Bord na Móna

SEMC Consultation on

Best New Entrant Net Cost of New Entry

(BNE-Net CONE)

Consultation Response

30 November 2022

Introduction

Bord na Móna (BnM) welcome the opportunity to provide views on the BNE for the next T-4 Auction (2026/27). Given the current capacity context, and the time available before the Auction, which is due to take place in March 2023, we have focused our response on changes we believe are deliverable and can be implemented in that timeframe. We would support a more in-depth review of the CRM in the medium to longer term in line with our response to SEM-22-054[1], but it is important to recognise the criticality of revising the Auction Parameters in the upcoming T-4 to facilitate the delivery of new capacity in that timeframe.

BnM has carried out analysis to inform our investment approach in the context of the carbon budgets and the electricity system capacity requirements over the next decade. By 2030, in line with the Governments' sectoral ceilings, the electricity sector will likely only have a carbon budget of 1-2Mt available to use. To comply with this cap the only fossil fuel that can be used will be gas burned in efficient gas plant. Our assessment of the generation fleet has identified a clear need for new CCGT capacity in line with that of the TSO, EirGrid, who, as highlighted in the EY Report on the CRM[2], also call for 1 GW of new CCGT capacity by 2026 to bridge the gap in lower carbon baseline generation.

We welcome the SEMC acknowledgement of "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" highlighted in the most recent Generation Capacity Statement[3] (GCS). In the 2022 GCS EirGrid identified "significant capacity deficits in 2024 and 2025" which are forecast to decrease in 2026 as new capacity comes online. The commercial reality is that a number of projects that were due to be delivered in previous T-3 and T-4 auctions may not be delivered, given the significant changes to the cost of debt, supply chains and increased risk associated with large infrastructure delivery. To reflect this investment environment a strong economic signal for investors is required through the CRM. EirGrid also acknowledged that an "assessment is required around how the future demand projections and renewable targets deliver on these carbon budgets and this is

[1] SEMC, 2022, Call for Comments on the CRM Review Report by EY. https://www.semcommittee.com/sites/semc/files/media-files/SEM-22-054%20Call%20for%20Comments%20on%20the%20CRM%20Review%20Report%20by%20EY.pdf
[2] EY Report on Performance of the CRM, 2022. https://www.semcommittee.com/sites/semc/files/media-files/SEM-22-054A%20Performance%20of%20the%20SEM%20CRM.pdf
[3] EirGrid, 2022, Generation Capacity Statement. https://www.eirgridgroup.com/site-files/library/EirGrid/EirGrid_SONI_Ireland_Capacity_Outlook_2022-2031.pdf

being assessed as part of Shaping our Electricity Future[4]" as the Sectoral Emission Ceilings were published after the data freeze for GCS 2022. It is imperative that this assessment is completed as soon as possible and considered in a timely revision of the CRM. Otherwise there is a risk of 'locking-in' carbon intensive investments that will undermine the electricity sectors ability to meeting its own carbon budgets and to contribute to other sectors that will struggle to decarbonise by 2030. It is BnM's view that delivery of new carbon efficient generation through the CRM and keeping emissions below Government Carbon Emissions Ceilings are inextricably linked and as such, the CRM needs to properly incentivise new CCGT capacity in the upcoming T-4 auction.

We welcome the CEPA/Ramboll review from the SEM Committee on the BNE and note the SEM Committee's recognition of the challenges in defining an expected return from thermal investments in the current market, where achieving higher RES-E penetration targets and lower carbon budgets are a core objective. BnM has previously stated that there are more 'attractive' energy investments than new gas capacity and this is bearing out in the industry, where traditionally large utilities are shifting their investment portfolio away from Gas towards renewable portfolios. Wind farms for example are underpinned by a guaranteed 15-year contract, support carbon reductions and are more easily financed. In Ireland new gas-fired capacity faces a market where future energy revenues are uncertain, financing is challenging due to low capacity contract rates and future operational life is not foreseeable beyond the 10-year contract.

Increasing the Auction Price Cap (APC) to attract investment in the right technologies needs to be a priority. In the near term there are changes that can be made to elements of the CRM to address this such as a revision of the BNE, an increase to the multiplier or a combination of both. In other markets using mechanisms like the CRM, the multiplier is adjusted to reflect market or technology scarcity. It is not uncommon for Market Operators to increase multipliers for specific technologies where future capacity adequacy (EUE or LOLE) is expected to drop below acceptable levels[5]. The most recent GCS clearly identifies a shortfall in capacity out to 2030, so we believe this is an imperative. From a cost perspective it appears possible to apply a specific multiplier to CCGTs to maintain control on the overall cost of new capacity. We believe this change can be delivered before the March 2023 Auction and would encourage the SEMC to do so.

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[4] IBID. Pg.57
[5] Brattle Group, 2021, Alberta's Capacity Market Demand Curve. [Alberta's Capacity Market Demand Curve (brattle.com)]

In the longer term a wider revision of the CRM is required to address challenges that arise on an annual basis for the RAs, TSO, and Investors. In 2022 the number of consultations on elements of the CRM demonstrated a desire by the RAs to make adjustments to support new investment, but also highlighted the need for a review of the Mechanism given its failure to deliver the required capacity since its implementation in 2018. We would support the RAs in the work over the coming years and welcome the intent signalled by this consultation and the publication of the EY Report in October 2022.

Auction Price Cap

The CRM sets an Auction Price Cap (APC) using the Net CONE rate which is calculated by subtracting the level of revenue that the best new entrant (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. A multiplier is then applied to the Net CONE which gives the APC.

In 2017, the SEMC decided to set the multiplier for New Capacity at 1.5. In the Decision Paper, the SEMC explained that it "favoured setting the Auction Price Cap at 1.5 x Net CONE for the foreseeable future, since there is significantly more installed capacity than the Capacity Requirement, and since the experience of the SEM is that capacity providers have found a capacity payment of less than 1 x Net CONE adequate to cover their 'missing money'" At that time, the 2016 GCS included 10,800 MW of installed capacity versus a capacity requirement of 7,070 MW. This margin provided the context for the SEMC to set the Multiplier at 1.5 and it noted in the Decision Paper that the margin meant "the current level of capacity payments has resulted in significantly more capacity than required, despite each MW of capacity getting significantly less than Net CONE with an Annual Capacity Payment Sum designed for 7,070MW shared between 10,800MW. This multiple of 1.5 allows for a margin of error in the calculation of Net CONE[6]". This is no longer the case.

The SEMC also noted in the 2018 BNE Decision that there is an enduring risk that "setting the Auction Price Cap…at too low a level to incentivise new investment when it is needed [would] jeopardis[e] system security[7]". The CEPA/Ramboll report output raise this risk even further as the IMR revenues are significantly overestimated which has led to a BNE figure for a CCGT that is not

[6] SEMC, 2017, Capacity Remuneration Mechanism Parameters and Auction Timings (SEM-17-022) https://www.semcommittee.com/sites/semcommittee.com/files/media-files/SEM-17-022%20CRM%20Parameters%20Decision%20Paper_1.pdf
[7] IBID. Pg. 43

realistic and not investable in the current environment. The authors of the report acknowledge[8] that this may be the case and we have included our position on how to mitigate this risk later in this response.

The keys points in our response are:

- **Financeability is entirely dependent on the certainty of revenues**. For most developers in the Irish market it is not possible to finance a project at CCGT scale without leveraging debt. The risk profile associated with new gas investment in a system that is decarbonising results in a funding approach which would seek to leverage as much debt financing as possible. Increasing the level of guaranteed capacity payments will allow developers to maximise the debt sizing available, minimise the required equity and greatly increase the probability of projects being delivered. From an investor's perspective, the level of debt sought would typically be over 70%. The CEPA/Ramboll Report has a level of 40% in the BNE calculation – this is not realistic in the Irish context. The effect of this underestimate in WACC is to reduce the BNE value. However, while we believe a higher gearing is required in reality to deliver these projects in Ireland, the underestimation in WACC can be counteracted by a higher overall Capacity Payment for CCGT technology and give the overall same nett effect in making the projects more financeable.
- **CEPA/Ramboll's Capex costs are underestimated.** Turbulence in financial markets and global supply chains mean that Capex costs are increasing. The estimates in the report are severely underestimated and are not reflective of the commercial reality for procuring CCGTs in 2022. In addition, due to said supply chain issues, OEM's are struggling to guarantee fixed pricing for new equipment at time of contract signature which results in increased risk profile for the investor. In addition, given the carbon budgets the report should have taken account of the need to 'future proof' gas investments to ensure they are 'hydrogen ready' in line with national objective and the EU Taxonomy. Being 'hydrogen ready' is a de facto funding obligation and adds a capital cost premium.
- **Market revenues are overestimated.** The IMR and DS3 revenues in the CEPA Report are overestimated and do not reflect the current or future market structures and reality. The load factor assumed for a CCGT in the model do not account for an 80% RES-E electricity system and our independent analysis shows, using PLEXOS modelling over the 15 years from 2027, that the actual running profile would be a fraction of that quoted in the CEPA report. There is also a significant lack of clarity on Future Ancillary System Service arrangements (FASS) and it is unclear

[8] https://www.semcommittee.com/sites/semc/files/media-files/SEM-22-076a%20BNE-Net%20CONE%20Report.pdf pg.57

how these payments were derived. From an investor perspective and from a financing point of view, we would have to take a very conservative assumption on both of these revenue streams as there are a myriad of things that could impact this between now and 2040 (market redesign on Energy and FASS, future role and cost of gas and carbon, speed of development of renewables development, etc).

- **Incentivising technologies that the system needs.** The Irish system needs baseline CCGT capacity to meet system demand while operating within the emissions limits set in the Carbon Budget for the Electricity sector. The emissions impact of the low efficiency emergency generation already in development has not been accounted for and is likely to have a significant negative impact on the overall emissions of the sector while operational. Similarly, the CRM does not take a view on carbon intensity beyond the run hours limitations. However, we know that the emissions from OCGTs are significantly higher than that of more efficient CCGT plant and that the system requires 2GW of new flexible gas capacity by 2030 (EirGrid notes 1GW of CCGT needed by 2026). It is BnM's view that the Carbon Ceiling of 1-2M T by 2030 (and decreasing from thereon to 2040) means that CCGT plant is the best placed technology to provide a high level of security of supply combined with a lower carbon footprint. In that context, the Capacity Renumeration Mechanism needs to incentive CCGT technology and we believe that an increased Net CONE combined with an appropriate multiplier can attract investment via a cost reflective price cap.
- **The Economic Lifetime for new Gas Plant will become increasingly smaller as we move towards a Net Zero Power system.** The CEPA report highlight a 20-year economic life for new CCGT technology. It is BnM's view that it is possibly not realistic to assume a 20-year economic life for a new Gas facility such as a CCGT, in the context of an increasingly decarbonised power system. A more prudent approach may be to assume a 15-year lifetime, where the first 10 years is financeable by a fixed capacity contract and the investor takes on an additional risk over the final 5 years of its lifetime. We would have no line of sight to future Capacity Market revenues beyond 2037 as well as Ancillary Services Revenue or IMR and as such we could not rely on this in financing such a project. Again, this economic life risk, can be mitigated by a technology specific Auction Multiplier, where individual investors can weigh up and aim to manage that risk on a project by project basis.

The remainder of our response is focused on component elements of the BNE as set out in the CEPA/Ramboll Report.

Response

Reference technologies

The CCGT reference technologies in the CEPA/Ramboll Report are broadly in line with those a CCGT investor might consider. However, our understanding is that some of the technologies considered are no longer available based on discussions with providers. In addition, the selection of technologies looks reasonably in line with ACER Methodology on the calculation of VoLL, CONE and RS (ACER Decision No. 23/2020).

Capital fixed costs

Bord na Móna believe that the fixed capital costs for a CCGT in Ireland as stated in the CEPA/Ramboll report are significantly underestimated. Our view is based on information currently available to Investors, having already begun procurement processes on same. The Report has substantially underestimated two key components in our view:

1. Equipment EPC cost; and
2. Cost of delivery of grid & gas infrastructure

The estimates in the Report included a CCGT reference CAPEX cost based for February 2022 using GT PRO and applied an 8.4% escalation factor in line with European indexes available to June 2022. It is our view that this does not reflect the significant impact of geopolitical factors over the past 8 months, it fails to account for hyperinflation and substantial supply chain disruption. These factors have had a knock-on effect on Investors and Developers of new capacity. Based on our engagement with EPC & OEM providers and considering our experience in sourcing similar technology; the plant reference price is simply not available to developers in the market at present at these cost estimates. As an example of the discrepancy of procuring a CCGT, BEIS in the UK commissioned a report in 2020, which had a cost estimate for new CCGTs to be €813/kW[9]. This is significantly higher than the CEPA assumption of €670/kW. And this reflected the cost of a CCGT in 2020, 2 years prior to the current volatile inflationary and supply chain environment that has emerged since.

BnM responded to the SEMC consultation on call for evidence of cost inflation[10] indexation in October and set out our view of the current high inflationary environment. EPC providers and OEM's are offering very limited validity to offers (weeks) and are developing new indexing mechanisms to account for market uncertainties and risk not experienced previously.

[9] https://www.gov.uk/government/publications/beis-electricity-generation-costs-2020

[10] SEMC, 2022, Call for evidence regarding the impact of inflation in CRM. https://www.semcommittee.com/publications/sem-22-071-call-evidence-regarding-impact-inflation-crm

The inputs for grid and gas development costs used in the Report assume an ideal theoretical location adjacent to a high voltage substation with spare capacity in immediate proximity to the high-pressure gas infrastructure. While we appreciate that the model is based on idealised scenarios, it may be prudent to apply a premium to reflect the fact that such sites may not exist on the Island of Ireland. An investor in a new gas plant in Ireland requiring access to the gas and grid infrastructure could realistically expect to be quoted a multiple of up to 10-20x the estimated connection cost in the Report. From a grid perspective, this is predominantly due to the fact that a new substation will be required at the IPP site regardless and as is driven by the TSO, given the capacity constraints, and requirement of a large plant. For example for a new 470 MW CCGT, it would be more prudent to include the cost of a new 220 kV substation as the baseline grid connection cost, which could be in the order of €30-40M. Likewise, the cost of new Gas infrastructure has increased significantly in recent years. It would not be unrealistic to be quoted upwards of €3-4M/km for new gas infrastructure and this should be reflected in the development of Gross CONE also. Finally, it is worth noting that the cost of gas and grid infrastructure increased by over 60% between February to August 2022, which was not properly accounted for in the CEPA analysis.

In relation to CCGT EPC reference price/MW & current OEM equipment quotes based on 500MW unit, highlight the BNE determined cost of technology is understated by >30%. Incremental capex cost per MW should give an advantage to the larger machine but in reality, the market and up to date OEM data show significant variance above the reference EPC price.

Recurring fixed costs

The recurring fixed costs seem reasonable and broadly in line with those we experience at Edenderry and Cushaling Power Peaking plant when scaled up for larger CCGT investments.

Cost of Capital

The Irish energy market is small when considered on a European basis and developers may only be able to deliver very large capital-intensive projects through non-recourse project finance debt structures. These structures enable Investors to deliver projects which would normally not be possible due to the equity required. However, project finance lenders will only size debt based on guaranteed revenues and do not account for merchant revenues in the calculation of cash available for debt service.

Capacity market payments are considered ‘guaranteed’ by funders and are the only means upon which they will consider providing debt financing. Increasing the level of guaranteed capacity payments will allow Investors to maximise the debt sizing available, minimise the required equity and greatly increase the probability of projects being delivered. The WACC calculation will be unique to each developer and the cost of equity required will increase as the materiality of the equity investment increases in proportion to the developer’s balance sheet and associated risk. As noted in the summary, BnM would seek to attract at least 70% debt into a CCGT project. The estimate of 40% included in the Report does not, in our view, reflect the market reality and is only possible in the model based on the IMR and DS3 assumptions which again are not realistic. However, whilst we don’t agree with the WACC reported by CEPA, if the WACC were to remain the same for the purposes of deriving Gross CONE, the same net effect for an investor can be achieved by increasing the potential Capacity Payment or APC for the technology.

Energy Market and System Services Revenue

Infra Marginal Rent (IMR)

The Poyry BNE paper from 2018[11] indicates a final IMR estimate for a CCGT in Ireland of €73.3/kW. When indexed, this increases to €78.84/kW for 2026/27. In comparison, the CEPA estimate is for a much higher figure - €106.48/kW de-rated over a 20-year life - this is significantly higher than previously assumed in a time where the system is incorporating more and more RES-E. SEMC acknowledge that this is the principal driver for a CCGT setting the BNE. It is also noted that the CEPA/Ramboll report calculated the IMR for the CCGT, OCGT and the gas engine using available PLEXOS runs for 2025/26 and inflated to 2026/27.

In addition, the SEMC has acknowledged that the IMR for a CCGT is “highly uncertain for later years of the assessment” and more renewables come onto the system to allow for increased SNSP. Again, this uncertainty can be mitigated to some extent by applying a higher BNE multiplier to a CCGT. CEPA have assumed a load factor of 65% for a CCGT but do reference that they consider this unrealistic to prevail for the 10-year capacity period. BNMs independent analysis on this suggests a more appropriate assumption on IMR and running profile would be ~30% of that stated in the CEPA report. This is based on a 15-year PLEXOS model, completed by an independent consultant. The reality is, the environment which we must view an investment in CCGT technology is that in which we would meet our 2030 RES-e and Carbon Ceiling targets and if we are to achieve this, a CCGT would have far

[11] SEM -18-156 CRM T-4 CY202223 BNE Decision Paper Final

lower running hours and as a consequence lower IMR. However, CCGTs do provide value to the system by supporting the grid when intermittent renewables are not available and in the most carbon efficient way. This is an additional benefit of CCGT technology as it will help the sector limit emissions in a way that OCGTs cannot.

System Services Revenue

As an Investor we can only make a prudent assumption that we would earn very little return from System Services over the 10-year contract period and beyond that to the eventual lifetime of the project. This is due to several factors including a lack of clarity in the regulatory framework for Future Ancillary System Services (FASS) to 2030. As an example, the introduction of auctions which is currently anticipated in line with the 'Future Arrangements' Decision – makes it increasingly unclear what an investor could assume to earn from System Services. In addition, the pace of roll out of renewables and the introduction of new technologies will also impact future revenues in this space – for example, the upcoming Low Carbon Inertia Services (LCIS) auction will likely mean that SIR and Inertia services previously earned by CCGT technology will likely be reduced to zero. Therefore, as a rationale investor we believe the estimate value of System Services Revenue in the CEPA report is over-estimated. The Report estimates revenues of €17.06/kW/yr for 2026/27 which is a significant increase when compared with the Poyry estimate of €7.7/kW/yr for a CCGT in capacity year 2022/23 included in their 2018 study[12]. This increase in estimated return is based on a forecast increase in System Service payments. This is not reflective of the market we foresee. BnM has been active in the system service market for a number of years and is forecasting a decline in revenues particularly for technologies like CCGTs over the period from Q4 2022 to end 2027. Separately we have received advice from Baringa outlining the forecast decline outline in the table below.

Service Type	Estimated % reduction in revenues 2022 to 2027 (indexed)
Primary Operating Reserve	86%
Secondary Operating Reserve	86%
Tertiary Operating Reserve 1	86%
Tertiary Operating Reserve 2	86%
Replacement Reserve Synchronised	31%
Steady State Reactive Power	32%
Synchronous Inertial Response	31%
Ramping RM1, RM3, RM8	32%

12 SEM-18-025 CRM T-4 BNE Consultation Paper - proposing a BNE Net CONE appropriate for the Capacity Year 2022/23.

Table 1 - Forecast decline in System Service Revenue for CCGT.

We have used these inputs from Table 1 to estimate the reduction impact on CCGT System Services revenues 2022-2027 (using an appropriate blend of the services above, based on our own thermal assets).

By then applying this multiplier to the Poyry estimate for System Services revenues at €8.3/kW/yr (indexed to 2026) reaches an estimated System Services revenue of just €4.48/kW/Yr for 2027. This latter value is considerably lower (by 74%) than the CEPA estimate of €17.06/kW/Yr.
In the longer term BnM believes that the CRM mechanism including the BNE Net CONE need to be revised to procure appropriate technology for the Irish market. The carbon intensity of new and existing capacity needs to be carefully considered when evaluating capacity market bids. While it may be possible to repower older plant with 'cleaner' fuel, extending the lifecycle of carbon intensive turbines that will not transitioning to natural gas is contrary to our national policy objectives. It is likely that repurposed units not running on gas will have at best achieve overall conversion efficiency at nominal output of 30% and at minimum load 20% or less. Such units will likely be inflexible with excessive start and full speed no load costs coupled with high incremental cost of generation in comparison with currently available technology. Such projects need to be considered in the broader contact of a highly intermittent power system as such investments would mean that back-up generation with significantly higher carbon emissions intensity than existing OCGT fleet comes onto the system placing further pressure on carbon budgets. The SEMC has signalled an intent to do this and we would welcome a review in the coming year to ensure the technologies necessary to meet our 2030 carbon ambitions are delivered.

Conclusion

In conclusion the costs used by CEPA/Ramboll in building a BNE-Net Cone are broadly in line with what we would expect except for Capex, Market Revenues and Cost of Capital. The carbon intensity of different technologies, and the need for new gas plant to be 'hydrogen-ready' is also not accounted for through the CRM, this is a significant issue that needs to be addressed. We appreciate that the SEMC is seeking feedback to support a potential change to the BNE in advance of the T-4 in March 2023 to attract new capacity and our view is that a higher BNE, higher multiplier or a combination of both can deliver the right economic signal to a CCGT Investor.