Generation scaling used by SQSS, CBA and FES for Demand Security and Economy

How SQSS scales generation

Demand Security Planned Transfer conditions (as reflected by Peak Security Background) scales generation to meet demand:

"Availability Factors"

> *C.3 In derivation of Security planned transfer conditions, the **registered capacities of power stations are scaled by availability factors**, known as AT, for classes T of power station. For the Security planned transfer condition, these factors are set as follows:*
>
> *C.3.1 For stations powered by wind, wave, or tides, AT = 0. This zero factor is set for the Security planned transfer condition so that there is confidence that there is sufficient transmission capacity to meet demand securely in the absence of this class of generation.*
>
> *C.3.2 For imports or exports from / to external systems, AT = 0.*
>
> *C.3.3 For all other power stations, AT = 1.0*

Straight Scaling Technique

- *C.6 In this technique, all power stations at the time of the ACS peak demand are considered contributory and **their output is calculated by applying a scaling factor to their registered capacity** proportional to an availability representative of the generating plant type at the time of ACS peak demand **such that their aggregate output is equal to the forecast ACS peak demand** minus total imports from external systems." (SQSS, emphasis added)*[1]

Economy Planned Transfer conditions (as reflected by Year Round Background) scales generation to meet demand:

"Directly Scaled Plant"

> *E.3 In the Economy planned transfer condition the registered capacities of certain classes of power station are scaled by fixed factors, known as DT, for classes T of power station. These factors are set as follows:*

[1] NETS SQSS

E.3.1 For nuclear stations, and for coal-fired and gas-fired stations fitted with Carbon Capture and Storage, DT = 0.85

E.3.2 For stations powered by wind, wave, or tides, DT = 0.70. E.3.3 For pumped storage based stations, DT = 0.5

E.3.4 For interconnectors to external systems regarded as importing into GB at the time of peak demand, DT = 1.0

E.4 The ISOP will review the appropriateness of these factors and revise them where necessary, based on alignment with cost benefit analysis. The period between reviews shall be no more than five years, but may be less if required. Variably Scaled Plant

E.5 All remaining power stations and on the system at the time of the ACS peak demand are considered contributory and ***their output is calculated by applying a scaling factor to their registered capacity such that their aggregate output is equal to the forecast ACS peak demand*** *minus the total output of directly scaled plant*." (SQSS, emphasis added)

How Network Options Assessment CBA scales generation to meet demand:

- *NOA is used to*: *"Recommend the most economic reinforcements, whether infrastructure build or alternatives, for investment over the coming years, to meet bulk power transfer requirements as outlined by the ETYS."*
- *"The model is set to simulate 365 days per year, 20 years into the future with an appropriate time resolution. The year in which an option is commissioned can be varied. The primary output from the tool for the cost-benefit analysis process is the annual transmission constraint forecast; there are further outputs that help the user identify which parts of the network require reinforcement." (NOA methodology)*
- *NOA demand and generation capacities taken from the NG ESO Future Energy Scenarios (FES)*

How FES scales generation to meet demand

References taken from NESO Future Energy Scenarios (FES) 2024[2].

"Demand reduction measures include energy efficiency improvements and changes in consumer behaviour. These have a tangible impact on net emissions, ***as less energy input is needed to meet the required energy demand****. Shifting demand away from peak times can also reduce emissions*

[2] NESO Future Energy Scenarios 2024: download

by avoiding additional high carbon generation. More information on this is in the Energy Consumer chapter (page 71)." (FES 2024, p38, emphasis added)

*"Generation capacity is expected to increase rapidly across all our pathways **to meet increased demand** from electrification of transport and heat. We expect a higher contribution from distributed generation in 2050." (FES 2024, p106, emphasis added)*

*"Recent capacity auction results, market and project intelligence and data from the distribution and transmission-connected capacity registers guide our short-term projections. We have adopted a capacity expansion model (CEM) for electricity and hydrogen supply beyond 2030. This seeks the lowest cost mix of transmission-connected generation and storage which meets the Sixth Carbon Budget and net zero emissions reduction targets. **The model balances estimated build rates alongside capital and operational costs of different technologies against their ability to meet electricity demand.** The aim of this is to minimise the total long-term cost of operating the system." (FES 2024, p106, emphasis added).*