# System Operators' view on the responses to the consultation on the Proposed Methodology for determining auction capacity requirements and de-rating factors

**By EirGrid plc and SONI Ltd**

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# Contents

## 1. Executive Summary

EirGrid and SONI, as System Operators in Ireland and Northern Ireland respectively and joint operators of the Capacity Market, welcome the opportunity to respond to Industry comments regarding responses to SEM-22-075 Consultation Paper on 'Consultation on the proposed enhancements to the methodology for determination of the CRM Capacity Requirement and Associated De-Rating Factors' (the "Consultation Paper").

On 19th of October 2022, SEM-22-075 was published. The consultation requested feedback on updates to the current methodology for determination of the CRM Capacity Requirement and Associated De-Rating Factors and informed market participants on changes to the input data used in this methodology. The consultation period closed on 10th of November 2022 and all responses received have been read by the System Operators and all relevant comments and queries are addressed in this document.

EirGrid and SONI would like to take the opportunity to thank industry for their responses to the consultation. We note the comments raised by the participants and we are of the view that our responses to the comments further support the need to implement the proposed enhancements to the methodology for the calculation of the CRM Capacity Requirement and Associated De-Rating Factors. All comments and suggestions made by industry throughout the consultation have been noted and will be used for future review of the methodology.

## 2. Introduction

This document addresses responses to the Consultation Paper, which was published in October 2022. Through this document these enhancements, which are outlined in SEM-22-075, are referred to as the 'proposed methodology'.

The consultation is narrowly focussed on a small number of proposed enhancements. Participant responses were sought regarding the following changes to the current methodology:

- Adoption of net-demand modelling
- Removal of the storage scaling factor

These amendments to the current methodology are designed to improve the function of the capacity market and should be viewed in this context. We begin by reviewing the role of the capacity market and explaining how the proposed methodology relates to the objectives and purpose of the capacity market.

Recognising the interest shown by participants in changes to the outage statistics that are inputs to the methodology, we provide a brief summary of these changes and how they service the overall goal of the capacity market. Regarding these updates, we wish to stress that the current methodology provides for the changes to outage statistics and that the proposed methodology should be evaluated independently of the outage statistics updates, as the outage statistics themselves are dynamic and subject to change.

We then consider the specific issues raised by participants in response to the consultation.

Along with responses directly related to the consultation, a number of participants offered views on other aspects of the wider system and market arrangements. The System Operators do not address responses that do not directly relate to the proposed methodology.

## 3. Role of the Capacity Market

### Capacity Market Objectives

Capacity Remuneration Mechanism Detailed Design[1] sets out that maintaining system security and promoting economic efficiency are key objectives of the capacity market.

Further to the Capacity Market Code Objectives[2], the System Operators consider that any proposed methodology should be open, transparent and fair, promote the delivery the required level of reliability and do so at efficient prices.

The Capacity Requirement and De-Rating Methodology is subject to approval by the Regulatory Authorities, is published and any changes are subject to publication consultation.

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[1] SEM-15-103

[2] Capacity Market Code. The Capacity Requirement and De-Rating Methodology does not form part of the Capacity Market Code; however, as a critical component of the Capacity Market, these objectives are relevant.

The maximisation of economic efficiency in the capacity market requires pricing the marginal benefit of each technology and technology variant as closely as possible to its true marginal benefit. Therefore, it is important that the market and modelling methodology is technology agnostic, reflecting only consequential differences between technologies.

To the extent that marginal benefits are mis-represented in the auction through inaccurate de-rating factors (DRFs), the result is an adequacy adjusted higher total cost of provision, which is ultimately borne by the wider economy. This inefficiency can manifest itself as higher costs for Awarded Capacity than are necessary through over-payment for benefits to adequacy and/or under-provision of capacity adequacy relative to the defined standard which, in expectation, result in more, and longer, outage periods with the concomitant economic costs that accompany those. Similarly, DRFs that are overly conservative under-value the contribution to reliability of different technology classes and can result in reduced propensity for investment in these technology classes.

The proposed methodology assists the efficient acquisition of capacity adequacy by improving the assessment of the marginal benefit to capacity of each unit:

- The adoption of net-demand modelling instead of capacity credit modelling for variable generation technologies such as wind and solar captures the correlation between variable generation and demand and reflects the increasing role of fluctuation in variable generation as a source of capacity adequacy challenges. The improved representation of opportunities to contribute to capacity adequacy in peak periods enables recognition of a wider range of contributions to capacity adequacy. It also enables the calculation of marginal de-rating factors for variable generation technologies.
- The removal of the storage scaling factor currently applied to storage technologies enables the calculation of technologically agnostic marginal de-rating factors for storage technologies that reflect the actual contribution to capacity adequacy of these units.

The proposed methodology is accompanied by adjustments to outage statistics that more accurately capture the performance of each technology class within the modelling framework. These adjustments also contribute to improved assessment of the marginal benefit to capacity adequacy.

Finally, we note that a number of participants expressed the desire for the capacity market to achieve more diverse objectives than the efficient provision of capacity adequacy. These included objectives such as particular technology mixes or environmental objectives. These proposed objectives and, more generally, the re-purposing of the capacity market, lie outside of the scope of the proposed methodology and do not form part of the consultation.

## 4. Net Demand Modelling

Many of the responses to the consultation support the proposal to move to a net demand model in principal, but have concerns which will be addressed in this section. There was some slight confusion about the effect that net demand modelling will have on the capacity requirement due to the caveated

figures shown in Table 1 of the consultation report. While moving away from a capacity credit model to a net demand model is expected to imply a higher final de-rated capacity requirement, this is not guaranteed.

## Accuracy of forecast installed capacities and accounting for variability

The level of installed wind and solar capacities will continue to align with GCS forecasts. As RES becomes a much higher proportion of the system, the importance of these forecasts' accuracy will also grow but that is the case in either a net demand or a capacity credit model.

Variability will be accounted for in the variable generation profiles which are adjusted for future capacity levels and deducted from demand profiles, effectively forming a comparatively stable net load duration curve for each scenario. Demand itself is scaled to a number of different levels as is currently the case in the ISAC simulation process. The effect of this approach is to consider a variety of net-demand conditions through the variation of demand profile scaling. No change is proposed to the current ISAC functionality which adopts least-worst regrets analysis to define demand the critical demand level, capacity requirements and de-rating factors. Some responses highlight concerns around the limited number of historic profiles and demand / variable generation profile combinations. These limitations are present in the current model and are mitigated by the simulation of different demand levels, while retaining the feature that the correlation between renewable generation and demand is inherent.

While we believe this is currently the most appropriate modelling method available, we will continue to monitor its appropriateness compared to other mechanisms.

## Correlation of low renewable generation in SEM and External Markets

We note participant comments that the potential for corresponding times of low renewable generation in SEM and connected markets is a risk and the potential impact of this risk is growing with the level of installed renewable capacity in all markets. For clarity, we note that as well as being de-rated for purely reliability terms in the current and proposed methodology, interconnectors are subject to an external market de-rating factor (EMDF) that represents the extent to which external markets can be relied upon. The EMDF is an input to both the current and proposed methodologies. The setting of the EMDF is not addressed in either the current or proposed methodology, and therefore is beyond the scope of this consultation.

## Limitations to historic demand profiles

While the proposed methodology does not involve any change to the treatment of demand profiles, we note that some responses have highlighted concerns relating to simply using historic profiles to forecast future profiles, particularly in the case of demand as the electrical grid absorbs load (from other transport, heat etc.). While no set of demand profiles can account for the all future scenarios in either a net demand or capacity credit model, the current approach mitigates the risk that future scenarios may not be representative by using detailed demand data generated in the Generation Capacity Statement (GCS). The GCS explicit considers demand trends and this is input to the capacity adequacy process as both peak and energy requirements for each capacity year. Within the ranges supplied, multiple historical profiles are always used in conjunction with a least-worst regrets approach, Further, demand profiles are relatively

stable from year to year and periods of tight margin will likely continue to be driven by forced outages and variability of generation.

Improved methods of both demand and net-demand forecasting are considered on an ongoing basis but these beyond the scope of the proposed changes to the methodology.

## 5. Removal of storage scaling factor

While some responses were supportive of the proposal to remove the storage scaling factor, some responses highlighted concerns around the lack on analysis provided that addressed this single factor. While the indicative analysis shown does include the removal of the storage scaling factor, it is important to highlight that the factor is highly dependent on the level of storage on the system at the time, as well as other input data changes. Due to the high correlation with the level of storage, and the rapidly changing level of storage on the system, sharing analysis on the removal of the storage scaling factor is unlikely to be relevant to future auctions and may be more misleading than helpful if taken out of context.

The storage scaling factor causes the marginal contribution of energy limited units to capacity adequacy to be overestimated and is therefore not compatible with the objectives of the capacity market. The current methodology requires the capacity market be technology agnostic so that it may evaluate all technologies according to their marginal contribution to adequacy. The storage scaling factor is distortionary and overstates the contribution of some technology classes at the expense of the efficient procurement of capacity adequacy.

## 6. Outage Statistic Updates

### Requirement to consult

A number of participants remarked that the changes to the outage statistics that were notified in the consultation document should also be consulted upon. The changes, notified to provide additional context for indicative analysis, included:

- Adoption of a capacity weighted average outage rate
- Adjustment of outage rates to reflect the modelling context in which they are used
- Applying DSU outage statistics to DSUs instead of system-wide outage rates.

Regarding the specific issue of consultation, the current methodology, issued in June 2018, states:

*"While it is considered that the run-hour weighting approach is most suitable for the current system, the approach to calculating will need to adapt to best reflect the performance characteristics of the system."*

The current methodology requires that the approach to calculating must adapt to best reflect the performance characteristics of the system. The consultation document explained the reasons why capacity-weighted technology class averages does better reflect the performance characteristics of the

system, particularly in times of low system margin. Additionally, these reasons have been outlined in Section 8.

The scheduling outage adjustment is a technical adjustment to input data to reflect the modelling context in which the data is used. The current methodology states that:

*"A marginal technology class de-rating factor is determined by looking at the impact on adequacy of adding a single notional unit of a specific technology class and size to each capacity adequate portfolio for a demand scenario"*

Due to ISACs outage optimisation feature, which schedules outages to occur during times of highest capacity margins, modelling scheduled outages that occur during times of tight margins as scheduled does not accurately assess the impact of these outages on capacity adequacy. Applying an adjustment to the outage statistics, to model these outages as forced outages instead of scheduled, more accurately determines the contribution of these units to adequacy.

Finally, the current methodology also notes:

*"For the initial auctions, DSUs and potential new storage units (that are not pumped hydro units) will be treated as new technology and assigned the system-wide outage statistics. In addition, where they are duration limited this will also be taken into account. These unit types will eventually form their own categories once their availability data is deemed to be representative of their operation in the SEM under the I-SEM design."*

DSU availability data is now sufficient to be representative of their operation in the SEM under the I-SEM design, therefore requiring their availability data to be used, replacing the system-wide outage statistics that served initial auctions. More information on DSU outage statistics is given in Section 8.

Notwithstanding our view that these changes are part of the normal operation of the current methodology, we consider the specific comments made by participants with respect to these issues.

## Outage Statistics

The proposed enhancements to the methodology include no changes the approach of assigning each capacity market unit a technology class and evaluating each unit according to the performance of their technology. Additionally, there are no proposed changes to the currently selected technology classes or the source of the availability data, which is gathered from EDIL as under the current methodology and is published on the EirGrid and SONI websites.

## Capacity Weighted Averages

There is no change to the basis for calculating outage statistics other than the weighting scheme applied to technology classes. In determining the most appropriate weighting scheme, we are primarily interested in the most accurate representation of system reliability in a given period.

The capacity adequacy process is primarily interested in periods of system stress when margins are tight. At these times, the reliability of the whole system stack is more likely to be a more accurate determinant

of system performance. This is because, at such times, it is reasonable to assume that a large portion of units will be called upon to operate and will therefore contribute to reliability. That contribution will be proportionate to their MW capacity, not their annual run hours.

## Scheduling uncertainty adjustment

Some participants expressed concern around the fairness, justification and implementation of the proposed scheduling uncertainty adjustment.

The need for this adjustment arises from the way scheduled outages are determined a number of years in advance in ISAC which results in an overly optimistic outage schedule. ISAC assumed that all outages can be scheduled to maximise capacity margins. In reality, outages can occur outside the transmission outage season and continuing to model these outages during times of highest margins underestimates the impact of scheduled outages resulting in the under-procurement of capacity relative to the adequacy standard.

The scheduling uncertainty adjustment does account for the MW and duration of outages during off-season. The adjustment still tends to provide an overly optimistic outage schedule, but the transmission outage season provides a reasonable and independent demarcation of those periods in which system stress is likely to arise.

Finally, it should be noted that the adjustment is unlikely to significantly impact DRFs as the adjustment is applied to all units, including those within the initial portfolio, thereby mitigating the effect of additional modelled forced outages by creating more opportunities for marginal units to contribute to capacity adequacy.

## DSU Availability

Since DSUs have entered the market they have been assigned system wide outage statistics as per the current methodology. This was done so on the basis that the availability statistics for DSUs were related to other factors beyond those of reliability and were related among other things to the previous market rules. As such, availability statistics predominantly from the period prior to 2018 may not have been representative.

Based on the availability data for DSUs, the use of system wide outage statistics is not representative of the availability of these units. As we now have a greater number of years of availability statistics under the current market arrangements, these are more reflective of the actual availability of DSUs. As per the methodology, we are required to use outage statistics that are representative of performance.

As for other technology classes, as the availability statistics for DSUs change over time, this will be represented in changes to their outage statistics. For example, if availability were to improve over the course of the next few years, a DSU that qualifies for a T-4 Capacity Auction based on a particular DSU MW Capacity would be able to qualify additional capacity in a T-1 auction based on the same DSU MW Capacity based on an improved DRF. In this way, the use of actual DSU statistics is more representative and provides for changes in the future developments of this technology class, in the same way as it does for all other technology classes.

## 7. Impact on DRFs and Capacity Requirement

A number of responses were received requesting further explanation of the benefit of implementing the proposed changes and adding clarity of the impact on investors, particularly regarding the impact on de-rating factors and capacity requirements in future auctions.

### Indicative analysis

A number of responses highlighted discrepancies between the DRFs provided in the indicative analysis section of the consultation and the DRFs used in recent auctions. The results included in the indicative analysis section of the report are intended to compare the DRFs we might observe when applying each approach to the same dataset. Primarily, the indicative analysis illustrates the benefit of adopting a net demand modelling approach which realises a peakier demand profile and provides more opportunities for all technologies to contribute to capacity adequacy. The results and examples included in the consultation report are purely for indicative purposes and are deliberately chosen not to represent any particular previous auction or create expectations that may not be supported by a different set of input data.

DRFs will vary from auction to auction for the reasons outlined earlier in this consultation and comparing the indicative results to previously published DRFs is not recommended. Each set of DRFs is determined by the methodology in conjunction with input data which evolves over time, affecting the marginal contribution of each technology to capacity adequacy.

In addition to differences in input data, it should be noted that DRFs for DSUs and Other Storage units with Maximum Storage ≤ 6 hours of operation, have been frozen since the T-4 24/25 auction. During the intervening period, there have been significant changes to relevant input data and the existing portfolio resulting in significant changes to proposed DRFs that have not been reflected in published DRFs.

Some responses requested indicative analysis results for a broader range of unit capacity size and/or reservoir size. As has been highlighted, the indicative analysis should be viewed as a comparison between the two methodologies and may not match future DRFs. As a result, it would not be beneficial to provide DRFs for a wide range of units.

Other participants interpretation was that the results may be counterintuitive. The primary effect of the proposed methodology is that net-demand modelling will make the net load duration curve peakier, creating more opportunities for a marginal unit to contribute to capacity adequacy. This may or may not counteract reductions in availability over the same period that reduce the DRF of the technology concerned because it will be available less often to contribute to capacity adequacy. When viewed together, with a focus only on availability, apparently counter-intuitive results may arise, but these are consistent with model expectations.

### Impact of the change on capacity requirement and de-rating factors in future auctions

Many participants expressed concerns regarding the impact that these changes would have on the Capacity Requirement and DRFs for future auctions if implemented. For each auction, the DRFs and Capacity Requirement are a function of the latest available historic and forecast data for the target year

and as such no specific information for future auctions are available. The final capacity volumes are a function of rated capacity requirements and de-rating factors, so it is not possible to determine whether this number will be higher or lower for an individual auction without all the input data available.

It is important to note that while the proposed methodology is a reasonably complex process and takes into account a large amount of historical availability and demand data, it is expected that the evolution of de-rating factors will develop in line with the input date in line with the following relationships:

(i) Improvement in the performance of a technology class (in terms of historical outage statistics) will result in an improvement in the DRFs for that technology class. Similarly, deterioration in the performance of a technology class (in terms of historical outage statistics) will result in a deterioration in the DRFs for that technology class. This effect will be more pronounced for larger units than for smaller ones and will be dampened due to the multi-year rolling average approach which also mitigates the effect of high impact low probability outages.
(ii) An increase in the penetration of energy limited technology classes including Pumped Hydro Storage Units, Other Storage Units and Demand Side Units (<=6 hours) will result in a decrease in their marginal contribution to reliability and consequently, their DRFs. This is related to how peaky the demand is, where the use of Net Demand vs Gross Demand becomes important. As the presence of these energy limited technologies increases, they flatten the demand profile.
(iii) An increase in the penetration of variable renewables primarily in the form or wind and solar will result in an increase in how peaky the Net Demand is. This effect will act in the opposite direction to the relationship in point (ii).

The above effects should ensure investment in the right balance of technologies to ensure that the Net Demand can be reliably met. As more renewables are developed, the increased contribution of DSUs and Other Storage will be reflected in higher DRFs for these technology classes. As we approach adequate levels of DSUs and Other Storage, the DRFs will reduce.

In this way, Participants should be able to form a view as to the likely evolution of DRFs based on their assessment of the evolution of the input information.

## 8. DSUs and Energy Limited Units

A number of the responses express concerns with the proposed changes to DSU modelling, in particular highlighting concerns around using historic DSU outage statistics, market design issues relating to DSUs and the DRFs calculated using the current methodology in the indicative analysis section.

### Market Design and DSU DRFs

A number of the responses highlight that historic DSU performance may not be indicative of future DSU performance as changes to the market design may incentivise better future performance. Market design issues themselves are beyond the scope of not only this consultation, but also the methodology. We are therefore unable to constructively comment on the validity or otherwise on the views expressed as to the appropriateness of the market design.

Aside from the market design issues themselves, a number of participants were concerned that the use of historical availability statistics was not appropriate given the respondents' forecasts of market design improvements. As the current methodology calls for the use of historical average availability data "*in the SEM under the I-SEM design*" and the consultation makes no proposal to adjust this basic philosophy, there is no option but to use historical availability data.

Notwithstanding the above, participants should be aware that the current methodology is adaptive and based on rolling averages of historical data. Where market design changes elicit improved performance from DSUs, the current methodology will respond to the latest data and incorporate it into DRF and capacity requirement calculations. Similarly, where the forecast portfolio, and in particular forecast storage capacity changes, DRFs will respond.

### DSU DRFs in Indicative Analysis

The indicative analysis of the consultation document was designed to demonstrate the effect of adopting the proposed methodology compared to the current methodology. Comparison of the DRFs from the consultation document is not possible due to each using entirely different input data sets. Further, in the case of DSUs and Other Storage units with Storage ≤ 6 Hours of capacity have been frozen for previous auctions. The DRFs for DSUs and Other Storage units with Storage ≤ 6 Hours calculated for recent auctions are significantly lower than the published DRFs for these auctions. For a given set of technology characteristics, the indicative analysis shows that the updated methodology will typically award higher DRFs than the current methodology.

## 9. General Issues

The following issues were noted in the responses. These issues were out of the scope of this consultation, but some additional information has been provided below.

### Extended Max Reservoir Size for Energy Limited DRFs

Participants were supportive of the proposed consideration of longer duration storage technologies.

The proposed methodology adopts the current methodology's DRF calculation for shorter duration and extends this to longer duration units.

### DRF Consistency within an auction year

A concern was raised that if the proposed changes were implemented for the T-1 23/24 auction, as proposed in the consultation paper, this would lead to discrimination between units for the same year given that the T-4 23/24 auction has already cleared capacity for the 2023/2024 capacity year. However, units that were cleared in previous auctions will, in general, achieve different de-rating factors as each auction will use the latest available historic and forecast data. Implementing the changes does not discriminate against any units more than updates to input data do, and the alternative of retaining fixed DRFs between auctions for the same capacity year would deny the capacity auction mechanism the benefit of the latest data.

Furthermore, where a technology class benefits from increased availability over time due to some or other changes in the market design or otherwise, the additional de-rated capacity beyond that which qualified for a T-4 Capacity Auction would be eligible to qualify for a T-1 Capacity Auction.

### Interconnectors

To resolve any confusion around the modelling of interconnectors, we would like to clarify that interconnectors to external markets are considered capacity providers under both the current and the proposed methodology. Additionally, in both methodologies, an EMDF is applied to interconnectors. This EMDF is supplied by the regulatory authorities and any alteration to this procedure is beyond the scope of this consultation.

Figure 8 in the consultation report shows the potential impact of adopting the proposed methodology on the DRF for a 100MW interconnector. The DRFs shown in this figure are the DRFs calculated by the model before an EMDF is applied. This is not indicative of the EMDF being removed for future auctions and we expect that an EMDF supplied by the RAs will be applied to future DRFs and adequacy modelling.

## 10.Conclusion

EirGrid and SONI would like to take the opportunity to thank industry for their responses to the consultation. We note the comments raised by the participants and we are of the view that our responses to the comments further support the need to implement the proposed enhancements to the methodology for the calculation of the CRM Capacity Requirement and Associated De-Rating Factors. All comments and suggestions made by industry throughout the consultation have been noted and will be used for future review of the methodology.