



**Integrated Single Electricity Market
(I-SEM)**

**Capacity Requirement and De-Rating Factor
Methodology
Detailed Design**

Consultation Paper

SEM-16-051

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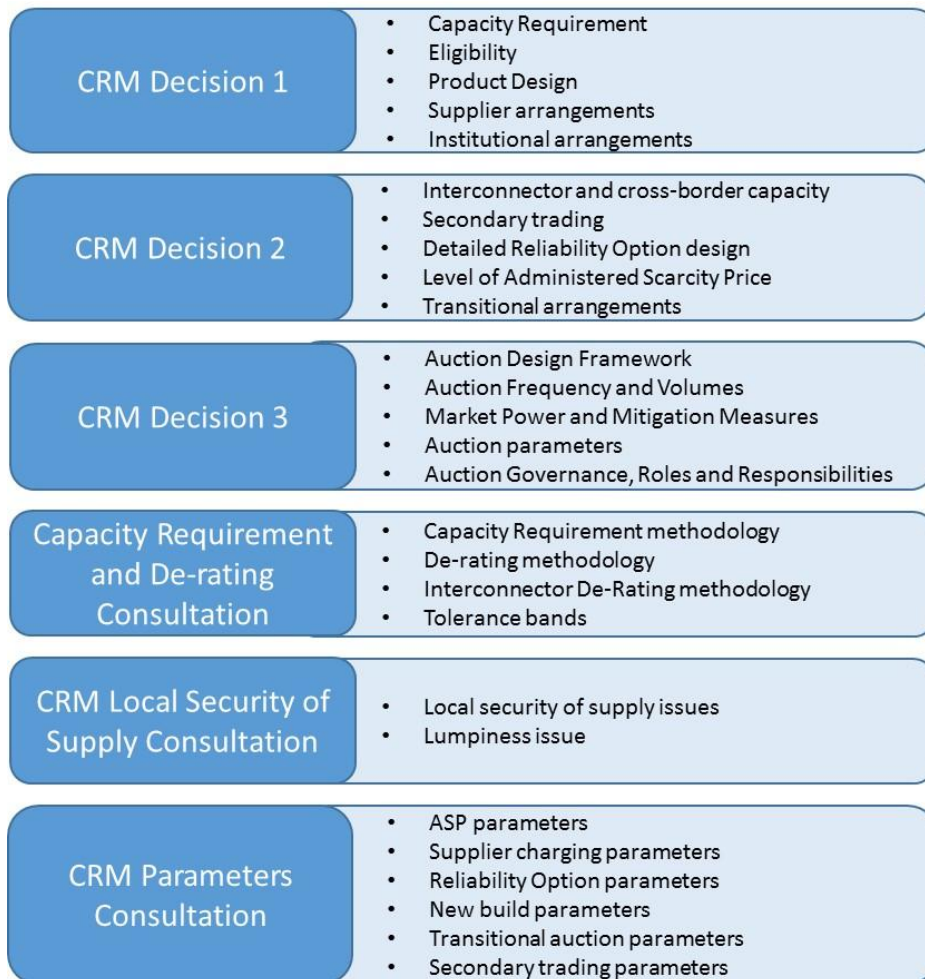
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1. INTRODUCTION

1.1 BACKGROUND

1.1.1 The purpose of the CRM Detailed Design is to develop through consultation the specific design features of the new capacity mechanism. As illustrated in Figure 1, this consultation paper is one of the three which covers more detailed areas of design identified in the three earlier decisions made during the development of the CRM Detailed Design.

Figure 1 : Overview of CRM Policy Development



1.1.2 This document focuses on the design of the methodology to determine the Capacity Requirement and the De-rating Factors to be applied to capacity providing units. It also covers any tolerance band that will apply around the de-rated capacity of a capacity provider.

1.1.3 The Capacity Requirement is a key input to the setting of the demand curve used in the auction of Reliability Options as laid out in CRM Decision 3 and to be elaborated in the forthcoming Parameters Consultation. The De-rating Factors to be applied to capacity providers will establish the volume of capacity which can enter into the auction and which can participate via the secondary trading platform.

1.1.4 The CRM Parameters consultation is planned for Quarter 3, 2016.

1.2 ROLE OF THE CAPACITY REQUIREMENT AND DE-RATING FACTORS WITHIN THE CRM PROCESS

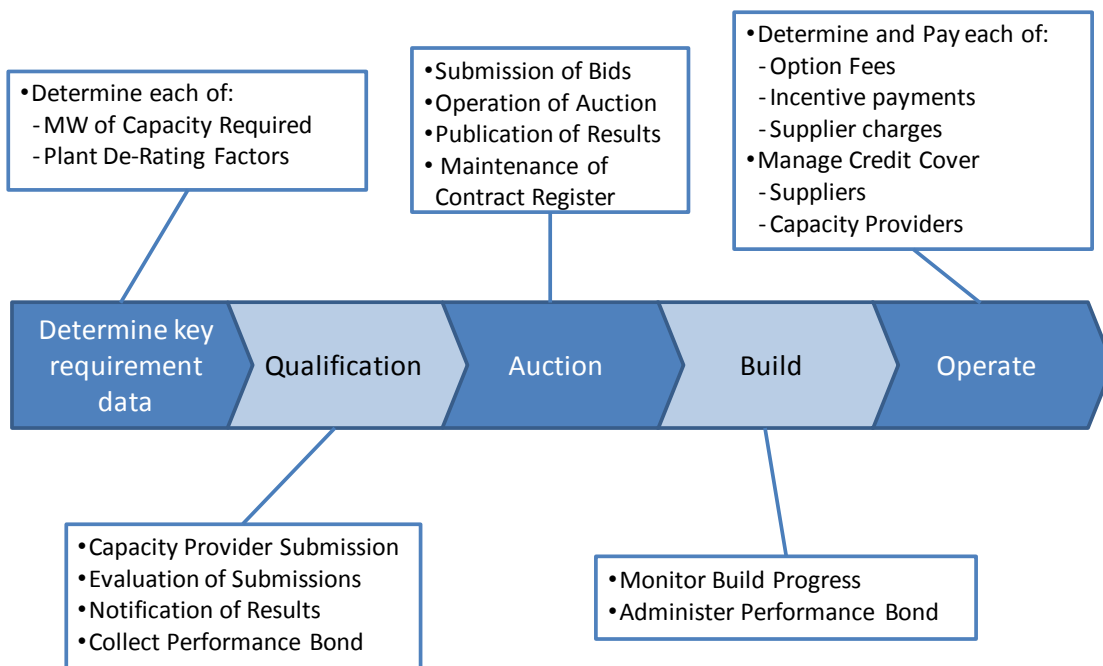
1.2.1 As can be seen in Figure 2 below, the determination of the Capacity Requirement and the De-rating Factors form part of the “determination of key data” element of the I-SEM CRM process.

1.2.2 The Capacity Requirement is the primary driver of the volume of capacity to be purchased by the market through the Reliability Option auction. The intention is that the level of capacity procured should be sufficient to maintain the agreed security standard, i.e. the 8 hour LOLE standard.

1.2.3 All providers of capacity will have an element of unreliability when they will be unavailable to perform, e.g. due to forced outages or intermittency. Such unavailability will require additional capacity to be procured to maintain the agreed security standard.

1.2.4 The De-rating Factors are used to adjust the nameplate capacity of capacity providers to reflect the contribution they can make to meeting the Capacity Requirement.

Figure 2: End to End Process for the I-SEM CRM



1.3 KEY DECISIONS FROM CRM CONSULTATIONS 1 - 3 FOR THE CAPACITY REQUIREMENT AND DE-RATING FACTOR METHODOLOGIES

Capacity Requirement

1.3.1 In CRM Decision 1 (SEM-15-103), the SEM Committee stated that the Capacity Requirement should be:

“determined based on the analysis of a number of scenarios for demand. These scenarios should provide reasonable coverage of the potential future requirement for capacity. The capacity requirement should be determined for each scenario, and the optimal scenario selected based on the least regret cost approach as outlined in the consultation paper.”

1.3.2 In setting the volume of capacity to be auctioned, CRM Decision 3 (SEM-16-039) makes clear that the volume will be based on the Capacity Requirement adjusted for capacity withheld by capacity providers, capacity already purchased under previous auctions and capacity withheld by the RAs from the T-4 to the T-1 auction. The volume purchased from the auction will be on the basis of a sloping demand curve, the details of which will be consulted on as part of the CRM Parameters Consultation planned for Q3, 2016.

De-Rating Factors

1.3.3 Following the first CRM consultation, as part of CRM Decision 1, the SEM Committee decided that:

“the procurement of Reliability Options under the I-SEM should be based on a de-rated requirement.”

and further that this de-rated requirement should be determined using de-rating factors developed as follows:

*“Central de-rating factors will be technology specific, but make allowance for the impact of plant size. [De-rating factors will] be based on **marginal contribution** to meeting the capacity requirement.”*

1.3.4 That same decision stated that the De-Rating Factors should:

- *be centrally determined by the TSOs, with the TSOs determining de-rating factors for groups of technologies;*
- *be based on TSO analysis of the marginal contribution of the relevant technology to the capacity requirement. That is the extent to which a marginal increment or decrement of nameplate capacity from that technology type impacts the overall requirement for nameplate capacity; and*
- *vary for characteristics of a technology (e.g. size) that can be parameterised, and which legitimately impacts its marginal impact on the capacity requirement.*

1.3.5 Concerns were raised by stakeholders during the second CRM Consultation about the conflicts of interest which could occur if the TSOs were to develop de-rating factors for the interconnectors. Responding to these concerns, the SEM Committee decided in CRM Decision 2 (SEM-16-022) that:

“RAs should develop a methodology to determine the de-rating factors to be applied to interconnectors.”

1.3.6 Given the absence of historic data directly relating to the operation of the I-SEM, and changes to the GB market, and taking account of responses received to the second CRM Consultation, the SEM Committee decided that:

“the methodology [for interconnector de-rating] will be based on suitable historic and forecast data for GB and the SEM.”

1.3.7 As part of CRM Decision 1, the SEM Committee decided that:

“Existing dispatchable plant will need to bid within a tolerance band of the centrally determined de-rating factor for that plant [...]. This band will be tight, and will not exceed the lower of:

- *A threshold as set periodically by the SEM Committee (e.g. +x%, -y%); and*
- *Variation that, is sufficient to encompass legitimate variations in the technical characteristics of relevant plant.”*

1.4 ASSESSMENT CRITERIA

1.4.1 The assessment criteria for the detailed design of the CRM (including the auction design) are based on the same principles as those applied to the I-SEM High Level Design and as agreed with the Departments in the Next Steps Decision Paper March 2013. We have developed detailed descriptions of these criteria to focus on issues that are relevant to procuring capacity and tailored to the detailed design elements of the capacity remuneration mechanism.

1.4.2 These assessment criteria are set out below:

- **The Internal Electricity Market:** the market design should efficiently implement the EU Target Model and ensure efficient cross border trade.
- **Security of supply:** the chosen wholesale market design should facilitate the operation of the system that meets relevant security standards.
- **Competition:** the trading arrangements should promote competition between participants; incentivise appropriate investment and operation within the market; and should not inhibit efficient entry or exit, all in a transparent and objective manner.
- **Equity:** the market design should allocate the costs and benefits associated with the production, transportation and consumption of electricity in a fair and reasonable manner.

- **Environmental:** while a market cannot be designed specifically around renewable generation, the selected wholesale market design should promote renewable energy sources and facilitate government targets for renewables.
- **Adaptive:** The governance arrangements should provide an appropriate basis for the development and modification of the arrangements in a straightforward and cost effective manner.
- **Stability:** the trading arrangements should be stable and predictable throughout the lifetime of the market, for reasons of investor confidence and cost of capital considerations.
- **Efficiency:** market design should, in so far as it is practical to do so, result in the most economic overall operation of the power system.
- **Practicality/Cost:** the cost of implementing and participating in the CRM should be minimised; and the market design should lend itself to an implementation that is well defined, timely and reasonably priced.

1.4.3 Fundamental to the SEM Committee's consideration of the overall CRM design is the European Commission State Aid Guidelines, particularly in light of the ongoing EC energy sector inquiry including capacity mechanisms. Furthermore, we are actively engaged with the Departments (DCCA and DfE) and the European Commission as we develop the capacity market design as ultimately EC approval is required for the CRM auctions to commence.

2. CAPACITY REQUIREMENT AND DE-RATING FACTOR METHODOLOGY

2.1 THE PROPOSED METHODOLOGY

- 2.1.1 The requirement for De-Rating Factors to represent the marginal contribution to meeting the Capacity Requirement means that a combined methodology for the determination of both the Capacity Requirement and unit De-rating Factors is needed.
- 2.1.2 As set out in CRM Decision 1, the TSOs have developed a methodology for the determination of the Capacity Requirement and the unit De-rating Factors. As required by earlier SEM Committee decisions this methodology:
- Determines a Capacity Requirement on the basis of a representative range of future demand scenarios and uses a least-worst regrets approach to determine the Capacity Requirement; and
 - Determines De-rating Factors for groups of technologies and then adjusts these based on the marginal contribution to Capacity Requirement made by each unit.
- 2.1.3 A paper from the TSOs setting out the details of this methodology is appended as Appendix A. In addition to setting out the methodology, the TSOs paper also provides indicative values for the following:
- the Capacity Requirement;
 - the technology groupings used in the determination of De-rating Factors;
 - technology group level De-rating Factors;
 - marginal de-rating curves; and
 - unit level De-rating Factors.
- 2.1.4 As set out in CRM Decision 2, the Regulatory Authorities have developed a methodology for determination of the De-Rating Factor to be applied to the interconnectors. The details of this methodology and indicative results are appended as Appendix B.
- 2.1.5 Please note that the development process for the TSOs and RAs methodologies took place in parallel. The TSOs methodology relies on inputs from the RAs relating to the interconnectors and the RAs methodology requires an estimate of the Capacity Requirement and average De-rating Factor. In each case, the indicative results reproduced in the Appendices were based on an early estimate of the respective inputs.
- 2.1.6 The RAs are mindful of the need for transparency of the input data and the TSOs De-Rating Model of both the capacity requirement and de-rating factors. The RAs will continue to work closely with the TSOs throughout this process to satisfy the RAs need for transparent input and modelling which will inform the RAs decision.
- 2.1.7 The RAs note that the proposal from the TSOs to include operational reserves in the determination of the Capacity Requirement represents a change to their current treatment in

the SEM capacity market and this has a significant impact on the end result. Hence, the RAs particularly welcome feedback on this proposal.

2.2 SUMMARY OF CONSULTATION QUESTIONS

2.2.1 The SEM Committee welcomes views on all aspects of the methodology proposed and the historic and forecasts inputs used including:

- A. The determination of Capacity Requirement;
- B. The treatment of operational reserves in the determination of Capacity Requirement;
- C. The technology groupings;
- D. Determination of the marginal de-rating curves;
- E. The determination of Effective Interconnector Capacity;
- F. The use of the TSO De-Rating Model in conjunction with the RA-determined values of Effective Interconnector Capacity and the outage rates for the interconnector Technology Class to determine the marginal de-rating factors to be applied to the interconnectors.

2.2.2 The Committee would particularly want to receive evidence supporting any alternative to the methodology proposed, where possible supported by quantitative analysis.

3. TOLERANCE BANDS

- 3.1.1 CRM Decision 1 allowed for the possibility of tolerance bands to be applied to the unit-level De-Rating Factors determined for capacity providers. These tolerance bands would allow some flexibility in the level of participation required from dispatchable plant in the RO auction.
- 3.1.2 The decision required that these bands should be both tight and should only be sufficient to cover “legitimate technical variation in the relevant plant”.
- 3.1.3 The technology groupings proposed by the TSOs for determination of De-Rating Factors are such that the “legitimate technical variation” between plant within each grouping is very limited.
- 3.1.4 The Demand Side Unit (DSU) technology grouping does contain units with substantially different technical characteristics, but such capacity is not required to participate in capacity auctions. This means that the lack of a tolerance band will not lead to exposure of DSUs to unmanageable difference payments.
- 3.1.5 It could be argued that there is legitimate technical variation between single and multi-shaft gas turbine plant. Under the SEM, each “shaft” of each of the multi-shaft gas turbine plant participates in its own right and it is assumed that this behaviour will carry over into the I-SEM. As a result, there does not seem to be a requirement for a tolerance band to be applied to cover this variation.
- 3.1.6 On the basis of the above discussion, the SEM Committee is **minded-to** set the tolerance bands to +0%, -0% at I-SEM go-live. The intention would be to keep this decision under review.

3.2 SUMMARY OF CONSULTATION QUESTIONS

- 3.2.1 The SEM Committee welcomes views on all aspects of this section including:
 - Do respondents agree with the minded to decision to set the tolerance bands to zero?
- 3.2.2 The Committee would particularly want to receive evidence supporting any alternative view on tolerance bands, where possible supported by quantitative analysis.

4. NEXT STEPS

- 4.1.1 Interested parties are invited to respond to the consultation, presenting views on the methodologies presented and where applicable any minded to positions that have been expressed, proposals and discussion in this paper.
- 4.1.2 The SEM Committee intends to make a decision in December 2016 on these specific aspects of the detailed design of the CRM covered in this consultation paper. In reaching this decision we will take into account comments received from respondents to this paper.
- 4.1.3 Responses to the consultation paper should be sent to Karen Shiels (Karen.Shiels@uregni.gov.uk) and Thomas Quinn (tquinn@cer.ie) by 17:00 on Wednesday 5th October 2016.
- 4.1.4 Please note that for this particular consultation we intend to share the consultation responses with the TSOs and also to publish all responses unless marked confidential. While respondents may wish to identify some aspects of their responses as confidential, we request that non-confidential versions are also provided, or that the confidential information is provided in a separate annex. Please note that both Regulatory Authorities are subject to Freedom of Information legislation.