



Capacity Remuneration Mechanism (CRM)

2027/28 T-4 Auction,

Volumes Information Note

SEM-24-051

23 July 2024

Executive Summary

The 2027/28 T-4 auction was held in November 2023. This paper is a summary of the decisions made by the SEM Committee in determining the volumes procured for the 2027/28 T-4 auction and the factors which the SEM Committee took into account in making those decisions. The paper aims to improve transparency in volume setting, in line with one of the recommendations of the EY Review of the Performance of the SEM Capacity Remuneration Mechanism (CRM).¹

In March 2023, the TSOs calculated an all-island initial Capacity Requirement of 7,236 derated MW (MW_d), which is the amount of de-rated capacity required to meet the all-island reliability standard, without transmission constraints. As of March 2023, the all-island reliability standard was set at 8 hours of Loss of Load Expectation (LOLE). An 8-hour LOLE standard means that it is expected that there will be eight hours per year in which there is insufficient generation, interconnection and storage capacity to meet demand.

There are material transmission constraints between Ireland and Northern Ireland, and within Ireland between the Greater Dublin area and the “rest of Ireland”. These constraints may not be resolved within four years, so the TSOs also calculated minimum requirements of the key Locational Constraint Capacity Areas (LCCAs):

- 5,691 MW_d of capacity to be situated in Ireland to meet an 8-hour reliability standard for Ireland, of which at least 2,100 MW_d must be within Greater Dublin; and
- 1,599 MW_d of capacity to be situated in Northern Ireland to meet an 8-hour reliability standard for the Northern Ireland.

There are also “short circuit” issues within Greater Dublin which limit the maximum amount of capacity that can be connected, or run at any given time within Greater Dublin, without risking a breach of the short-circuit limits set out in the Grid Code. The combination of “short circuit” constraints, which limit generation in Greater Dublin, and

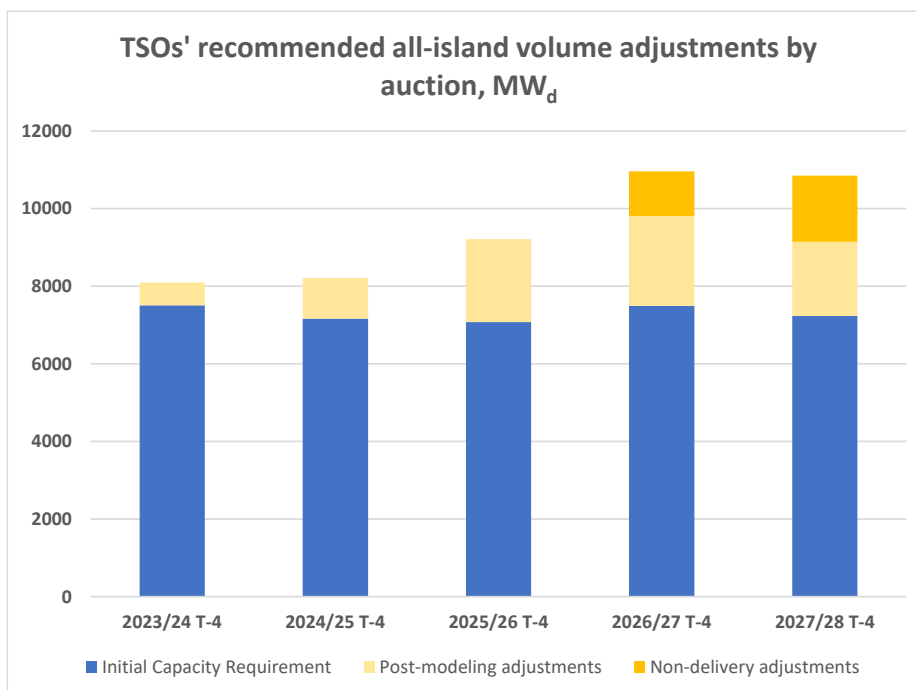
¹ <https://www.semcommittee.com/files/semcommittee/media-files/SEM-22-054A%20Performance%20of%20the%20SEM%20CRM.pdf>

transmission constraints, which limit the capacity to import power into the Greater Dublin, are likely to persist for a number of years, and could limit the ability to meet demand growth within Greater Dublin. The planning and permitting system in Ireland is a significant factor in limiting the ability to build and connect capacity. It limits the ability of capacity providers, particularly gas-fired generators, to build new capacity, whilst also presenting a challenge to capacity providers and the electricity and gas TSOs and DSOs in building new connections. Furthermore, it also creates challenges for the electricity TSO to invest to alleviate transmission constraints and short circuit issues.

In addition to the aforementioned TSO calculations, the TSOs also estimated approximately 400MW_d of non-participating capacity, predominantly accounted for by the new Celtic interconnector, which will connect Ireland and France, and is expected to be operational by the start of 2027/28. The Celtic interconnector has a maximum capacity of 700MW, and is assumed to provide 350MW_d of capacity support in 2027/28 at times of system stress, improving the security of supply position even though it did not participate in the auction.

Whilst the TSOs used their approved methodology to calculate the capacity requirements, the TSOs' methodology does not adequately capture all key requirements and risk factors. Therefore, in recent years, the TSOs have also calculated an increasing volume of adjustments, which, in the TSOs' view are not adequately captured in the approved methodology, and which need to be added to the initial Capacity Requirement to calculate the total amount of capacity that needs to be procured.

As illustrated in the chart below, at the time of the 2023/24 T-4 auction, the TSOs proposed three different types of adjustments totaling 585MW_d, an 8% addition to the requirement calculated using the approved methodology. By the 2027/28 T-4 auction, the TSOs' proposed adjustments had grown to 3,618MW_d, approximately a 50% addition to the initial Capacity Requirement. This increase in adjustments is explained in part by a significant increase in non-delivery risk, which accompanies the increased volume of contracted capacity in the delivery pipeline. The adjustments are made up of a number of different "post-modelling adjustments" totaling 1,863MW_d, as well as 1,705MW_d of "non-delivery" adjustments.



Following engagement with DECC in Ireland and DfE in NI, it was agreed that all-island target volumes would be procured based on a 6.5-hour LOLE standard. The NI target volumes were also procured based on a 6.5-hour standard. In Ireland, DECC working with the CRU, decided to set an alternative reliability standard for Ireland based on a 3-hour standard. Therefore, at the Regulatory Authorities' request, the TSOs also calculated that a 50MW_d adjustment to reflect the fact that the all-island reliability standard had been tightened from 8-hours LOLE to 6.5 hours LOLE between the publishing of the initial Capacity Requirement in March 2023, and the auction in November 2023.

The 1,863MW_d of "post-modelling adjustments" reflects six different categories of risk adjustments. The 1,705MW_d of "non-delivery" risk represents the TSOs' estimate of how much of the new capacity contracted in previous auctions, or expected to be contracted in this auction is not expected to deliver by 2027/28. "Non-delivery" includes projects which are forecast to deliver late, and projects which are expected to terminate.

The "non-delivery" adjustment should be seen in the context of the overall success of the CRM in contracting new capacity. In total, as of May 2024, the CRM auctions to date have contracted a total of just under 3,750MW_d of multi-year New Capacity contracts for 2027/28, net of terminations. Just over 3,050MW_d of this capacity is in

Ireland and just under 700MW_d is in Northern Ireland. Just over 2,850MW_d of the 3,750 MW_d is new-gas fired capacity. As of July 2024, a total of 836 MW_d of multi-year New Capacity contracted for 2027/28 has already achieved completion, of which 229 MW_d is in Ireland and about 607 MW_d is in Northern Ireland. Around 85% of the “non-delivery” adjustment relates to capacity in Ireland, with the planning and permitting system in Ireland being a significant constraint on the ability to reinforce the transmission system within four years, as well as the ability of generators to build within four years.

The TSOs estimate six categories of “post-modelling” adjustments and the “non-delivery” adjustments. However, in the view of the SEM Committee:

- Whilst some of the proposed adjustments represent a reasonably prudent estimate of the additional capacity required to mitigate the impact if that individual risk events materialises, it is unlikely that all risks will materialise simultaneously. The TSOs’ proposed approach of adding the adjustments does not adequately capture the diversification effects between the risks, or the fact that other mitigations can apply.
- About 1,050MW_d of the TSOs’ proposed volumes do not translate directly into unserved energy. The TSOs’ recommendation included an extra 700MW_d to cover target operating reserve (i.e. spare capacity that the system can call on, over and above what is necessary to meet demand) and 350MW_d in Ireland to cover Transmission Outage Planning to connect new renewable generation faster. The cost of procuring some of this extra capacity may exceed the benefit to consumers.
- Whilst it may be appropriate to include some adjustments at a local (LCCA) level, it may not be appropriate to include them in the all-island requirement. For instance, additional generation capacity in Northern Ireland is unlikely to support transmission outages to connect new renewables in Ireland.

The SEM Committee approved a set of adjustments, which took into account risk diversification and the optimum cost-benefit trade-off for consumers. An allowance was made for the capacity contracted for 2027/28 in previous auctions. As a result, the SEM Committee approved net requirements for this auction of 5,275MW_d at all-island level, 4,729MW_d in Ireland and 1,463MW_d in Northern Ireland. The sum of the local

requirements for Ireland and Northern Ireland was over 900MW_d greater than the all-island requirement, illustrating the scale of the additional cost to consumers resulting from delays to the north-south tie-line upgrade.

Until the north-south tie-line is complete, volume decisions made at local level will have a significant influence on contracted volumes. The SEM Committee approved requirement for Ireland was 574MW_d lower than the TSOs' proposed value, and the approved requirement for Northern Ireland was 23MW_d less than the TSOs' proposed value, so in aggregate the SEM Committee's target volumes were around 600MW_d less than proposed by the TSOs.

In the event, all 4,209MW_d offered in Ireland and all 1,441MW_d offered in Northern Ireland was contracted, and the volumes contracted would have been the same, even if the SEM Committee had approved the TSOs' adjustments in full.

The total contracted capacity was 5,470MW_d, which exceeds the TSOs' estimate of the 5,275MW_d that would have been required if there were no transmission constraints on the island of Ireland. This illustrates the fact that whilst there was a shortfall of around 700MW_d against target volumes in the auction, this was largely because it is assumed that the north-south tie-line upgrade will not be complete by 2027/28. If the north-south tie-line upgrade can be completed, the shortfall would be largely or completely resolved. These results are consistent with the findings of the EirGrid / SONI 2023 Generation Capacity Statement (GCS), which forecast, based on the median demand forecast, that the all-island system would move into surplus in 2028, 2029 and 2030², as more of the already contracted capacity delivers. By contrast, based on the same demand forecasts, if the north-south tie-line upgrade is not complete, the 2023 GCS forecasts a deficit for Ireland of 550MW_d in 2028, 560MW_d in 2029 and 630MW_d in 2030³, unless more capacity is contracted in subsequent auctions. To note, this forecast includes the addition of operational requirements (including Transmission Outage Planning of 350MW) to demand.

² See Table 6.5 of 2023 GCS

³ See Table 6.1 of 2023 GCS

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1. Introduction

This paper is a summary of the decisions made by the SEM Committee in determining the volumes procured for the 2027/28 T-4 auction, and the factors which the SEM Committee took into account in making those decisions. It follows a similar format to the 2026/27 T-4 Auction Volumes Information Note (SEM-23-089) published in November 2023.

This note aims to improve transparency in volume setting, in line with the EY Review of the Performance of the SEM Capacity Remuneration Mechanism (see SEM-22-054a), which recommended that there be better “explanation of process by which GCS⁴ forecasts are translated to Target Volume to procure”. The RAs recognise that there are a number of factors which hinder transparency in understanding how demand forecasts translate into initial Capacity Requirements and will seek to further improve transparency via the use of a Panel of Technical Experts (PTE) and the adoption of the National Resource Adequacy Assessment (NRAA).

This information note focuses on the process within the 2027/28 T-4 auction, as distinct from the GCS forecasts themselves. The GCS and the capacity requirement calculation methodology are currently undergoing significant change in order to comply with Article 24 of the Electricity Regulation (EU) 2019/943 and be based on the European resource adequacy assessment methodology.

Prior to each auction, the TSOs calculate the minimum volumes required⁵ using established methodologies and assumptions which have been consulted upon and approved by the SEM Committee. An initial Capacity Requirement⁶ recommendation is submitted by the TSOs to the SEM Committee at the Initial Auction Information Pack (IAIP) stage, just over six months in advance of the auction. The initial Capacity Requirement is based on demand forecasts set out in the TSOs’ latest Generation

⁴ Generation Capacity Statement

⁵ The TSOs calculate the All-Island Capacity Requirement and the Locational Capacity Constraint Required Quantities for each Locational Constraint Capacity Area (LCCA) for approval by the SEM Committee

⁶ For the All-Island requirement

Capacity Statement (GCS). The 2027/28 T-4 auction volumes were based on the demand forecasts from the 2023 GCS. The SEM Committee approves the initial Capacity Requirement and the definition of the Locational Capacity Constraint Areas (LCCAs) at the time it approves the IAIP, approximately 25 weeks in advance of the auction.

In addition to the initial Capacity Requirement, the TSOs estimate a number of additional volume adjustments which are submitted to the SEM Committee. Where approved by the SEM Committee, these adjustments are subsequently reflected in the all-island demand curve and the LCCA minimum required volumes, which are published in the Final Auction Information Pack (FAIP), approximately three weeks in advance of the auction.

This note explains, at a high-level, the adjustments proposed by the TSOs, and the SEM Committee's rationale for their approved volume adjustments to be applied for the 2027/2028 T-4 Auction.

There have been a number of changes to the way in which volume requirements are calculated between the 2026/27 T-4 auction and the 2027/28 T-4 auction, which are discussed in Section 2. The move to the new ISAC2 methodology led to a reduction in the volume of "post-modelling" adjustments; however, the TSOs recommended increased non-delivery adjustments as more capacity had been contracted in 2026/27 T-4, adding to the non-delivery risk. The net result was that the total volume of adjustments proposed was higher for 2027/28 than 2026/27. The SEM Committee accepted the majority, but not all, of those recommended adjustments.

The remainder of this paper is structured as follows:

- Section 2: Describes how the process for setting volumes has evolved since the inception of the current CRM, and highlights the key changes in approach between the 2026/27 T-4 auction and the 2027/28 T-4 auction;
- Section 3: Describes the respective duties and roles of the TSOs and the SEM Committee. The TSOs' primary focus is to ensure security of supply considerations are maintained through adequate transmission capacity and system reliability, whereas the SEM Committee needs to strike an appropriate

balance between security of supply and cost to consumers. It is the role of the TSOs to advise, and the SEMC to decide, and to make the difficult judgement calls to achieve this balance;

- Section 4: Contains a summary of the adjustments proposed by the TSOs for the 2026/27 T-4 auction, and the volumes approved by the SEM Committee;
- Section 5: Explains how recent changes to the reliability standard, previously set at 8-hours of Loss of Load Expectation (LOLE), have been reflected in volumes;
- Section 6: Highlights the unprecedented level of work that needs to be undertaken to deliver the capacity that the CRM has successfully contracted, particularly at a time when a high volume of new renewables capacity is also being targeted, including via renewables support schemes outside the CRM. This section highlights the delivery risks and how these risks may constrain the build and connection of new thermal capacity, a risk also factored into volume decisions;
- Section 7: Sets out how the process is expected to evolve in the next few years, including:
 - The planned implementation of a Panel of Technical Experts, in line with the recommendations of the EY Review;
 - The move to the adoption of a new methodology for the GCS, in line with the methodology for the European resource adequacy assessment (ERAA), is underway and will be in place for this year's report.

2. Key changes in adjustments

2.1 Overview

In the first CRM auction, the transitional auction for 2018/19 held in December 2017, the volume requirements were calculated based on the results of the TSOs' original capacity methodology (sometimes referred to as ISAC1)⁷, which was publicly

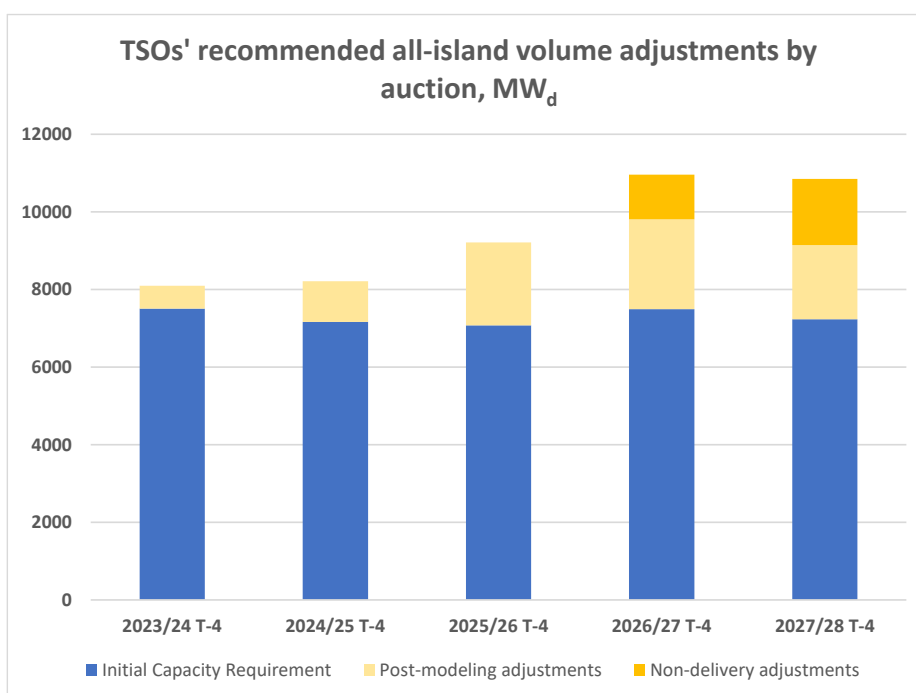
⁷ With an appropriate deduction for intermittent solar and wind output which was providing capacity, but chose not to participate in the auction

consulted on and approved by the SEM Committee. Over the course of a number of auctions, the TSOs identified that the original ISAC1 methodology had certain limitations. As discussed in the 2026/27 T-4 volumes paper (SEM-23-089), up to and including the 2026/27 T-4 auction, the TSOs had been recommending an increasing number of volume adjustments to the volumes calculated using the ISAC1 methodology to compensate for the limitations of this methodology.

At the time of the 2023/24 T-4 auction, held in March 2020, the TSOs proposed three different types of adjustments totaling 585 derated MW (MW_d) in addition to the initial Capacity Requirement of 7,510 MW_d , so adjustments accounted for around 8% in addition to the TSOs' modelled initial Capacity Requirement. Three years later, by the time of the 2026/27 T-4 auction in March 2023, the number of adjustments proposed by the TSOs had increased to eleven, totaling 3,466 MW_d , so the proposed adjustments added around 46% to the initial Capacity Requirement, and the TSOs recommended the procurement of nearly 11,000 MW_d of volume in total.

For the 2027/28 T-4 auction, on the recommendation of the TSOs, the initial Capacity Requirement was calculated using the new ISAC2 methodology, which aimed to reduce the size of "post-modelling" adjustments. The TSOs proposed 3,618 MW_d of adjustments, approximately 50% of the TSOs' modelled initial Capacity Requirement. Of these, 1,705 MW_d related to "non-delivery" risk adjustments. As anticipated, there was a reduction in the size of TSO-recommended "post-modelling" adjustments as a result of the move from the ISAC1 methodology to the ISAC2 methodology. However, this was more than offset by the increase in TSO-recommended "non-delivery" risk adjustments between the 2026/27 T-4 auction and the 2027/28 T-4 auction, largely due to an increased volume of contracted multi-year New Capacity.

Figure 1: TSOs' recommended all-island volume adjustments by T-4 auction, MW_d



Typically, the SEM Committee has approved many, but not all, of the TSOs' recommended adjustments. The adjustments are then reflected in the key volume parameters which are published in the Final Auction Information Pack (FAIP). The key volume parameters are the auction demand curve, and the minimum quantities required in each LCCA.

2.2 Key changes since the 2026/27 T-4 auction

There were a number of key changes to the way in which the TSOs calculated their volume requirements between the 2026/27 T-4 auction and the 2027/28 T-4 auction, namely:

- A move from the ISAC1 to the ISAC2 methodology for the calculation of the capacity requirements and DRFs;
- A change in LCCAs, with a reversion to the LCCA used in all auctions except the 2026/27 T-4; and
- The introduction of maximum volumes in an LCCA.

2.3 Move to ISAC2 approach

The initial Capacity Requirements and the DRFs for the 2026/27 T-4 auction were calculated using the ISAC1 approach. The SEM Committee approved the TSOs' proposed move to the ISAC2 approach for the 2027/28 T-4 auction.

The ISAC1 approach treated the capacity contribution of intermittent renewables such as wind and solar as a fixed capacity credit, to be deducted from gross peak demand. For the 2026/27 T-4 auction, there was approximately 780MW_d of non-participating capacity⁸ which could be deducted from the initial Capacity Requirement to calculate the amount of derated capacity that needed to be procured in the auction. However, the ISAC2 approach uses a net demand (demand net of the output of wind and solar) which better reflects the uncertain nature of wind and solar output at times of scarcity.

The move to the ISAC2 approach also led to a change in the way in which DRFs are calculated, and the incorporation of a number of adjustments, which were categorised as “post-modelling adjustments” in the 2026/27 T-4, within the initial Capacity Requirement in the 2027/28 T-4.

The change to the use of the “net demand” approach and the way in which DRFs are calculated mean that the initial Capacity Requirement published in the 2027/28 T-4 auction IAIP and FAIP is not directly comparable with the initial Capacity Requirement published for the 2026/27 T-4 auction.

2.4 Changes in LCCAs

In auctions held prior to the 2026/27 T-4, Northern Ireland and Ireland were defined as Level 1 LCCAs, and Greater Dublin and the “rest of Ireland” were Level 2 LCCAs nested within the Ireland Level 1 LCCA.

⁸ In the 2026/27 T-4 this was principally made up of intermittent wind and solar capacity but could also include some other dispatchable renewable capacity (such as that operating under the NI ROCs scheme which is not permitted to receive CRM payments under the State aid agreement, due to the cumulation of State aid. The Celtic interconnector was not assumed to be providing capacity support in the 2026/27 but was assumed to be operational and providing capacity support throughout 2027/28, and was treated as non-participating capacity in the 2028/29 T-4 auction.

For the 2026/27 T-4 auction, the TSOs advised that the splitting of the Greater Dublin LCCA into Dublin North and Dublin South could result in the accommodation of more capacity in parts of Greater Dublin, if coupled with maximum volume constraints on Dublin North and Dublin South. The SEM Committee accepted this recommendation, and this LCCA structure was adopted in the 2026/27 IAIP, where the structure of LCCAs is fixed for a particular auction. Subsequent to the publication of the 2026/27 T-4 IAIP, further analysis by the TSOs determined that no net additional capacity could be accommodated in either Dublin North or Dublin South, and that there was no benefit in partitioning the Greater Dublin LCCA into Dublin North and Dublin South.

As a result, for the 2027/28 T-4 auction, the TSOs did not recommend partitioning the Greater Dublin LCCA, and there was a reversion to an LCCA structure with Northern Ireland and Ireland as Level 1 LCCAs and Greater Dublin and “rest of Ireland” as Level 2 LCCAs.

2.5 Introduction of maximum volume constraints in LCCAs

As noted in SEM-23-089, the TSOs consider that there are issues in regard to short circuit levels within the Greater Dublin network which mean that little or no net additional generation capacity can be connected in the Greater Dublin area..

In SEM-23-089, the SEM Committee noted that the TSOs had advised that it would not be appropriate to connect net additional capacity in the Greater Dublin area, until such time as short circuit risks are alleviated. The TSOs further advised that the route to easing the constraint on net additional capacity is to upgrade the transmission network in Dublin, that these changes may take them a number of years to deliver, and that there may be limited scope for any net additional capacity in Greater Dublin in the 2020s as a result.

Prior to the 2026/27 T-4 auction, the SEM Committee approved CMC Modifications to accommodate maximum volume constraints in an LCCA, as well as minimum volume constraints. The concern was that if there was insufficient capacity (less than the minimum requirement) offered in the “rest of Ireland” or Northern Ireland, the auction

could clear more capacity in Greater Dublin that could be used at any given time, resulting in consumers paying for more capacity in Greater Dublin than could be used.

Implementing maximum volume constraints alongside minimum volume constraints required changes to the TSOs' auction software, and these changes could not be implemented in time for the 2026/27 T-4 auction. As a result, for the 2026/27 T-4 auction, the TSOs' recommended a 1,000MW shift to the demand curve, to reduce the chances that the unconstrained auction could procure more capacity in Greater Dublin than could be accommodated within short circuit constraints. The demand curve shift was a sub-optimal solution, and the TSOs were able to make changes to the auction algorithms so that the auction system could successfully solve with a maximum volume constraint in time for the 2027/28 T-4 auction.

The Greater Dublin maximum volume constraint was set at a gross capacity⁹ of 2,423MW_d, which is consistent with contracting all Existing Capacity and already contracted New Capacity in Greater Dublin. The implementation of the Greater Dublin maximum volume obviated the need for the demand curve shift to be employed in the 2027/28 T-4 auction. Maximum volumes of 20,000MW_d were approved for the other LCCAs (Northern Ireland, Ireland and "rest of Ireland") on the basis that 20,000MW_d was a large number, which in practice would mean that maximum volume constraints would not bind in those LCCAs.

In the event, the 2027/28 T-4 auction contracted all capacity offered in Greater Dublin without hitting the maximum volume constraint. Approximately 1,411MW_d of capacity was contracted in Greater Dublin in this auction, which combined with a total of approximately 992MW_d of multi-year New Capacity procured in previous auctions

⁹ The maximum volume constraints are specified gross of Previously Awarded Capacity in the FAIP, so with a maximum constraint of 2,423.376MW_d and Previously Awarded Capacity of 991.566MW_d, the 2027/28 T-4 auction was looking to procure a maximum volume of 1,431.81MW_d. It was also recognised that it may not be possible to simultaneously satisfy a minimum volume constraint, a maximum volume constraint and the inflexibility constraints in an LCCA if minimum and maximum volumes are sufficiently close together. The FAIP specified "prices" for exceeding the maximum volume constraints and for undershooting the minimum volume constraint, which could result in the maximum volume constraint being exceeded under certain circumstances.

totals approximately 2,402MW_d of capacity already contracted for 2027/28, approximately 20MW_d less than the maximum constraint of around 2,423MW_d.

3. Roles of the SEM Committee and the TSOs

The TSOs are responsible for a safe, secure and reliable supply of electricity. Whilst the TSOs have economic obligations¹⁰, their primary focus is ensuring security of supply.

The TSOs are responsible for calculating the capacity requirements and advising the SEM Committee on volumes to be procured. It was originally envisaged that the calculation of capacity requirements would be largely formulaic, with the TSO models applying the methodology which had been consulted and approved by the SEM Committee. However, over the years, the adjustments to the modelled initial Capacity Requirement have grown substantially, to the extent that the TSOs proposed adding 3,618MW_d in adjustments to the 2027/28 T-4 auction, i.e., 50% additional to the modelled initial Capacity Requirement.

Whereas the modelling of the initial Capacity Requirement is based on agreed methodologies, underpinned by engineering and economic principles, many of the adjustments proposed by the TSOs require the exercise of judgement. The size of the adjustments proposed depends on the level of risk the TSOs choose to take relating to the adjustments. For example:

- Will the average reliability of the generation fleet continue to decline, once new capacity replaces older units?

¹⁰ For instance:

- Under Condition 12 of its EirGrid's System Operator Licence it has a requirement to procure "assets, services and Ancillary Services from the most economical sources available to it having regard to the quantity and nature of the assets, services and Ancillary Services required to enable it to discharge its obligations"
- Under Condition 23A(g) of the SONI licence, SONI is required "(g) through the development of the Capacity Market, to promote the short-term and long-term interests of consumers of electricity with respect to price, quality, reliability, and security of supply of electricity across the Island of Ireland"

- What proportion of the multi-year New Capacity which has been previously contracted and is in the delivery pipeline will deliver on time, what proportion will deliver late, and what proportion will fail to deliver? The multi-year New Capacity in the delivery pipeline represents around 50% of the existing thermal generation fleet. Whilst the TSOs, Departments and the RAs have set up monitoring programmes, the amount of new capacity in the delivery pipeline is unprecedented, as are circumstances around delivery (e.g., delays to planning consents, environmental permitting numbers, grid and gas connection numbers, as well as the impact of the war in Ukraine and Covid-19 on supply chain disruptions).
- The need to replace high-emissions plant alongside data centre-driven demand growth is placing unprecedented strain on the industry, and there is no relevant historical parallel on which to base assumptions.
- Will DSUs' average availability be better in a scarcity event than their average availability across the year as a whole, and would DSUs' availability improve if measured against their Load Following Obligated Capacity Quantity or if energy market rule changes were implemented to remunerate them for demand reduction down from their baseline demand?

As discussed in SEM-23-089, it is necessary to make a judgement about how risks are correlated and how much they diversify.

The TSOs, as prudent operators whose primary focus is security of supply, tend to take a conservative approach with respect to risk diversification and other key assumptions. For instance, in recommending adjustments to the initial Capacity Requirement, the TSOs take an additive approach, which implicitly assumes that risks are perfectly correlated, and it is necessary to procure additional capacity as insurance to cover the eventuality that all reasonable known risks materialise simultaneously. However, if this approach to the minimum requirements results in more capacity being procured than is required to meet the security standard, consumers bear the financial consequences.

The SEM Committee¹¹ is the decision-making authority for all Single Electricity Market (SEM) matters, covering both Ireland and Northern Ireland. The principal objective of the SEM Committee is to protect the interests of consumers of electricity by promoting effective competition between persons engaged in, or in commercial activities connected with, the sale or purchase of electricity through the SEM¹². In pursuing this objective, the SEM Committee is required to have regard (amongst other things) to the need to ensure that all reasonable demands for electricity in Ireland and Northern Ireland are met.

When making decisions on volumes to be procured, the SEM Committee has to balance the All-Island consumers' interests in having access to low-cost energy against Security of Supply risks.

The SEM Committee has taken a balanced approach when approving adjustments to CRM auction volumes. On the one hand, if adjustments are too conservative, they run the risk of further increasing consumers' capacity bills. On the other hand, the SEM Committee is also aware that if a higher-than-expected number of risks materialise, then the cost / MW_d / year of remedial actions could be significantly greater than the cost of procuring more capacity via T-4 auctions.

4. Volume decisions for 2027/28 T-4 auction

4.1 All-island Overview

In September 2023, the TSOs submitted recommendations to the SEM Committee for the following adjustments to the all-island Capacity Requirement and LCCA required quantities for the 2027/28 T-4 auction:

- Six different “post-modelling” adjustments, totaling 1,863MW_d at all-island level. The proposed modelling adjustments remain large despite the move to

¹¹ Established in 2007 following the introduction of the SEM, legislation required the establishment of SEM governance in the form of a SEM Committee, and consist of three representatives from the Commission for Regulation of Utilities (CRU) in Ireland and three representatives of the Utility Regulator (UR) of Northern Ireland along with an independent and a deputy independent member.

¹² <https://www.semcommittee.com/about-us#:~:text=The%20principal%20objective%20of%20the,of%20electricity%20through%20the%20SEM.>

ISAC2. The largest element includes 700MW_d of reserves, increased from 500MW_d to reflect the fact that the Celtic interconnector is expected to be commissioned by 2027/28, and will increase the size of the largest single infeed by 200MW. A 350MW_d adjustment for Transmission Outage Planning (TOPs), is also included;

- A further 1,705MW_d of adjustments at all-island level, to increase the amount of capacity sought to reflect the risk of non-delivery of contracted new capacity. This includes an expectation that a proportion of the 3,917MW_d of the capacity awarded in previous auctions¹³ will not be commissioned in time for 2027/28, and an expectation that some of the capacity to be awarded in the 2027/28 T-4 will not be commissioned in time either; and
- A potential adjustment to the All-Island demand curve of 50MW_d to reflect changes to the All-Island Reliability Standard. This sensitivity was requested by the RAs, and the decisions around the Reliability Standards are discussed separately in Section 6.

As shown in Table 1, the SEM Committee decided to approve some, but not all of the TSOs' recommendations.

Table 1: Summary of TSO recommended adjustments and SEM Committee approved volumes

	TSO Recommended					SEM Committee Decision				
	All Island	Level 1		Level 2		All Island	Level 1		Level 2	
		NI (L1-1)	Ireland (L1-2)	Dublin (L2-1)	Rest of Ireland (L2-2)		NI (L1-1)	Ireland (L1-2)	Dublin (L2-1)	Rest of Ireland (L2-2)
Initial Capacity Requirement	7,236	1,599	5,691	2,100	0	7,236	1,599	5,691	2,100	0
Non-participating capacity	-402	-23	-379	0	-379	-402	-23	-379	0	-379
Adjusted ISAC Requirement	6,834	1,576	5,312	2,100	-379	6,834	1,576	5,312	2,100	-379
Post modelling adjustments	1,863	541	1,347	107	1,239	1,099	468	968	107	861
Non-delivery adjustments	1,705	260	1,445	253	1,192	0	0	0	0	0
Reliability Standard	50	20	205	0	205	50	20	205	0	205
Diversified Risk Adjustment	0	0	0	0	0	1,210	310	1,250	0	900
Gross Auction Requirement after Adjustments	10,451	2,397	8,309	2,461	2,257	9,192	2,373	7,735	2,207	1,587
Previous Awarded Capacity	-3,917	-911	-3,006	-992	-2,015	-3,917	-911	-3,006	-992	-2,015
Net Auction Requirement	6,534	1,486	5,303	1,469	243	5,275	1,463	4,729	1,216	-428

¹³ Consistent with the values published in the FAIP, which reflects capacity previously awarded, net of terminations as of the date the FAIP was approved.

At an All-Island level, the SEM Committee approved:

- A total of 1,099MW_d of “post-modelling” adjustments to the all-island requirement, although the sum of the adjustments accepted at LCCA level was greater at 1,436MW_d.¹⁴ The SEM Committee also took into account a further 350MW_d of one of the categories of “post-modelling” adjustments, the Transmission Outage Planning (TOPs) adjustment, when calculating the “diversified risk adjustment”, which diversified risk across a range of risk categories, and LCCAs;
- A total of 1,210 MW_d of diversified risk adjustment, which took into account diversification of TOPs risk and non-delivery risks at all-island level. The sum of the LCCA diversified risk adjustments is 1,520MW_d. The SEM Committee’s decision with regard to the diversified risk adjustment took into account other elements of the overall approach to volume setting, which are relatively conservative, such as the use of the Least Worst Regrets methodology which selected a demand forecast approximately 300MW in excess of the median forecast;
- An adjustment of 50MW_d, to reflect a move to a 6.5-hour All-Island Reliability Standard- see further discussion in Section 5.

4.2 Decisions at LCCA level

At LCCA level, the SEM Committee approved:

- 2,423MW_d of adjustments in L1:2 (rest of) Ireland, which is 81% of the 2,997MW_d recommended by the TSOs, a difference of 574MW_d; and
- 797MW_d of adjustments in Northern Ireland, which is 97% of the 821MW_d recommended by the TSOs, a difference of 24MW_d.

As a result, the SEM Committee approved Gross Auction Requirement of:

¹⁴ The sum of the 468MW_d of “post modelling adjustments” for NI and 968MW_d of “post modelling adjustments” for Ireland

- Ireland: 1,587MW_d in the “rest of Ireland”¹⁵, together with Gross Auction Requirements of 2,207MW_d in Greater Dublin and 7,735MW_d in Ireland as a whole;
- Northern Ireland: 2,373MW_d.

It is the LCCA Gross Auction Requirements that are published in the FAIP¹⁶, and the LCCA values of previously Awarded Capacity published in the FAIP¹⁷ must be deducted from the published Gross Auction Requirements to calculate the Net Auction Requirements being sought.

When procuring capacity at a regional level, the SEM Committee also needs to bear in mind that capacity procured for locational reasons in Ireland is borne in part by consumers in Northern Ireland, and capacity procured for locational reasons in Northern Ireland is borne in part by consumers in Ireland. Therefore, the SEM Committee has to give careful consideration to adjustments which are targeted at achieving a policy objective in one jurisdiction only via the CRM. For instance, where the SEM Committee approves the Transmission Outage Planning adjustment in Ireland, to support the Government of Ireland’s renewables targets, consumers in Northern Ireland bear a share of the costs.

4.3 Impact of volume decisions

After the auction, the SEM Committee calculated the effect of its decisions on volumes and consumer bills.

Following the 2027/28 T-4 auction, the CRM auctions to date have contracted a total of just under 3,750MW_d of multi-year New Capacity contracts for 2027/28, net of

¹⁵ However, given the maximum constraint of 2,423MW_d in Greater Dublin, 5,332MW_d of 7,735MW_d gross requirement in Ireland had to be located in the “rest of Ireland”, and it is the 5,332MW_d which should be regarded as the “rest of Ireland” gross requirement, rather than the value of 1,587MW_d published in the FAIP.

¹⁶ Published in Table 4 of the 2027/28 T-4 FAIP

¹⁷ Published in Table

terminations¹⁸. Just over 3,050MW_d of this capacity in Ireland and just under 700MW_d in Northern Ireland. Just over 2,850MW_d of the 3,750MW_d is new-gas fired capacity. As of July 2024, a total of 836 MW_d of multi-year New Capacity contracted for 2027/28 has already achieved completion, of which around 229 MW_d is in Ireland and around 607 MW_d is in Northern Ireland.

It was clear that the SEM Committee's decision to approve less than 100% of the TSOs' proposed adjustment had no impact on the volumes contracted, as 100% of offered volume was contracted. The consumer bill for the T-4 auction was €598m, which, added to the €476m¹⁹ cost of the 3,750MW_d of multi-year capacity procured for 2027/28 in prior year auctions, brings the consumer bill to €1.07bn, equal to around €86 per year for the average household. However, not all of this capacity is expected to be delivered by the start of 2027/28, which is why the SEM Committee made a significant provision for "non-delivery" risk in the diversified risk adjustment. Where capacity is delivered late or terminates, the outturn cost to consumers will be commensurately reduced.

5. Reliability Standard

The All-Island initial Capacity Requirement, and those for the Northern Ireland and the Ireland Level 1 LCCAs²⁰ were calculated based on the 8-hour LOLE Reliability Standard, which was in place at the time the IAIP was published²¹, which had been used in all CRM auctions to date.

¹⁸ As of July 2024. The estimate of 3,750MW_d, is different from the value of previously contracted capacity published in the 2027/28 T-4 FAIP due to: projects which terminated between when the FAIP was published; and additional multi-year New Capacity contracted in the 2027/28 T-4 auction.

¹⁹ The estimate of €476m takes account of terminations up May 2025, but does not take account of the impact of the cost of indexation resulting from the SEM Committee's decision to allow indexation during the build period for the increase in capex costs of New Capacity contracted during the 2024/25 T-3 and 2025/26 T-4 auctions

²⁰ The requirements for Level 2 LCCAs are calculated based upon a different approach as set out in SEM-17-040a

²¹ 14 March 2023

However, in late September 2023 the SEM Committee published the results of the VoLL study (SEM-23-072), which set out the estimate of VoLL_{RS}, calculated in line with the ACER Decision on the Methodology for calculating the Value of Lost Load, the Cost of New Entry, and the Reliability Standard. SEM-23-072 noted that when combined with the estimate of CONE derived from the 2023 CEPA/Ramboll 2023 BNE Net Cone study²², this would result in a revised LOLE Reliability Standard (RS) of 6.5 hours. SEM-23-073 noted that ACER stated the following:

“... pursuant to Article 25(2) of the Electricity Regulation, setting the RS is a Member State’s prerogative that is beyond the scope of the RS methodology. In that respect, ACER agrees with the views provided by ENTSO-E and the Member States during the consultation process ...and reiterates that the RS methodology focuses solely on calculating the RS and therefore does not encroach upon the Member States’ right to set the RS.”

SEM-23-072 stated that *“the SEM Committee has accepted the 6.5 hours as the output of the methodology and instructed the RAs to engage DECC in Ireland and DfE in NI (including through the Joint Steering Group) on whether an alternative RS should be set as a national competence instead of the default output of the ACER methodology.”*

Following engagement with DECC in Ireland and DfE in NI, it was agreed that a 6.5-hour LOLE would be applied to the all-island capacity requirement. The NI adjusted Capacity Requirement was also set based on a 6.5-hour standard. In Ireland, DECC working with the CRU, decided to set an alternative RS for Ireland based on a 3-hour standard, using a Member State’s rights to set the RS based on a national competence rather than the default output of the ACER methodology.

Moving from an 8-hour standard to a 6.5-hour standard adds 50MW_d to the All-Island Capacity Requirement and 20MW_d to the NI Capacity Requirement. Moving from an 8-hour standard to a 3-hour standard resulted in an increment of 205MW_d to the Capacity Requirement in Ireland.

²² See SEM-23-016

6. Capacity delivery and challenges

The electricity and gas systems of Ireland and Northern Ireland are facing an unprecedented level of change to replace high emissions plant, connect new renewables and storage, meet increasing demand and make other changes required to deliver decarbonisation. The CRM is an important component of the transition, and key to facilitating delivery of storage capacity and to “keep the lights on” on the road to net zero. The CRM will not, on its own, deliver the path to net zero. However, in the short term, the CRM is key to significantly reducing carbon emissions, whilst maintaining security of supply, by replacing old high emissions coal, oil and peat units with storage capacity, DSUs and lower emissions gas-fired units. Additionally, as set out SEM-24-035 the SEM Committee is considering further measures to support decarbonisation.

Building and connecting all the new CRM capacity to electricity and gas networks in contracted timeframes is a large and unprecedented challenge to the electricity and gas industry in Ireland and Northern Ireland. The magnitude of the challenge is heightened by the fact that the industry is also required to deliver almost 7,000MW of onshore and offshore renewables capacity in Ireland following the recent RESS-1, RESS-2, RESS-3 and ORESS auctions. Overall, EirGrid / SONI expect to connect around 20GW²³ of renewables across Ireland and Northern Ireland within the next ten years.

The SEM Committee recognised that delivering on these challenges will place unprecedented strain on scarce resources, including appropriately skilled engineers and building contractors, which may be a finite resource that constrains the rate at which new thermal and renewables capacity can be connected. Whilst these challenges and risks may be hard to quantify, the SEM Committee recognises the risk and factored this consideration qualitatively into its volume decisions. Contracting more capacity will

²³ The 2023 Generation Capacity Statement forecasts an additional 20,196 MW of wind and solar capacity across Ireland and NI between the end of 2023 and end of 2032. This represents a significant increase over forecasts contained in the 2022GCS, which estimated an increase of 11,460MW of wind and solar capacity between the end of 2022 and the end of 2031.

not necessarily improve security of supply, if the capacity is competing for scarce resource, and if it makes existing contracted capacity more difficult to deliver.

7. Future Changes

Capacity Remuneration Mechanisms continue to develop and evolve, and the need for this to happen is reflected in the various reviews that assessed the SEM CRM, including the EY Report (SEM-22-054a), which was consulted on by the SEM Committee.

7.1 Panel of Technical Experts

EY was engaged to review the performance of the SEM Capacity Remuneration Mechanism (CRM), which was subject to a consultation process, with outcomes noted in SEM-23-036 (published November 2023). As part of this review, EY assessed the design of the CRM for any improvements that could be made in order to ensure sufficient procurement of capacity and prepared a report (see SEM-22-054a), which included recommendations that could be implemented to improve the performance of the CRM.

One of the key recommendations is to promote greater transparency of the target volume setting through an assessment by a panel of technical experts (PTE) of TSO volume recommendations, with their findings published, and an explanation of the process by which GCS forecasts are translated to the target volume to procure in capacity auctions.

The SEM Committee has accepted this recommendation (see SEM-23-036), and is undertaking work to implement the PTE. The SEM Committee is currently consulting on the PTE's Terms of Reference (SEM-24-049).²⁴

7.2 Move to NRAA approach

²⁴ <https://www.semcommittee.com/files/semcommittee/2024-07/SEM-24-049%20SEM%20PTE%20ToR%20Consultation.pdf>

The capacity requirements for the SEM are currently calculated based upon an approach known as convolution. Both ISAC1 and ISAC2 are based on convolution approaches, and have a number of inadequacies, particularly in terms of modelling a power system with increasing levels of intermittent renewable generation, storage and interconnection. The ISAC2 approach will continue to be used until the SEM moves to adopt the new National Resource Adequacy Approach (NRAA) for the purposes of calculating capacity requirements.

The European Commissions' Clean Energy Package introduced requirements for a new methodology to assess both national and European resource adequacy. The European Resource Adequacy Assessment (ERAA) may be used by Member States to justify the need for a capacity mechanism. While ACER approved the ERAA methodology in October 2020, it did not approve the ERAA results for 2021 or 2022. In May 2024, ACER approved ERAA 2023. However, the EU regulations also allow a Member State to use its own NRAA for the purposes of calculating its capacity requirement.²⁵ The NRAA is currently being developed, and will use a Monte-Carlo based method for calculating requirements, which is expected to be an improvement on the current convolution-based approach.

The TSOs have developed an implementation plan for the new NRAA for both Ireland and Northern Ireland, published a consultation paper on the NRAA methodology in December 2023 and a consultation paper on input assumptions in March 2024. Once this methodology has been implemented, it will be used to calculate the capacity requirements for Ireland, Northern Ireland and the SEM as a whole. The TSOs' Generation Capacity Statement (GCS) will also be based on the new NRAA methodology.

Once the NRAA has been adopted by the TSOs, it should further reduce the need for "post-modelling" adjustments and non-delivery adjustments, and hence the requirement to make judgement calls in setting volume requirements. However, it will

²⁵ Article 24(1) of the Recast Electricity Regulation (2019/943) sets out that the NRAA should be based on the ERAA methodology and thus must apply probabilistic calculations, include economic assessment and consider all resources, including energy storage and interconnection.

still be necessary to make judgement calls about what proportion of the contracted multi-year capacity will be successfully delivered by any given capacity year.