Reserve Capacity – Minimum Generation Requirements

Presentation Market Advisory Committee
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By Brendan Clarke

Issue Statement

"The Penetration of Demand Side Management allowed in the SWIS leads to a heightened risk to System Security"

Current Determination of the Maximum Quantity of Demand Side Management (DSM) that may be Procured under Rule 4.5.12

The 2010 Statement of Opportunities shows the following results for the 2012/13 Capacity Year

10% POE Load	= 4,986 MW
Reserve Margin = 8.2% of 10% POE Load + Load Following Reserve + Intermittent Load Allowance	= 515 MW
Total Requirement (10% POE load + Reserve Margin) = 4,986 + 515	= 5,501 MW

The amount that is available form DSM is given below

1. Load in Top 96 hours

50% POE Load	= 4,569 MW
50% POE Load occurring less than 96 hours per year	= 4,158 MW
*Load in the top 96 hours = 4,569 – 4158	= 411 MW
Made up of	
Load Less than 96, more than 72 hours (class 2)	= 81 MW
*Load Less than 72, more than 48 hours (class 3)	= 99 MW
*Load Less than 48 hours (class 4)	= 231 MW

2. *Difference 10% POE and 50% POE

= 4,986 – 4,569	= 417 MW

3. *Reserve Margin

= 515 MW

Total Available for DSM (sum of 3 items) = 411 + 417 + 515 = 1,343 MW

In addition the Minimum Generation requirement = 4,097 MW (based upon 0.002% Unserved Energy Criterion of the modified demand curve)

Hence, the capacity that may be available from DSM is 5,501- 4,097 = 1,404 MW (= Total Available for DSM + 61 MW)

This represents 26% of total Reserve Capacity Requirement

Also note Reserve Margin and the difference between the 10% POE and 50% POE components need only be available for 24 hours

Current Issue

System Management believes that rule 4.5.12 does not relate to

1. The use of the 50% POE load
2. The use of DSM to supply the reserve margin
3. The Probabilistic Criterion (0.002% Unserved Energy)

The use of the 50% POE is not related to the planning criteria which requires a margin above the 10% POE forecast and so should not be used. In addition this difference in load is sustained for longer than 96 hours during a 10% POE load.

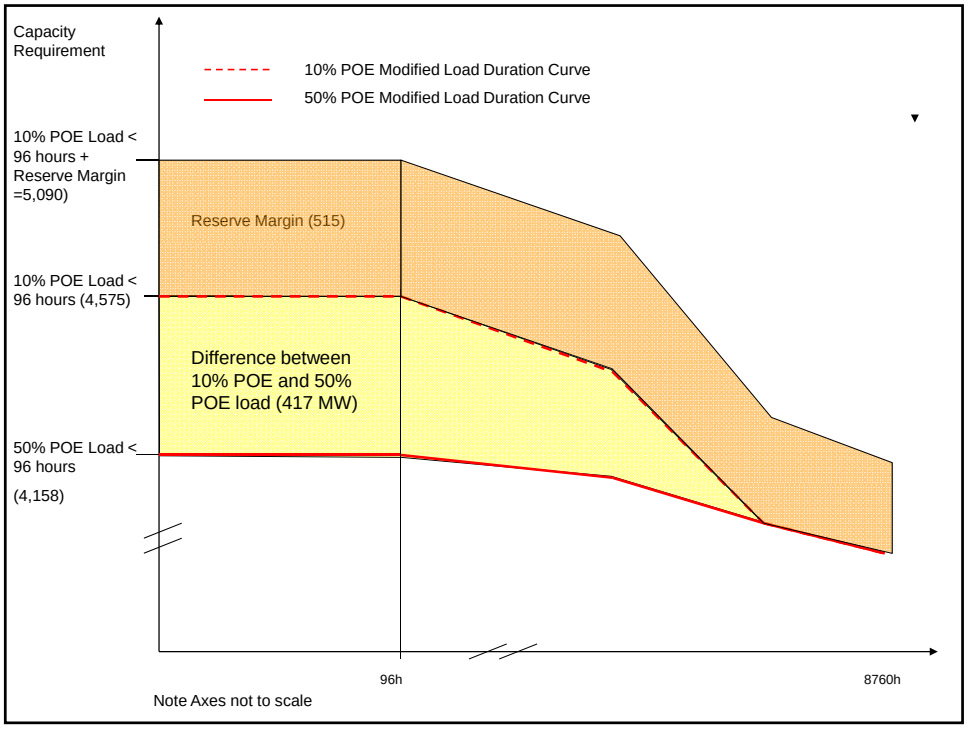
The Reserve Margin must be supplied to allow for an extended forced outage of the largest unit, which is unable to be supplied by DSM because of operating restrictions such as non availability on the 3rd day. In addition spinning and load following reserves must be supplied from either interruptible loads or synchronised generating units that can react instantaneously and can not be supplied by DSM.

The differences are shown graphically overleaf as a modified load duration curve. The orange area is the reserve margin and the yellow area is the difference between the 10% POE and 50% POE loads,

Rule 4.1.12 uses the planning criteria set out in clause 3.18.11 requires there to be sufficient capacity available to remain in service to cover the load plus a reserve margin which is not a probabilistic criteria. Hence the probabilistic criterion should not be used.

Hence the capacity that may be made available from demand side response is only the top 96 hour load = 411MW MW (7% of total requirement).

Note this assumes that the demand side response is activated to minimise the peak demand. In reality the activation of demand side is limited by its activation time and the number of consecutive days that it can be called upon, for example it can not be used for more than 2 days in a row. In addition the consumption of DSM may be used prior to the peak load day due to multiple contingencies or fuel constraints.



Way Forward

1. System Management clarifies its issue at MAC
2. MAC notes System Managements concerns, that is “The Penetration of DSM allowed in the SWIS leads to a heightened risk to System Security”
3. MAC discusses issue and provides feedback
4. IMO with System Management establish which components of the Reserve Capacity Requirement may be procured from DSM (and hence what amount must be sourced from generation) prior to the 2011 SOO. In particular the
   - Reserve margin
     (567MW in 2013/14, based on 2010 SOO)
   - The difference between the 10% and 50% POE load
     (442MW in 2013/14, based on 2013/14 SOO)
   - An extra margin using the probabilistic criteria

Appendix 8 Determination of Availability Curve

The Availability Curve determination is a complex process from the Market Rules. In recognition of this complexity, the IMO offers a more detailed explanation below.

In essence:

- Availability Class 1 ensures that there is sufficient generation capacity to cover all but the highest 96 hours of demand;
- Availability Class 2 ensures that there is sufficient generation and DSM capacity to cover all but the highest 72 hours of demand;
- Availability Class 3 ensures that there is sufficient generation and DSM capacity to cover all but the highest 48 hours of demand; and
- Availability Class 4 ensures that there is sufficient generation and DSM capacity to cover the highest 48 hours of demand. This Class also includes all additional capacity to cover the reserve margin and the difference between expected and 10% POE forecasts.

Please read below for more information on the application of both elements of the Planning Criterion in determining the Availability Curve.

The Availability Curve ensures that there is sufficient capacity at all times to satisfy both elements of the Planning Criterion (10% PoE + Margin and 0.002% Unserved Energy). This is done by assessing the capacity required for more than 96 hours, 72 hours, 48 hours and 24 hours based on a Load duration curve which has been scaled up to be equivalent to the expected maximum demand **[MR 4.5.12(a)]**. This level of "Required Capacity" is then compared to the "Minimum Generation Required", where the Minimum Generation Required is calculated by assuming that the 96 hours of highest demand were reduced through the activation of DSM and then calculating the generation required (including an allowance for expected outages) to ensure that the 0.002% Unserved Energy (USE) criterion could be satisfied for this reduced load profile **[MR 4.5.12(b)]**.

The Availability Curve (or "the capacity associated with each availability class" as it is referred to in table 4) is then calculated by comparing the Minimum Generation Required to the Required Capacity for each of the Availability Classes, with the greater of the two numbers setting the requirement for each Availability Class. **[MR 4.5.12(c)]**. As the Minimum Generation Required is less than the capacity needed for more than 96 hours, the level of capacity required for Availability Class 1 is set by the capacity required for more than 96 hours. In turn:

- Availability Class 2 is defined as the difference between the Capacity Required for less than 96 hours and the Capacity Required for more less 72 hours;
- Availability Class 3 is defined as the difference between the Capacity Required for less than 72 hours and the Capacity Required for less than 48 hours(The difference between the two green lines in the graph below); and
- Availability Class 4 is defined as the difference between the Capacity Required for less than 48 hours and the Reserve Capacity Requirement(between the top green line and the solid blue line in the figure below).

The Capacity associated with Availability Class 4 is much higher than that associated with both Availability Class 2 and 3 because it incorporates both the difference between the Required Capacity for less than 48 hours and the 10% PoE + Reserve Capacity Margin Requirement.