

Distributed generation hosting capacity methodology

The DG Hosting Capacity uses a simple, high iteration approach appropriate to the current quality of data, modelling, and business/system capabilities. Further advancements in all these areas are planned, and in the future, we may adopt alternative approaches needed to produce statistical and/or time series capacity information.

Additional generation is modelled on every conductor of the HV network, systematically increasing generation until a network limit is violated. The additional generation just before the limit is reached becomes the maximum hosting capacity at that conductor. Generation is stepped up in 1MW increments for sub-transmission circuits and 50kW for 11kV feeders.

At its heart the methodology employs a scriptable automated power flow computation engine. This systematically ingests each network part, generally divided into each of the 600+ HV (11kV) feeders and then the ~20 discrete 33kV (sub-transmission) networks.

For DG capacity modelling it is necessary to model appropriate loads, these being connected to the distribution transformers for the HV feeder analysis, and to the zone substation feeder circuit breakers for the sub-transmission models. 40% of current maximum demand is modelled as a reasonable approximation of minimum daytime loading. Any existing generators (above a 100kW materiality threshold) are modelled at full nameplate output. New generators that are not yet commissioned are not modelled.

The 11kV feeder capacities are capped at the estimated capacity of the zone substations; and the sub-transmission circuit capacities are capped by the nominal grid exit substation capacities. Note, however, that the DG Hosting capacities do not reflect any potential export congestion there may be on the grid.

Hosting capacity is an indicator of the future DG that can be accommodated with only the existing network. It does not attempt to evaluate the plausible upgrade options or the potential this would provide. Such analysis is case specific and better carried out during the subsequent application process.

The analysis assumes a steady state three phase model, and therefore does not address the analytically complex issues of unbalance, protection, or dynamic response. It should be noted these could impose additional constraints on capacity.

The DG Hosting capacity assumes a fixed power factor, and hence does not model voltage management through reactive power control. Nor is operational congestion management such as runback control considered. This would require more detailed analysis, appropriate to consider in the feasibility assessment process itself.

Batteries or ESS systems, of which there is only one grid scale on our network to date, are not modelled, since ESS output would presumably occur at times and in a manner to mitigate, not exacerbate, export congestion, and hence only serve to enable more DG Hosting capacity in that location.