Scottish & Southern Electricity Networks

Constraint Managed Zone (CMZ) Decision Making Criteria

January 2021

SSEN is an industry pioneer in DSO services, with the CMZ scheme implemented in Business As Usual (BAU) in 2016 to attempt to secure load injection or demand reduction services to offset the need for network reinforcement. Since its inception other DNOs have followed suit, developing their own versions of CMZ and now developing a wider array of service types. The wide uptake of CMZ style services is a response to a generic shift within UK DNOs towards the utilisation of flexibly connected and controllable Distributed Energy Resources (DER), the works undertaken through the ENA Open Networks Project and a commitment made on behalf of those DNOs by the Energy Networks Association (ENA) to the Department for Business, Energy and Industrial Strategy (BEIS) in 2018.

SSEN is committed to providing transparent, accessible service offerings across its licence areas and part of this commitment is to display our decision making criteria for the selection of CMZ services against traditional solutions. CMZ viability is a commercial calculation based on the total evaluated cost of CMZ service vs the cost of the traditional alternative, with the contributing cost elements changing across service types.

CMZ Sustain

The CMZ Sustain service calculation is currently a financial calculation which provides SSEN an NPV over a 4-5 year duration based on the deferment of the whole reinforcement cost specific to a scheme. The timescales are defined by the ongoing need of the network and maximum contract length of 5 years, the process of calculation is as follows;

- Determine the ΔNPV from the investment deferral. This is the difference in NPV between reinforcing the network when originally planned (say, two years from now) and reinforcing the network with a delay due to a CMZ service contract. The rate of return for the NPV calculation should be close to the regulated rate of return (c. 4%).

- Take the absolute value of the number determined in the previous step and subtract operating costs for SSEN, in the form of Flexible Solution operations. Since the operating costs may be variable depending on the technology, for instance Energy Storage vs. DSR, an assumption must be made for a typical representative value. If the number above (ABSOLUTE(ΔNPV) – operating cost) is negative, the CMZ solution is not viable from a commercial point of view. If the number is positive, this is the counterfactual value (CV) that will be used to determine the maximum prices to pay for the service and is used within decision making and approvals.

- The SSEN pricing structure chosen for the CMZ is availability payment plus utilisation payment. The availability payment is equal to Availability Price, AP (£/MW/day) * MW * days; and the utilisation payment is equal to Utilisation Price, UP (£/MWh) * MWh.

- The number of MW and hours for availability comes from the planning engineering analysis, and it is the width of the CMZ Service Window and the MW required to defer reinforcement.

- For utilisation, the engineering analysis tells us what the MWh requirements are for N-1 conditions with demand above firm capacity of the network. This number of MWh is actually reasonably low (because of the low probability of the event), therefore, the analysis should take a more realistic number including a number of tests (assume per year 6 utilisation events lasting an assumed amount of time, for instance half an hour).

- In order to determine the maximum SSEN Availability Price (AP) and Utilisation Price (UP) that can be paid, the following equation applies:

$$CV = AP * (MW*days) + UP * (MWh) \quad (I)$$

The equation above is a linear equation with two variables, with infinite combinations for solving.

- Historically SSEN has weighted CMZ payments within the Sustain service towards Availability (95%) which aligns against network risk avoidance and ensuring providers can benefit from a larger guaranteed income. This is under review based on outputs from the ENA Open Networks Project, flexibility service market evolution and stakeholder feedback. The existing process is to make around 95% of the payment to be availability payment:

  0.95 * CV = AP * (MW*days) (II)

- Solving the two equations (I) and (II) above provides a starting point for setting maximum AP and UP. As long as these are positive and considered competitive, the CMZ is passed for Assurance review and SSEN senior level approval before being progressed. Should any calculation generate a negative NPV or negative/low payment levels then the CMZ is not commercially viable and will not progress.

CMZ Secure, Restore, Dynamic

The CMZ Secure, Restore and Dynamic services calculation is currently a financial calculation which provides SSEN an NPV over an outage duration, calculated on a daily/MWh requirement basis. Using the current cost of securing Mobile Diesel Generation (MDG), the cost of transporting and running those units on a daily and per MWh basis SSEN calculate a 'price ceiling' for use in market testing. This price ceiling is then divided across the standard payment element for these services.

Availability can be general, where we know the required time periods ahead of time and form these as part of the contract, or targeted, where we identify the required time periods in response to a specific network condition post contract placement. We calculate availability as per below

For Secure, the Availability and Utilisation costs will be based on the total evaluated cost of the planned network outage, including any Customer Interruptions (CIs) or Customer Minutes Lost (CMLs) and any use of MDG. This will create a 'ceiling price' which will not be able to be shared with the bidders as SSEN will be looking for a competitive price from the bidder to compete with this ceiling price.

For Dynamic and Restore, the utilisation payment will be based on the current mobile diesel generation prices within the relevant CMZ area. Unfortunately, similar to the ceiling price, we will not be able to publish these values.

The Availability payment equation, seen below, determines the total the Availability payments made to the DER over the desired settlement period (which in most cases will be monthly), using the agreed contracted £/MW/day price and number of days the DER has been asked to be available for SSEN's CMZ.

- SSEN Availability Payment (AP_m) can be paid during the Period requested within the service notification instruction by SSEN to the CMZ Provider, which will be an amount calculated in accordance with the following formula:

$$AP_m = \left(\sum_{j \in Pp} A \times CM \times FO_j \times FU_j\right)$$

where:

$\sum_{j \in Pp}$	is the summation over all Settlement Periods j, in the set Period (P) of Settlement Periods (days) in the Availability Period "p";
AP_m	Availability Payment during period (p);
j	Settlement period j in the set period;
A	Contracted availability price;
CM	CMZ Capacity contracted OR requested service capacity, in MW;

FO_j	Binary factor, equal to zero if a declaration of unavailability;
FUj	Binary factor related to the delivery of contracted capacity during a CMZ Event and to the provision of complete data. If MW < 90% contracted capacity or Requested Capacity, FUj = 0, otherwise 1. Also, if less than 90% of the data is reported FUj = 0.

The Utilisation payment equation, seen below, determines the total Utilisation payments made to the DER over the desired settlement period (which in most cases will be monthly), using the agreed contracted £/MWh price and the provided energy for SSEN's CMZ.

SSEN Utilisation payments are usually linked directly to the amount of power provided or reduced in response to a specific instruction. For example, SSEN pays a generation device £150/MWh for exporting power, or a demand response service for dropping the equivalent power when we suffer an outage on our network.

A Utilisation Payment (UP_m) can be paid post Event by SSEN to the CMZ Provider which will be an amount calculated in accordance with the following formula:

$$UP_m = \sum_{j \in Pp} U \times E$$

where:

UP_m	Utilisation Payment during period (p), where m is used to represent the period for one month;
U	is the Utilisation Price, in £/MWh;
E	is the Energy Delivered, estimated in accordance with sections generation and energy storage and Demand Side Response, as applicable, in MWh. This MWh is capped at a value no greater than the total contracted CMZ Capacity multiplied by the duration of the CMZ Event;
j	Settlement period j in the set period.

If the values of alternative generation available are lower than the alternative traditional MDG then the CMZ is progressed and the services used to avoid the need for MDG to be used to support network outages.

Historic decisions

For a list of historic assessments and decisions which SSEN has undertaken on CMZ opportunities, please refer to this link.

Disclaimers

SSEN is continually improving our processes, systems and interactions around CMZ Flexibility services, as such the decision criteria displayed will be updated as new methods are applied to maximise uptake and efficiency across all services.

The Total Evaluated Cost will take into account the price of solutions, their carbon footprint and where applicable the social benefits and will vary from service to service, full detail will be released at point of tender release.