Distributed Generation Hosting Capacity Methodology

The DG Hosting Capacity Method uses a straightforward, iterative approach that fits our current data quality, modelling, and system capabilities. We plan to continue to improve our approach in collaboration with the ENA Future Networks Forum.

We model extra generation on each part of the HV network, increasing it step-by-step until a network limit is reached. The maximum generation just before hitting the limit is the hosting capacity for that part. For 11kV feeders, we increase generation in 50kW steps.

The core of this method is an automated power flow engine that processes each part of the network, divided into over 62 HV (11kV) feeders.

For DG capacity modelling, we connect appropriate loads to the distribution transformers for HV feeder analysis. We used the 80th percentile load of the year while running the hosting capacity calculations which means the estimated hosting capacity should be available for 80% of the year.

Asset thermal constraints were set at 100% of the asset rating and customer low-voltage constraints were set to 1.06pu and 0.94pu. As well as thermal and voltage constraints, 11kV feeder capacity is limited by the capacity of upstream zone substations. Note that these capacities do not account for potential export congestion on upstream parts of the network (E.g. sub-transmission or grid level)

Hosting capacity shows how much future DG can be added with the existing network. It doesn't evaluate possible upgrades or their potential, which is done during the application process.

This analysis uses a steady-state three-phase model and doesn't cover complex issues like unbalance, protection, or dynamic response, which could further limit capacity.

The DG Hosting capacity assumes a fixed power factor and doesn't include voltage management through reactive power control or operational congestion management like runback control. These would need more detailed analysis during the feasibility assessment.

Batteries or energy storage systems are not modelled, as their output would likely help reduce, not increase, export congestion, allowing more DG Hosting capacity in that area.

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