



**Single Electricity Market
(SEM)**

**Capacity Remuneration Mechanism
2023/24 T-4 Capacity Auction Parameters**

**Consultation Paper
SEM-19-023**

17 May 2019

1 EXECUTIVE SUMMARY

Under the revised SEM arrangements, implemented in October 2018, capacity revenues are allocated by a capacity auction for a relevant capacity year. Prior to each capacity auction, a number of capacity auction parameters must be set. The list of parameters to be determined by the Regulatory Authorities is described in paragraph D.3.1.3 of the Capacity Market Code.

This paper sets out the SEM Committee's proposals for the relevant parameters to apply in the 2023/24 T-4 capacity auction, scheduled to take place in March 2020.

The proposed parameters for consultation are:

Parameter	Proposed Value for 2023/24 T-4 capacity auction
De-Rating Curves, defining De-Rating Factors by unit Initial Capacity and by Technology Class (including for Interconnectors)	To be calculated by the System Operators and submitted to the Regulatory Authorities for determination prior to the publication of the Initial Auction Information Pack.
Capacity Requirement	To be calculated by the System Operators and submitted to the Regulatory Authorities for determination prior to the publication of the Initial Auction Information Pack.
Indicative Demand Curve	<p>The Demand Curve will be based on the following principles:</p> <ul style="list-style-type: none"> • Horizontal at the Auction Price Cap of 1.5 times Net CONE, from 0MW to 92.5% of the Capacity Requirement. • Slopes down in a straight line to 115% of the Capacity Requirement. The line passes through the point at where the volume is equal 100% of the Capacity Requirement and the price equals Net CONE.

	The demand curve for the auction will also include adjustments for reserves and demand withholding. Decisions on these volumes will be made prior to the publication of the Final Auction Information Pack.											
Auction Price Cap	1.5 times Net CONE i.e. €138.45 / de-rated kW.											
Existing Capacity Price Cap	0.5 times Net CONE i.e. €92.30 / de-rated kW.											
New Capacity Investment Rate Threshold	€300 per de-rated kW											
Annual Stop Loss Limit Factor	1.5											
Billing Period Stop Loss Factor	0.5											
Indicative Annual Capacity Exchange Rate	The Exchange Rate will be proposed by the System Operators and included in the Initial Auction Information Pack.											
Increase Tolerance and Decrease Tolerance by Technology Class	<table border="1"> <thead> <tr> <th>Technology Class</th> <th>Increase Tolerance (%)</th> <th>Decrease Tolerance (%)</th> </tr> </thead> <tbody> <tr> <td>All except DSUs</td> <td>0</td> <td>0</td> </tr> <tr> <td>DSUs</td> <td>0</td> <td>100</td> </tr> </tbody> </table>			Technology Class	Increase Tolerance (%)	Decrease Tolerance (%)	All except DSUs	0	0	DSUs	0	100
Technology Class	Increase Tolerance (%)	Decrease Tolerance (%)										
All except DSUs	0	0										
DSUs	0	100										
Performance Securities	Date / Event		Performance Security Rate (€/MW)									
	More than 13 months prior to the beginning of Capacity Year		10,000									
	From 13 months to beginning of Capacity Year		30,000									
	From beginning of Capacity Year		40,000									

Termination Charges	Date / Event	Termination Charge Rate (€/MW)
	More than 13 months prior to the beginning of Capacity Year	10,000
	From 13 months to beginning of Capacity Year	30,000
	From beginning of Capacity Year	40,000
Full Administered Scarcity Price and Reserve Scarcity Price	Short Term Reserve (MW)	Administered Scarcity Price (€/MWh)
	Demand Control	25% of VoLL
	0	25% of VoLL
	500	500
Values for determining strike price in accordance with the Trading and Settlement Code	The SEM Committee proposes to retain the existing values for the 2023/24 T-4 capacity auction.	

In addition to the parameters which must be determined under paragraph D.3.1.3 of the Capacity Market Code, the RAs make the following proposals:

- Transmission constraints will continue to be included in the 2023/24 T-4 auction
- The 2023/24 should be based on Auction Format D.

Responses to the proposals within this consultation should be sent to Kenny Dane (kenny.dane@uregni.gov.uk) by 28 June 2019. We intend to publish all responses unless they have been marked confidential.

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The I-SEM Capacity Remuneration Mechanism (“**CRM**”) was developed through an extensive series of consultation and decision papers. The CRM allocates capacity payments through ex-ante capacity auctions, with penalties being issued for capacity that is not delivered when it is needed.

Before each capacity auction, the Capacity Market Code (“**CMC**”) requires a number of auction parameters to be determined by the Regulatory Authorities (“**RAs**” (the Utility Regulator in Northern Ireland and the Commission for Regulation of Utilities (“**CRU**”) in Ireland).

Parameters to be determined

Paragraph D.3.1.3 of the CMC requires the Regulatory Authorities to determine the following parameters for each Capacity Auction, and provide them to the System Operators for inclusion in the applicable Initial Auction Information Pack:

- (a) De-Rating Curves, defining De-Rating Factors by unit Initial Capacity
- (b) Capacity Requirement
- (c) Demand Curve
- (d) Auction Price Cap
- (e) Existing Capacity Price Cap
- (f) New Capacity Investment Rate Threshold
- (g) Annual Stop-Loss Limit Factor
- (h) Billing Period Stop-Loss Limit Factor
- (i) Annual Capacity Payment Exchange Rate
- (j) Increase Tolerance and Decrease Tolerance by Technology Class
- (k) in respect of Performance Securities:
 - (i) the final Performance Security Posting Dates / Events; and
 - (ii) for each Performance Security Posting Date / Event, the final €/MW rate to be applied in setting Performance Securities
- (l) fee rates for calculating Termination Charges
- (m) Full Administered Scarcity Price and the Reserve Scarcity Price Curve; and

- (n) anticipated values for the parameters to be applied in determining the Strike Price in accordance with the Trading and Settlement Code.

In addition to these parameters, the consultation on parameters for the 2022/23 T-4 auction also covered:

- Treatment of constraints in T-4 auction
- Auction format
- Reserves and Capacity Withholding

This consultation will also cover these issues.

As described, the Regulatory Authorities must determine the following parameters:

(a) *De-Rating Curves*

A De-Rating Curve is a curve for a Technology Class that represents the De-Rating Factor applicable by unit Initial Capacity to be used in a Capacity Auction. A De-Rating Factor must be between zero and one, and describes the proportion of Initial Capacity of a Generator Unit or Interconnector that can be used in a Capacity Auction.

The most recent methodology for the calculation of the Capacity Requirement and De-rating factors was published in June 2018 (SEM-18-030a). A Least-Worst Regrets analysis is performed to select the demand forecast level to be used for the Capacity Market auction and associated capacity requirement. The de-rating factors are those that are used to derive the capacity requirement selected by the Least-Worst Regrets analysis.

The Regulatory Authorities will follow this methodology in determining the de-rating factors for the 2023/24 capacity auction, and are not inviting specific comments on this parameter.

(b) *The final Capacity Requirement for the Capacity Year to be used in the Capacity Auction*

The Capacity Requirement is the de-rated capacity required to satisfy the SEM Security Standard for a specific Capacity Year to be used in a Capacity Auction.

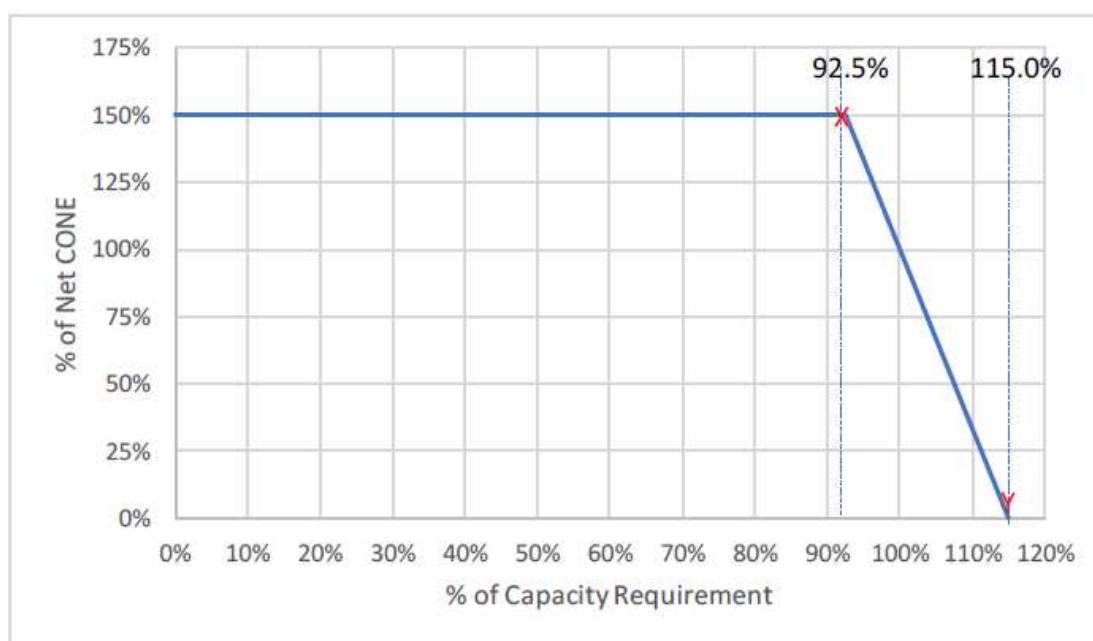
The Capacity Requirement for the 2020/21 T-1 and 2021/22 T-2 Capacity Auctions will be determined by the System Operators prior to the publication of the Initial Auction Information Pack. The Regulatory Authorities are not inviting specific comment on this parameter.

(c) *Indicative Demand Curve*

A Demand Curve is a curve determined by the Regulatory Authorities representing the deemed per MW value of each level of capacity that could be awarded in the Capacity Auction.

The shape of the demand curve for the 2022/23 T-4 auction was determined in accordance with the following principles:

- Horizontal at the Auction Price Cap of 1.5 times Net CONE, from 0MW to 92.5% of the Capacity Requirement.
- Slopes down in a straight line to 115% of the Capacity Requirement. The line passes through the point at where the volume is equal 100% of the Capacity Requirement and the price equals Net CONE.



This curve allows for the possibility of procuring less than the Capacity Requirement in the T-4 auction, and buying commensurately more in the respective T-1 auction. The Final Demand Curve used in the CY2022/23 T-4 Capacity Auction was:

De-Rated Capacity (MW)	Demand Curve Point (€/MW/year)
0	138,450
6,205	138,450
6,770	92,300
7,898	0

It is proposed that the shape of the demand curve will remain the same for the 2023/24 T-4 auction.

Reserves and Withholding

Reserves

In the CRM Reserves Decision Paper (SEM-18-173), published in November 2018, the SEM Committee decided to include a measure of reserves in the all-island demand curve, and to include a measure of reserves in the Level 1 and Level 2 Locational Capacity Constraint Area minimum MWs for at least the 2022/23 T-4 auction. The SEM Committee decided that the jurisdictional values be included for reserves should be as follows:

- **Northern Ireland: 100MW**, to reflect levels of operational reserve at which the System Operators have advised the RAs that they are likely to undertake demand control actions within Northern Ireland.
- **Ireland: 225MW**, to reflect the level of operating reserve at which the System Operators have advised the RAs that they are likely to undertake demand control actions within Ireland.
- **Dublin: 70MW** (approximately one-third of the total for Ireland) is broadly a pro-rata allocation of the Ireland reserve to Dublin.

The SEM Committee proposes to include reserves within the demand curve for the 2023/24 T-4 capacity auction. A decision on the specific volumes for each of the LCCAs will be made before the publication of the Final Auction Information Pack (FAIP).

Withholding for Demand Uncertainty

The final demand curve for the 2022/23 T-4 capacity auction was based upon the demand growth projections published in the 2018-27 All-Island Generation Capacity Statement. This growth is particularly steep in the Dublin region. The SEM Committee decided that the range between low and high scenarios, coupled with the steepness of the median growth, particularly in Dublin, justified the withholding of 250MW and 50MW from Dublin and Northern Ireland respectively. Should this growth materialise as

predicted, there will still be opportunity for extra capacity to be procured through a later auction.

The SEM Committee proposes to withhold capacity for demand uncertainty in the 2023/24 T-4 auction. A decision on the specific volumes to withhold will be made prior to the publication of the FAIP.

Withholding for DSU Participation

In CRM Decision 3 (SEM-16-039), the SEM Committee stated its intention to hold back between 2% and 5% of the Capacity Requirement from T-4 auctions to T-1 auctions. This decision reflected the recognition that it is difficult for DSUs to have certainty of availability and costs at T-4 stage, and hence to participate in a T-4 auction.

The decision to hold back between 2% and 5% reflected the level of DSU participation in the SEM at the time the decision was made, with only around 320MW of DSU participating in the Capacity Payment Mechanism in August 2016.

For the 2022/23 T-4 auction, the SEM Committee decided to withhold the lower end of this range at an all-island level and in each LCCA.

The SEM Committee propose to withhold capacity for DSU participation from the 2023/24 T-4 auction. A decision on the specific volume to withhold will be made prior to the publication of the FAIP. However, the volume will be within the range of 2% to 5%.

(d) The Auction Price Cap

The Auction Price Cap is the maximum price allowed in a Capacity Auction. It is the maximum price which all Qualified Bidders can submit. It is also the maximum price the auction can clear at, and the maximum Reliability Option fee that any capacity provider can be paid.

For all previous auctions, this has been set at 1.5 times Net CONE (Cost of New Entry). This was to allow a 50% margin for uncertainty in setting Net CONE.

Net CONE is determined by the value of a Best New Entrant (“**BNE**”) reference plant, net of infra-marginal rent and DS3 income. For the 2022/23 T-4 capacity auction, Net CONE was determined to be €92.30/de-rated kW. This value is also to be used for the 2020/21 T-1 and 2021/22 T-2 capacity auctions.

The SEM Committee therefore propose to continue to use a Net CONE of €92.30 / de-rated kW for the 2023/24 T-4 capacity auction.

(e) *Existing Capacity Price Cap*

The Existing Capacity Price Cap (“**ECPC**”) is the price cap applicable to Existing Capacity in a Capacity Auction. It is a uniform (i.e. non-technology specific) cap which caps the price that Existing Generators and interconnectors can offer volume at, unless they apply to the Regulatory Authorities for a higher Unit Specific Price Cap (“**USPC**”)¹. New Capacity² and DSUs are not subject to the ECPC, and may bid up to the Auction Price Cap.

For the first transitional capacity auction (2018/19 T-1), ECPC was set at 0.5 times Net CONE. The rationale for this value was:

- It was estimated that the vast majority of plant required to meet the Capacity Requirement could bid at its Net Going Forward Cost without needing to apply for a unit specific bid limit;
- It is consistent with relevant international benchmarks;
- It strikes an appropriate balance between the objectives of protecting consumers from the potential for bidders to exercise market power, and not placing an excessive workload on market participants and RAs from having to respectively submit and review significant volumes of USPC applications.

For the 2020/21 T-1 and 2021/22 T-2 capacity auctions, the ECPC was set again set at 0.5 times Net CONE = €46.15/de-rated kW.

¹ Or submit an Opt-Out Notification on the grounds that they are going to close before the end of the relevant Capacity Year

² Generators which meet the criteria for new build generation will not be subject to the Existing Capacity Price Cap and may bid at a price up to the Auction Price Cap

The SEM Committee is not proposing to amend the Existing Capacity Price Cap for the 2023/24 T-4 capacity auction, but will continue to keep the value under review, taking account of participants' bidding behaviour in auctions and the number of USPC applications received.

(f) New Capacity Investment Rate Threshold

The New Capacity Investment Rate Threshold is an amount determined by the RAs that must be exceeded by the cost per MW of constructing New Capacity for that capacity to be eligible to be allocated Awarded Capacity with a duration of more than one year.

For all auctions to date, the New Capacity Investment Rate Threshold (“**NCIRT**”) has been set at €300/de-rated kW. The SEM Committee propose to retain this value for the 2023/24 T-4 auction.

(g) Annual Stop-Loss Limit Factor

The Annual Stop-Loss Limit Factor is the multiplier used to establish the annual stop-loss limited for Non-Performance Difference Charges from a Capacity Market Unit. For all auctions to date, the Annual Stop-Loss Limit Factor was set at 1.5.

The SEM Committee propose to retain the Annual Stop-Loss Limit Factor at 1.5 for the 2023/24 T-4 auction.

(h) Billing Period Stop-Loss Limit Factor

The Billing Period Stop-Loss Limit Factor is the multiplier used to establish the billing period stop-loss limit for Non-Performance Difference Charges from a Capacity Market Unit.

For all auctions to date, this factor was set at 0.5. The SEM Committee propose to retain the Billing Period Stop-Loss Limit Factor at 0.5 for the 2023/24 T-4 auction.

(i) The indicative Annual Capacity Payment Exchange Rate

The Annual Capacity Charge Exchange Rate is an exchange rate applicable to a Capacity Year which converts the Capacity Payment Price for a Primary Trade or a Secondary Trade from Euros to Sterling.

Only the indicative Annual Capacity Exchange Rate must be determined for the Initial Auction Information Pack. The final Annual Capacity Payment Exchange Rate will be included in the Final Auction Information Pack.

Under K.2.1.5 of the Capacity Market Code, the System Operators will determine and publish an indicative Annual Capacity Payment Exchange Rate for the Initial Auction Information Pack for the first Capacity Auction in respect of that Capacity Year.

(j) The final allowed Increase Tolerance and Decrease Tolerance by Technology Class that may be applied by a Participant in its Application for Qualification to Capacity Market Unit de-ratings;

The Increase Tolerance is a percentage upwards tolerance that a Participant is permitted to apply to a Capacity Market Unit de-rating in an Application for Qualification. There may be different Increase Tolerances for different Technology Classes.

The Decrease Tolerance is a percentage downwards tolerance that a Participant is permitted to apply to Capacity Market Unit de-ratings in an Application for Qualification. There may be different Decrease Tolerances for different Technology Classes.

There are two additional issues to note regarding Decrease Tolerances:

Note 1: the decrease tolerance for the DSU technology class also applies to any demand reduction component of a Candidate Unit that is part of an

Autoproducer Site (where the demand reduction component is calculated as the Autoproducer Demand Reduction Volume / Maximum Export Capacity).

Note 2: in accordance with SEM Committee decision SEM-18-030, where satisfactory evidence is provided to the System Operators, the decrease tolerance shall be 100% for a Candidate Unit that, due to relevant emissions legislation, has its running hours restricted to an extent that would reasonably be considered to prevent reliable delivery of their De-rated Capacity at times of scarcity, e.g. the 500 hour limits set out in Annex V of the Industrial Emission Directive (2010/75) in relation to NO_x emissions.

The SEM Committee proposes to retain the following Increase and Decrease Tolerance levels for the 2023/24 T-4 capacity auction.

Technology Class	Increase Tolerance (%)	Decrease Tolerance (%)
All except DSUs	0	0
DSUs	0	100

(k) *In respect of Performance Securities:*

- (i) The final Performance Securities Posting Dates / Events applicable to Awarded Capacity allocated in the Capacity Auction; and
- (ii) For each Performance Security Posting Date/ Event, the final €/MW rate to be applied in setting Performance Securities applicable to Awarded Capacity allocated in the Capacity Auction;

A Performance Security is a security required as a condition of capacity award for Awarded New Capacity that has not reached Substantial Completion

A Performance Security Posting Date / Event is a date or event from which a specified €/MW rate shall be applied to Awarded Capacity in setting Performance Securities. There may be multiple different Performance Security Posting Dates/ Events.

The SEM Committee proposes to retain the following Performance Security Dates and Values for the 2023/24 T-4 Capacity Auction:

Date / Event	Performance Security Rate (€/MW)
More than 13 months prior to the beginning of Capacity Year	10,000
From 13 months to beginning of Capacity Year	30,000
From beginning of Capacity Year	40,000

(l) €/MW fee rates for calculating Termination Charges

A Termination Charge is a fee payable by a Participant where Awarded New Capacity is terminated

The SEM Committee proposes to retain the following Termination Charge rates for the 2022/23 T-4 capacity auction:

Date / Event	Termination Charge Rate (€/MW)
More than 13 months prior to the beginning of Capacity Year	10,000
From 13 months to beginning of Capacity Year	30,000
From beginning of Capacity Year	40,000

(m) *Anticipated values for the Full Administered Scarcity Price and the Reserve Scarcity Price Curve applicable to the Capacity Year;*

The Administered Scarcity Price function sets a floor on the Balancing Market price when a scarcity event occurs. The Full Administered Scarcity Price is the maximum value of the Administered Scarcity Price. The Reserve Scarcity Price Curve is a piecewise linear curve defining the relationship between the Reserve Scarcity Price and the Short Term Reserve Quantity.

The SEM Committee proposes to retain the following values for Full Administered Scarcity Price for the 2023/24 T-4 capacity auction.

Short Term Reserve (MW)	Administered Scarcity Price (€/MWh)
Demand Control	25% of VoLL ³
0	25% of VoLL
500	500

(n) *Anticipated values for the following parameters be applied in determining the Strike Price for the Capacity Year.*

- (i) The Carbon Price (PCARBON_m) for Month, m;
- (ii) The Natural Gas Fuel Price (PFUELNG_m) for Month, m;
- (iii) The Oil Fuel Price (PFUELO_m) for Month, m.
- (iv) The Peaking Unit Theoretical Efficiency (FTHEORYPU_y) for Capacity Year, y;
- (v) The Natural Gas Carbon Intensity Factor (FCARBONING_y) for Capacity Year, y;
- (vi) The Oil Carbon Intensity Factor (FCARBONIO_y) for Capacity Year, y; and
- (vii) The Demand Side Unit Theoretical Price (PTHEORYDSU_y) for Capacity Year, y.

The approved anticipated values for previous auctions are:

³ Value of Lost Load

Strike Price Component	Value	Unit
PCARBON _m	PCARBON _m Index	€/tCO _{2e}
PFUELNG _m	[PFUELNG _m Index (p/therm) x 0.01 (£/p) + PFUELNG _m Transport (£/therm)] x Exchange Rate €/£ x 9.48 (therms/GJ) x 3.6 (GJ/MWh)	€/MWh
PFUELO _m	[PFUELO _m Index (\$/t) x Exchange Rate (€/\$) + PFUELO _m Transport (€/t) x 0.025 (t/GJ) x 3.6(GJ/MWh)	€/MWh
PCARBON _m Index	ICE ECX EUA Futures – EUA – (monthly) ⁴	€/tCO _{2e}
PFUELNG _m Index	ICE UK Natural Gas Index (monthly)	p/therm
PFUELNG _m Transport	0.0424 ⁵	£/therm
PFUELO _m Index	Platt's Forward Curve (monthly) for monthly forward swap transactions for 1% sulphur free on board (FOB) fuel oil cargoes on North West Europe (NWE) for the relevant month (AAEGR00)	\$/T
PFUELO _m Transport	50 ⁶	€/t
FTHEORYPU _y	15	%
FCARBONING _y	0.202	tCO _{2e} /MWh
FCARBONINO _y	0.277	tCO _{2e} /MWh
PTHEORYDSU _y	500	€/MWh
Exchange Rate (€/£)	The Trading Day Exchange Rate as defined in the Trading and Settlement Code	€/£
Exchange Rate (€/\$)	The rate set at 17:00 the day before the Trading Day, from the same source as used for the Trading Day Exchange Rate	€/\$
therm per GJ	9.48 ⁷	therm/GJ
LSFO calorific value	0.025 ⁸	t/GJ

The SEM Committee proposes to retain these values for the 2023/24 capacity auction.

⁴ The December price for a given year applies to all months falling within that year

⁵ NI natural gas transport adder used in I-SEM PLEXOS Forecast model 2016-17

⁶ Based on ROI LSFO transport adder used in I-SEM PLEXOS Forecast Model 2016-17

⁷ I-SEM PLEXOS Model 2016-17

⁸ I-SEM PLEXOS Model 2016-17

5 TREATMENT OF CONSTRAINTS IN T-4 AUCTION

Within the [Decision Paper on the 2022/23 T-4 Capacity Auction Parameters \(SEM-18-155\)](#), the SEM Committee decided to reflect transmission constraints within the auction.

Three options were considered on the award of multi-year pay-as-bid Reliability Options:

Option 1: as with transitional auctions, allowing multi-year pay-as-bid Reliability Options, only where there are no other solutions available to satisfy the minimum MWs in the constrained areas;

Option 2: Allowing multi-year pay-as-bid Reliability Options to compete on the same basis against single year offers, but only where the multi-year offer is priced at or below Net CONE.

Option 3: allowing multi-year pay-as-bid Reliability Options to compete against single year offers at any price up to the Auction Price Cap.

The SEM Committee chose Option 1. This is consistent with the transitional auctions, allowing the possibility of multi-year pay-as-bid ROs, only where there are no other solutions available to satisfy the minimum MWs in the constrained area.

The SEM Committee proposes to reflect transmission constraints in the 2023/24 T-4 auction.

Within the CRM design, a number of options were proposed for the Auction Format. The 2018/19 and 2019/20 T-1 capacity auctions utilised Auction Format B: simple sealed bid with locational capacity secured to meet constraints being additional to that which clears the unconstrained auction. This was a transitional measure, with the intent to move to Auction Format D (full combinatorial) on an enduring basis.

As part of the State Aid process, the Regulatory Authorities in Ireland and Northern Ireland gave an undertaking to the EC that from Capacity Year 2020/21 onwards, any capacity awarded out-of-merit Reliability Options for locational capacity constraint reasons should not be additional to the capacity secured in merit. Consequently, if out-of-merit volumes need to be procured to satisfy locational constraints, this will displace in-merit generation elsewhere.

Because of these State Aid commitments, the SEM Committee decided to utilise Auction Format C for the 2022/23 T-4 capacity auction. This is a simple sealed bid auction, with a heuristic based second step to offset additional locational capacity secured.

For the 2023/24 T-4 capacity auction, the SEM Committee proposes to progress if possible to the Enduring Auction Solution Methodology i.e. Auction Format D.

Respondents to the consultation are invited to comment on this proposal. If it does not prove possible to implement Auction Format D for this auction, Auction Format C will continue to be used.

7 NEXT STEPS

Responses to the proposals within this consultation should be sent to Kenny Dane (kenny.dane@uregni.gov.uk) by 28 June 2019. We intend to publish all responses unless they have been marked confidential.

A decision on the parameter values will be made in August 2019, and the parameter values included in the Initial Auction Information Pack developed by the System Operators.