Best New Entrant Net Cost of New Entry (BNE-Net CONE) Consultation Paper

SEM-22-076

19 October 2022

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1. Introduction

1.1 Background

The SEM capacity market (or the Capacity Remuneration Mechanism (**CRM**)) is a competitive auction-based mechanism where the lowest-cost capacity is most likely to be successful. The CRM seeks to identify the economically efficient combination of quantity and price of capacity. The target volume of capacity required for a capacity year is determined by the SEM Committee in advance of the relevant auction, based on future capacity requirements in the SEM. The Capacity Market Auction Price Caps are currently defined within the capacity market regime with reference to the Best New Entrant Net Cost of New Entry (**BNE Net CONE**).

In the *2026/2027 T-4 Capacity Auction Initial Auction Information Pack (IAIP)* and the *CRM T-4 2026/27 Capacity Auction Parameters Decision Paper* (SEM-22-044) for the capacity auction for the capacity year 2026/2027, it was noted that the SEM Committee is undertaking a BNE Net CONE study. The SEM Committee engaged Cambridge Economic Policy Associates (CEPA) and Ramboll to perform a bottom-up assessment of the fixed costs and Net CONE of a BNE peaking plant for the RAs.

This consultation paper and the attached report (SEM-22-076a) detail estimates for the various capital and recurring fixed costs a rational investor would incur in the process of entering the SEM with a new generation unit through capacity auction T-4 2026/2027. By combining the recurring costs with annuitised fixed costs, and netting off market revenues, a Net CONE is estimated for a number of reference technologies considered as likely new entrants to the market.

The Net CONE metric applied in the CRM is expressed as the costs of the BNE per unit of de-rated capacity (Euro per kilowatt per year €/kW/year). The de-rating factors which are applied in this study reflect the decision of the SEM Committee on 2026/2027 T-4 Capacity Auction Parameters[1], leading to:

- De-Rating Curves, defining rating factors by unit initial capacity and by technology class.
- Annual Run Hour Limits (ARHL) de-rating factors to apply to new capacity with ARHLs less than or equal to 1,500 hours.

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[1] https://www.semcommittee.com/sites/semc/files/media-files/T-4_2026_27_Parameters_Decision_Paper.pdf

The BNE's Net CONE rate is set in advance of a capacity auction by the SEM Committee and is used to calibrate the Auction Price Caps (**APC**), the Existing Capacity Price Cap (**ECPC**) and the demand curve for each capacity auctions. These parameters are generally finalised in the Initial Auction Information Pack (**IAIP**). For the upcoming auction T-4 2026/2027, noting that the BNE study is ongoing, the SEM Committee stated that the Auction Price Cap may be reviewed and updated in the Final Auction Information Pack (**FAIP**), based on the outcome of this consultation, including any additional analysis provided. The FAIP is due to be published on 01 March 2023.

1.2 Purpose of this Consultation Paper

The purpose of this Consultation is to seek industry feedback on the accompanying assessment of the BNE Net CONE from CEPA\Ramboll for CY 2026/27.

It should be noted that in general, the methodology applied is consistent with that used for the previous BNE calculation (SEM-18-025), and those previously performed for the Capacity Payment Mechanism under the previous market arrangements, while also having regard to the ACER Methodology on the calculation of VoLL, CONE and RS (ACER Decision No. 23/2020).

The SEM Committee recognises challenges in calculating the BNE Net CONE in the current situation where the market is moving towards achieving higher RES-E penetration targets and lower carbon budgets, resulting in considerable uncertainty (up and down) regarding future market revenues across technologies.

The SEM Committee notes the recent All-Island Generation Capacity Statement which reflects the continued need for investment in new capacity generation due to rising demand levels, lower availability of older plants, and possible issues around annual run-hour limitations. The SEM Committee acknowledges that the current market volatility and other areas of uncertainty cannot be fully captured in such an analysis.

The CEPA-Ramboll analysis is the starting point for consideration of the appropriate BNE Net CONE and the SEM Committee recognises that changes may be made between the consultation and the final decision, following input from market participants.

The SEM Committee encourages stakeholders to present their views and feedback on the cost estimates, revenue structures, and the methodology used to estimate BNE Net CONE in this study which is annexed to this consultation paper.

1.3 Structure of Paper

The structure of the remainder of this document is as follows:

- **Section 2: Results** – briefly sets out the results from CEPA/Ramboll study;
- **Section 3: Next Steps** – sets out the next steps in the consultation process.

2. Results

2.1 Reference Technologies

The first step in the BNE Net CONE assessment is to propose suitable technology options, applicable for use in the Capacity Market for auctioning capacity for the capacity year 2026/2027. All available technology options which might reasonably be considered as candidate plants for a capacity auction were considered against ACER's requirements from its methodology for calculating the cost of new entry. From such technologies, the following generation technologies were considered in the BNE Net CONE assessment.

Technology type	Unit size
CCGT (single shaft)	Approximately 450 MW - 500 MW
Open cycle gas turbine	Approximately 200 MW
Reciprocating engines	Approximately 200 MW
BESS	100 MW/200 MWh

Table 1 – Technology types and sizes

2.2 Gross CONE

The study estimates various components of fixed costs and recurring costs that a generator might incur during the lifetime of respective plant. The study follows the methodology used in previous BNE studies of estimating the total Gross CONE, as the sum of annualised fixed costs and recurring costs.

Annualised fixed costs for each short-listed unit are derived by estimating the total capital costs for each relevant unit in 2026/27 terms, and annuitising the capitalised costs at the pre-tax WACC.

The study starts by estimating capitalised costs in 2022/23 terms. The current CEPA/Ramboll study estimates the capitalised cost of a 198.6 nameplate MW dual-fuel OCGT to be €108m in 2022/23, which is somewhat lower than the estimate in the Poyry 2018 study, which estimated the capitalised cost of a very similar sized nameplate MW dual-fuel OCGT at around €130m in 2017 money. This represents a reduction of around 20% in the capitalised cost of an OCGT between the CEPA/Ramboll study and the Poyry (2018) study, though the CEPA/Ramboll values

are expressed in 2022/23 money, and the Poyry values were expressed in 2017 money.

Study	Parameter	CCGT		OCGT	
		Ireland	Northern Ireland	Ireland	Northern Ireland
CEPA/ Ramboll	Capitalised cost €m (22/23, money)	395.3	392.0	108.1	106.1
	Nameplate capacity, MW	470.0	470.0	198.6	198.6
	Derated capacity MW	387.8	387.8	175.4	75.4
	Capitalised cost derated €/kW (22/23 money)	1019.5	1011.0	616.4	1407.6
Poyry (2018)	Capitalised cost €m (2017, money)	380.0	386.4	129.8	131.4
	Nameplate capacity, MW	438.5	438.5	198.6	198.6
	Derated capacity MW	382.4	382.4	180.5	180.5
	Capitalised cost derated €/kW (2017 money)	993.8	1010.5	719.0	727.9

Table 2 – Comparison of gross cones from Poyry (2018) and CEPA-Ramboll (2022)

Table 2 also shows the comparison between CEPA/Ramboll's estimates of the capitalised cost of a CCGT and Poyry's estimates. There have been some changes in the derating factors between the two studies, but when focusing on Ireland (where the ARHL derating is not applicable), the CEPA/Ramboll value is higher per derated kW for a CCGT but lower for an OCGT, compared to Poyry estimates.

The study then applies a pre-tax WACC of 6.92% in Ireland and 8.90% in Northern Ireland to annualise the capitalised costs over an assumed 20-year economic life.

The SEM Committee notes that the CEPA/Ramboll study estimates the annualised capital costs at current (2022/23 prices) and then inflates them to 2026/27 prices using 2% p.a. inflation (compounding to 8% over 4 years) and expresses them in derated kW terms.

Parameter	CCGT		OCGT		Engines		BESS	
	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland
Gross CoNE, € / derated kW (22/23)	168.00	171.78	89.07	218.46	165.76	407.06	413.66	418.12
Inflation adjustment	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08
Gross CoNE, € / derated kW (26/27)	181.85	185.94	96.42	236.47	179.43	440.62	447.76	452.59

Table 3 – Gross cone derated inflation adjustments

The SEM Committee also notes that the significant difference in the estimated Gross CONE for an OCGT in Ireland (€96.42/ derated kW/year) and in Northern Ireland (€236.47/ derated kW/ year) is predominantly a function of the assumption that the 0.43 ARHL derating factor applies in Northern Ireland.

The other key element of Gross CONE is recurring costs. As illustrated in the table below, the largest single element of recurring costs for a CCGT is gas network charges.

Parameter	CCGT		OCGT		Engines		BESS	
	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland
Fixed market operator charges	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01
Electricity network charges	2.96	1.99	1.25	0.84	1.26	0.85	0.63	0.42
Gas network charges	10.75	10.68	0.00	0.81	0.00	0.63	0.00	0.00
Personnel costs	3.65	3.65	0.90	0.90	0.90	0.90	-	-
Fixed O&M costs	4.23	4.23	0.92	0.92	3.61	3.61	1.50	1.50
Insurance	1.90	1.88	0.47	0.47	1.04	1.00	0.38	0.37
Business rates	4.55	1.50	1.92	0.97	1.94	0.98	0.97	0.49
Total, €m/yr	28.06	23.97	5.48	4.93	8.76	7.99	3.48	2.79

Table 4 – Recurring fixed costs

As illustrated in the table above (Table 4), the largest single element of recurring costs for a CCGT is gas network charges. The CEPA/Ramboll study assumes that

the reference CCGT contracts for 65% of its peak gas transportation capacity annually (where it has the flexibility to do so[2]), and hence it appears as a recurring cost, and is reflected in Gross CONE. The study assumes that this is the optimal strategy for a CCGT which is expected to run 65% of the year, aligned with the annual running modelled by the RAs' Plexos model for 2025/26. The study therefore implicitly assumes that when the CCGT runs at 100% of nameplate capacity all day, it will need to buy 35% of its gas transportation capacity in short-term markets, and that this will be treated as a short-run marginal cost.

Market participants are invited to comment and provide evidence as to the optimal trading strategy to hedge 65% of peak gas transportation capacity, if a unit is expected to run 65% of hours at peak load, or whether a more typical strategy would be to buy 100% of peak day requirements, for example.

2.3 Revenues

The table below (Table 5) sets out the assumed Inframarginal Rent (IMR) and ancillary service (also known as DS3) revenues earned by the BNE short-listed units within the assessment.

Parameter	CCGT		OCGT		Engines		BESS	
	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland
Infra-marginal rent (€/ derated kW), 25/26	104.40	104.40	0.63	1.47	0.63	1.47	70.36	70.36
Infra-marginal rent (€/ derated kW), 26/27	106.48	106.48	0.65	1.50	0.65	1.50	71.77	71.77
DS3 revenue (€/ derated kW), 22/23	15.76	16.79	7.94	18.46	7.97	18.54	183.65	158.76
DS3 revenue (€/ derated kW), 26/27	17.06	18.17	8.59	19.98	8.63	20.06	198.78	171.84
Total revenues, (€ / derated kW), 26/27	123.54	124.66	9.24	21.49	9.27	21.57	270.55	243.61

Table 5 – IMR & DS3 revenues by technology

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[2] Recognising that the flexibility varies between Ireland and Northern Ireland and between entry and exit capacity

The headline Infra Marginal Rents (IMRs) values used in the study for the CCGT, OCGT and the gas engine are based on available PLEXOS runs for 2025/26, and inflated to 2026/27. It should be noted that PLEXOS runs were based on fuel curves before the Ukraine War, so do not contain inflated IMR values which may be a short-term effect of the war[3].

In line with previous BNE studies, the "headline" results shown in the CEPA/Ramboll study assume that the IMR estimate for a CCGT in 2026/27 (€106.48/kW/yr) as a proxy for IMR over a 20-year life, and this assumption is the principal reason why a CCGT is the least cost unit in this study.

The SEM Committee recognises that in practice, it is reasonable to expect that the IMR of a CCGT is highly uncertain for later years of the assessment, as the installed RES-E capacity grows, and the system moves towards being able to accommodate SNSP at levels close to 100%.

Unlike the Poyry 2018 study, the CEPA/Ramboll study does not include any uplift to IMR revenues, resulting from the impact of Administrative Scarcity Pricing, particularly where a unit is able to earn the full Administrative Scarcity Price on its derated capacity, on which it is not subject to the Reliability Option Difference Payment. The Poyry 2018 study ascribed a total value of around €4-6/kW/year for the impact of Administrative Scarcity Pricing for CCGTs and OCGTs and the SEM Committee will continue to consider this issue.

The IMR estimate translates one-for-one into the Net CONE estimate, and in this context presents a degree of uncertainty around the Net CONE of a CCGT during the transition to the low-carbon economy.

The estimated IMR for an OCGT or a gas engine has significantly less bearing on the estimated Net CONE of these units since the assumption is that these units have limited run hours and low IMRs in 2026/27 based on the PLEXOS modelling. This assumption is also impacted by running pattern changes that might arise, as OCGTs and gas engines provide more flexibility and may complement high-RES penetration in a different way to CCGTs. The greater flexibility of OCGTs and gas engines may

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[3] And the Ukraine War has a more limited effect on fuel curves 2025/26 than for, say 2022/23

be reflected more in their constrained running, and Balancing Market running, rather than unconstrained DAM running.

It is also recognised that there is a level of uncertainty around the estimate of ancillary service (DS3) revenues. For instance, the study estimates the DS3 revenue for a CCGT at around €16-17/derated kW/year, i.e. a material value when it comes to setting Net CONE. These values for a CCGT are higher than the values estimated by Poyry in 2018 (approximately €8/derated kW/year). By contrast, the CEPA/Ramboll DS3 values for an OCGT in Ireland[4] (approximately €8/derated kW/year) are lower than the Poyry 2018 study values of around (€14-15/derated kW/year).

The Ancillary Service (DS3) revenue that a unit can earn may also depend on the running regime of a unit, with certain technologies only being able to provide certain services when they are running. The assumptions about the ability of different technologies to earn DS3 revenues are based on an EirGrid document, which estimates the availability of different technologies to provide the different DS3 services in 2030 (including their run-hours) and adjusted as set out by CEPA/Ramboll.

2.4 Net CONEs

The Net CONE rate is calculated by subtracting the level of revenue that the BNE can expect to recover from wholesale markets (inframarginal rents) and from system services, from the gross annualised cost of providing capacity (Gross CONE) in a given year. The table below provides a summary of the Gross CONE and "headline" revenue estimates of the selected four reference technologies in Ireland and Northern Ireland for the capacity year 2026/27. The Net CONEs of these technologies are derived by deducting the revenue from Gross CONE.

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[4] Values per derated kW per year in Northern Ireland are significantly different due to the application of the ARHL.

Parameter	CCGT		OCGT		Engines		BESS	
	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland	Ireland	Northern Ireland
Gross CoNE (€ / derated kW), 26/27	181.85	185.94	96.42	236.47	179.43	440.62	447.76	452.59
Revenues (€ / derated kW), 26/27	123.54	124.66	9.24	21.49	9.27	21.57	270.55	243.61
Net CoNE (€ / derated kW), 26/27	58.31	61.28	87.18	214.99	170.15	419.05	177.20	208.98

Table 6 – Gross to Net CONE calculations

The lowest cost technology, based on the "headline" numbers from the CEPA/Ramboll report is the CCGT, which has a value of €58.31/kW/year in 2026/27 money. This value is significantly lower than the value of €92.30/kW/year (for 2022/23) estimated by Poyry in 2018, which currently underpins the Auction Price Cap. The lower value is predominantly driven by the estimate of €123.54/kW/year in revenue, and as discussed above, there is significant uncertainty around how both the IMR and DS3 elements of the revenues will evolve over the lifetime of the various technology types across the study.

The CEPA/Ramboll study showed a sensitivity whereby the IMR value declines in a linear fashion from the 2026/27 value to zero by the end of Year 10, and the averaged discounted value of the IMR stream was around €76/kW/year lower. In this sensitivity, the Net CONE of a CCGT would be approximately €130/derated kW/year. An OCGT in Ireland would become the lowest cost unit, with a Net CONE of around €87/kW/year in 2026/27, still lower than the Poyry 2018 study value of €92.30/kW/year for 2022/23.

With appropriate assumptions underpinning the estimate of Net CONE, a BNE unit which receives a capacity payment equal to Net CONE will earn its cost of capital, i.e. earns an investible return.

3. Next Steps

The SEM Committee is aware that there is a level of uncertainty which is impacting the market, coupled with the changing face of the power system and wider economic

considerations. The level of uncertainty regarding revenues, gas capacity procurement strategy and inflation is possibly higher than at the time of any previous analysis.

The SEM Committee welcomes views and responses of stakeholders on the cost estimates, revenue structures, and the methodology used to estimate BNE Net CONE in the annexed report.

The SEM Committee intends to make a decision on the BNE Net CONE value and the Auction Price Cap to be applied to the capacity year 2026/27 for which the T-4 capacity auction is due to take place in March 2023. The SEM Committee notes that given the level of uncertainty around some of the components of Net CONE, the relationship between Net CONE and the Auction Price Cap for the T-4 2026/27 and subsequent auctions may need to be considered.

Responses to the consultation paper should be sent to Merin Joseph (mjoseph[at]cru.ie) and Donna Maye (donna.maye[at]uregni.gov.uk) by **the close of business on 30 November 2022**.

Please note that we intend 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.