East Midlands	37	West Midlands	30
South Wales	24	South West	108



Trial Zones

Three trial zones are being opened to test the use of demand turn up / generation turn down in managing a number of existing generation constraints on the network. These zones will allow NGED to trial new processes to manage these different constraints and flexibility services.

Trial Zones

Moira Primary (East Midlands)

St Austell to Bugle Circuit (South West)

Checkerhouse to Tuxford Circuit (East Midlands)

Volumes and Prices

Table 1 – Availability and Utilisation volumes and ceiling prices for the three trial zones

Zone	Constraint type	Product	Peak Requirement (MW)	Half-hours per day	Utilisation Volumes (MWh)	Availability Volumes (MWh)	CEM Utilisation (£/MWh)	CEM Availability (£/MWh)
Moira Primary	33/11 kV transformer	Scheduled Availability, Operational Utilisation – Day Ahead	1	18	329	1643	149.3	2.49
St Austell to Bugle Circuit	33 kV circuit		0.5	8	73	365	125.8	2.10
Checkerhouse - Tuxford Circuit	33 kV circuit		0.8	11	161	803	241.6	4.03

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