RESPONSE TO SEMC CALL FOR COMMENTS ON THE EY REVIEW OF PERFORMANCE OF THE CRM

(SEMC-22-054)

4th[th] November 2022

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Introduction

Net Zero Energy (NZE) is a recently formed renewables and storage company operating in Ireland. The team consists of energy industry professionals who have a proven track record in building successful renewable energy companies and delivering some of the most complex renewable energy and storage projects in Ireland over the past 2 decades. We are now focussed on high-impact projects that will enable Ireland to meet not only it's 80% RES-E target for 2030 but will also accelerate the country towards a net zero energy system in advance of our current 2050 target (as set out in the National Development Plan 2021-2030).

In the Call for Comments (SEM-22-054) the SEM Committee indicates a subset of the potential mitigation measures listed in the EY report as being considered for progression. NZE agrees with much of the EY report. The report provides an excellent overview of the functioning of the CRM to date and displays a good understanding for both the market fundamentals and the issues which have emerged since the market commenced. The report asks the right questions in order to get to the root of the problems which exist in the CRM today. While we agree with many of the answers and potential mitigations, there are specific areas where we diverge or where we believe the mitigations proposed are not adequate. This will be the main focus of our response. We will indicate the proposed mitigation measure from EY which we think most beneficial but also propose additional mitigation measures where we believe the EY report has not adequately addressed an issue raised in the report.

NZE is a member of Energy Storage Ireland (ESI) and we support the ESI response to this consultation. We will argue that a specific mitigation has been missed which can help to address a number of issues and is of particular value in delivering capacity in the crucial early years from now until 2026- i.e. specifically targeting the delivery of multi-hour storage for capacity. There are a number of options outlined to achieve this goal which we explore in more detail below

Detailed Response

Question 1: Was sufficient capacity procured in the capacity auctions?

A large number of the projects which were awarded new-build contracts in CRM to date have subsequently terminated their capacity contracts as a result of delays in the planning process. We agree with that the most beneficial and most feasible mitigation here is for SEMC to apply a risk adjustment to the capacity requirement to account for non-delivery of new capacity yet to be permitted.

Ireland has an issue with the permitting of large-scale infrastructure and the process regularly takes 5-10 years for wind farms, gas generators, roads etc. While we note that a review of Irish planning legislation is underway (that will hopefully help to address some of the issues which exist) the fact remains that permitting new gas generation plant will always be among the most complex, risky and time-consuming of planning processes. In addition to the permitting of the plant, an added layer of complexity is the requirement for an EPA licence which regularly adds a further 2 years to the process before a new gas generation plant can commence construction.

So how does SEMC mitigate the risk of new gas plant getting through planning and EPA licencing in time to meet its' contracted capacity obligations? We see 3 options:

- **NZE Option 1**- per the EY report "*apply a standardised adjustment to capacity requirement to account for likelihood of non-delivery*"

    - The advantage of this approach is that it effectively spreads the planning risk over a larger number of generators.
    - One disadvantage is that it does not necessarily de-risk the early years of delivery if all units entering the planning process are similarly delayed beyond the 3.5 year delivery window that currently exists for T-4 capacity. This has been the experience to date.
    - A second disadvantage is that it potentially leads to an over-procurement for the target year in the event that a higher number of contracted units turn up than expected. However, this seems like a reasonable price to pay, over-paying for maybe 3-5 years, assuming that subsequent auctions adjust down the volume for later years in response.
- **NZE Option 2**- specifically target new-build capacity which is not subject to the planning and licencing risk (which has been a primary cause of non-delivery to date).
    - Multi-hour battery storage has been proven to be relatively quick and straightforward to permit and also deliver.
    - It does not need an EPA licence.
    - Over the past 3 years we have seen the industry deliver >500MW from a standing start at the beginning of 2020.
    - Multi-hour batteries can have a material impact on the capacity shortage and can do so particularly in the difficult to mitigate early years (up to 2026) but they will not deliver without changes to the market to specifically incentivise them.
    - This is because these units are high capex and low opex and therefore cannot compete with low capex high opex gas units in the capacity market as currently structured.

  We will discuss this mitigation in more detail in our response on question 4 below. We note that this is not examined as a potential mitigation under Question 1 of the EY report and are disappointed that this potential mitigation to the risk of non-delivery is not highlighted.
- **NZE Option 3**- pursue a combination of option 1 and option 2- this is our recommended approach

Question 2: Did capacity auctions attract sufficient participation?

We would argue that the 2 main potential remedies described in this section are somewhat missing the point.

EY potential remedy 1- "*Greater investment in infrastructure to enable more competitive all-island market and reducing pressure for new build to be situated in particular locations*"

The principle here is sound; remove as many locational constraints as possible to ensure maximum competition for the auction. But the reality is that there is limited practical ability to significantly improve the situation in terms of grid connectivity into and out of a place like Dublin. Certainly, the North-South interconnector will be useful in easing the regional locational constraints but we would argue that this is not a 'Medium' feasibility mitigation when looking holistically at the CRM market- we think it is more realistically designated 'Low' for feasibility.

EY potential remedy 2- "*Requirement of new prospective capacity to have all necessary consents to prequalify for auction. This remedy is potentially redundant if remedy 3.1 is taken forward (i.e. extending auction lead times*).

We agree that this mitigation will provide more certainty that projects that secure capacity contracts will deliver in the timeline required and so we support it as a measure. However, this will create a gap in capacity in the short-term since there is a lack of permitted projects available to bid into

auctions at present. This needs to be addressed in more detail by EY in proposing this measure. NZE believes that this is another reason to consider specific measures to incentivise multi-hour storage which can deliver permitted projects into auctions in a much shorter timeframe than new gas generation plants.

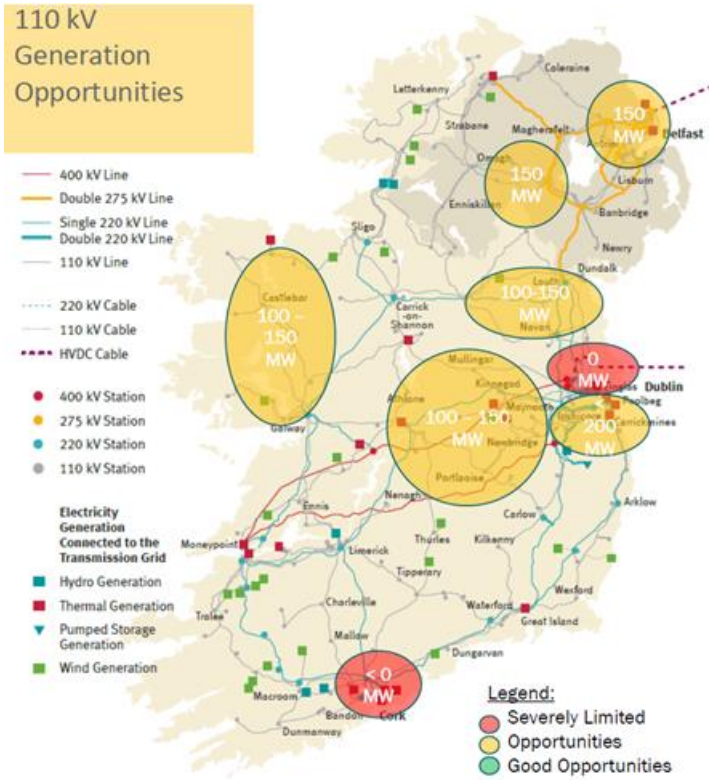
Mixed Signals in Dublin

We wish to add one further point of concern in relation to mixed signals coming from the SO in relation to the capacity constraints in certain areas versus the grid capacity to accept new generation in those locations- this is a particular issue in Dublin at present.

Dublin is in a constraint group for CRM and has not met its capacity requirement in recent auctions (T-4 2025/ 2026, T-3 2024/2025). Unsurprisingly, the region continues to clear at the CRM auction price cap. Recent CRU directions to the SO confirm grid will continue to be offered to units who are successful in winning capacity contracts in constrained areas, including Dublin. All of this should be a signal to developers to progress projects in the region.

But there is another side to the story…

At a recent CRM webinar for T-4 2026_2027 auction, EirGrid presented on potential generation opportunities in Ireland and showed 0MW potential in North Dublin at both 110kV and 220kV (see below)



We understand the reasoning behind this is that there is a short circuit issue in North Dublin and further synchronous thermal generation could not be accommodated. However, inverter-based battery technology has very low short circuit contribution compared to thermal generation so is a perfect solution in this region- i.e. providing much-needed capacity which does not negatively impact stability of grid in North Dublin.

The problem is that EirGrid has implemented CMC_08_22[1] which applies a blunt tool to simply impose a maximum limit to MW capacity in a given constraint location with no recognition of the difference in impact of thermal generation vs battery technology on the grid. By using megawatts as a proxy for the characteristic EirGrid is actually concerned with, namely minimising short circuit contribution, the approval of CMC_08_22 has (presumably inadvertently) excluded plant such as long duration batteries that provide good megawatts, but almost no short circuit contribution.

We believe that EirGrid should be seeking out low short circuit contribution technology to meet Dublin capacity shortage not putting up more road-blocks.

Question 3: Did new capacity procured in auctions get built?

We have no further comments beyond the ESI response to this question.

Question 4: Was the capacity procured of sufficient value?

The ESI response to this consultation proposes 3 specific options to specifically target multi-hour battery storage. In NZE, we have generated a high-level model to illustrate the impacts of the various measures. In each case we model a 100MW battery of varying duration. ***We deem all 3 options to be 'High' in terms of benefit but varying in terms of feasibility as detailed below.***

Maintain a 10-year contract duration but varying the CRM Clearing Price

We note that a review of the BNE is due to take place shortly and this may result in an increased price cap for new-build. Another option would be to implement a separate capacity pot for zero-carbon capacity of a minimum de-rating factor and allow this to clear at a separate cap based on Li-ion storage (as the most cost-efficient zero-carbon technology).

Li-ion BESS	Li-ion BESS (hrs)	CRM Clearing Price (€k/MW/annum)				
Duration (hrs)		147	200	250	300	350
	2	7%	10%	13%	16%	19%
	4	6%	9%	11%	14%	16%
	6	4%	7%	9%	11%	14%
	8	0%	3%	5%	7%	9%

Table 1: Multi-hour battery IRR- 10-year contract duration- varying CRM clearing price

This option requires an increase to the new-build price cap and perhaps a review of CRM state aid approval. Where this is noted as a requirement for other potential mitigations in the EY report the feasibility is designated as 'medium' and ***we therefore categorise this measure as 'medium' in terms of feasibility.***

Provide a 15-year contract for LDS

This potential mitigation is listed in the EY report and NZE has looked at the impact on the IRR for varying battery durations and varying CRM clearing prices below:

Li-ion BESS	Li-ion BESS (hrs)	CRM Clearing Price (€k/MW/annum)				
Duration (hrs)		147	200	250	300	350
	2	9%	12%	15%	18%	20%
	4	7%	10%	13%	16%	18%
	6	6%	9%	11%	14%	16%
	8	2%	5%	7%	9%	11%

Table 2:Multi-hour battery IRR- 15-year contract duration- varying CRM clearing price

This option requires an increase to the new-build price cap and perhaps a review of CRM state aid approval. Where this is noted as a requirement for other potential mitigations in the EY report the feasibility is designated as 'medium' and ***we therefore categorise this measure as 'medium' in terms of feasibility.***

Varying network charges for LDS

This potential mitigation leaves the capacity market untouched and has the storage clearing at the existing price cap for new build of €147k/MW/annum. Instead, we seek to address what we see as a fundamentally incorrect treatment of battery storage in the network charging regime.

Li-ion BESS	Li-ion BESS (hrs)	Network Charges percentage of today's standard charges (%)				
Duration (hrs)		100%	50%	0%	-50%	-100%
	2	7%	11%	15%	18%	22%
	4	6%	9%	12%	15%	18%
	6	4%	7%	10%	13%	16%
	8	0%	4%	7%	10%	13%

Table 3: Multi-hour battery IRR- 10-year contract duration at existing CRM price cap- varying network charges

This option does not require an increase to the new-build price cap nor a review of CRM state aid approval. There is precedent for the CRU rapidly addressing a clear issue with the network charging regime for battery storage. In September 2020, CRU/20/115[1] was an interim solution published which removed generator transmission use of system (GTUOS) charging for battery storage units. This decision paper acknowledged a widespread move in Europe to examine network charging for storage units and the potentially unfair treatment of storage and how this is a potential barrier to storage deployment. It further notes the need for a full examination of the network charging regime and this work has since commenced[2]. ***We therefore categorise this measure as 'high' in terms of feasibility.***

Firm Access as it applies to storage

Network charging is linked to the concept of firm access but firm access, as it applies to storage devices on the grid, is an important point to consider. In Ireland, the TSO is obliged to plan and develop the

[1] https://www.cru.ie/wp-content/uploads/2020/12/CRU20115-Decision-Paper-Network-Charges-for-Commercial-Storage-Units-.pdf

[2] https://www.cru.ie/wp-content/uploads/2021/10/CRU21123-Electricity-Network-Tariff-Structure-Review-Objectives-Principles-Call-for-Evidence.pdf

grid infrastructure to provide for firm access to all units using the transmission grid (per their license conditions and the Transmission Planning Standards). Connection to the grid is allowed prior to the completion of all grid infrastructure upgrades required so generators or demand units do have an option to connect initially on a non-firm basis until the necessary grid upgrades (known as Associated Transmission Reinforcements or ATRs) are complete to provide them with firm access.

Even apart from its capacity contribution, storage technology is an important element of Ireland's technology mix in working towards our 2030 target of 80% RES-E. The reason that storage is so vital to achieving this target is that it presents the opportunity to 'smooth' the profile of our abundant, but variable, renewable resource and match it better to the demand profile. In other words, storage projects can be used to charge (or import) energy at times of high renewable output and discharge (or export) at times of low renewable output. This very use-case of storage means that storage will tend to act against the normal flows on the grid i.e. storage is basically a contra-flow device on our grid. Therefore, applying a 'firm access' standard to build out grid for storage connections and impose network charges on them for this purpose is not rational.

Instead, storage projects should be provided with two new connection types as options for their connection. They can either connect in a 'permanent non-firm' manner, meaning they drive no grid reinforcements and the TSOs retain the right to constrain the units as needed. This connection type might be particularly suitable for a storage project looking to generate most of its' revenue via trading and capacity contracts. Or they can connect as 'contra-flow' units where they effectively create new firm capacity and the TSOs retain the right to operate the unit proactively in order to maximise its impact in a constraint scenario. This connection type would be particularly suited to storage projects located behind a specific network constraint. The incentive for storage developers to connect by one of these methods is that they can either avoid network charges or even be paid negative charges for acting as an enabler to increase grid capacity. Since network charges are a considerable cost to a storage project this would have a significant benefit for the project's business case. For the TSOs, they can provide a real incentive for the deployment of multi-hour storage while maintaining operational security and avoiding difficult network build-out.

The below table describes the existing connection types and two new types we propose:

Connection Type	Status	Network flows	Financial Firmness	Physical Firmness	Network upgrades	TUoS	Grid Connection Capacity	Congestion payment	Examples
Normal unshaped	Existing	Adding to existing peak flows	Firm	Firm	Must complete	Positive	Reduces	None	Typical large industrial demand or conventional generator
Temporary non-firm	Existing	Neutral	Non-firm initially	Non-firm initially	Must complete	Positive	Neutral	None	Wind farms or Dublin data centres policy
Permanent non-firm	Proposed	Neutral	Non-firm	Non-firm	Can ignore	Zero	Neutral	None	Battery prepared to take the risk of non-firm
Contra-flow	Proposed	Contra-flow at all peak time	N/A	N/A	Avoided	Negative	Increases	Payment to unit	A long duration storage plant built to offset network upgrades

Implementing a permanent non-firm or contra-flow grid connection regime for battery storage would allow for the removal of network charges and immediately make LDS competitive with new-build OCGT gas in today's CRM. We therefore propose this as our recommended approach.

Targeted Measures

Finally, we would note there is another mixed signal coming from the capacity market. We recognise that the above options, if applied broad brush to all storage, would result in a signal to shorter-duration projects to build, given the increased returns available to them. We also note that this is currently controlled by the CRU direction to the SOs to only grant grid for units >0.5 derating (circa 3-hour and longer). This policy was applied at the last minute, and without consultation. We do not know how this figure was arrived at. Industry does not know how it may change in future, so we cannot plan projects in response. It appears to be a very short-term fudge, because ECP will deliver grid to shorter duration batteries, perhaps as soon as next year, at which point they will outcompete longer duration batteries. Absent any other changes, short duration batteries will win future capacity auctions in the very near term.

If EirGrid want to target a minimum duration (e.g. >4 hours) of batteries then a permanent solution will be needed to target the measures:

- Specific pot for zero-carbon capacity of minimum duration with higher price cap
- Removal of or negative network charges for storage of minimum duration located in designated areas

Finding the optimum level for storage in the CRM in the long run.

The CRM is today designed to procure only one product, namely capacity. But the characteristics of fully dispatchable gas plant are very different to storage (and demand side) which is energy limited. The use of derating factor methodology attempts to level the playing field to allow both classes of technology to compete. But Ireland is aiming for an 80% renewables power system by 2030 and a fully decarbonised system a few years after that presumably. Any such system will surely be dominated by wind and storage. Even if dispatchable plant are running biomethane or liquid zero-carbon fuels or carbon capture and storage, they will have energy limits due to their storage capacity. The “infinite pool” of the fossil gas network will no longer be available.

Net Zero has completed some simple economic modelling of a power system with 100% wind and storage, based on an hourly demand, solar and wind profile. We find that a cost optimised generation mix sized to meet 2030 demand of 7.3GW requires around 1GW of 4hr batteries and 6GW of dispatchable green hydrogen generation plant with at least 300-hour run time per annum. Such a system meets all demand in a typical wind year, with only 5% wind oversupply. We found that intermediate duration of say 10-20hrs was not all that useful, because it was too long to cover the evening peak and solar day/night shifting, but too short to deal effectively with wind fluctuations, which often run for days. This is a simple model but, for the purposes of this discussion, let’s assume this is a perfectly optimum solution. The key question is whether or not the CRM, as currently implemented, could deliver that optimum mix.

We think the answer is no. Consider the likely scenario that battery prices continue to fall as the volumes grow exponentially to supply the EV industry, then it is likely that derated battery costs will fall below that for dispatchable plant. This leads to the obviously unworkable scenario where the capacity market, if it remains as implemented today, could procure 100% storage of 2-6hrs duration around 2030, with no dispatchable plant at all. Clearly a system with only wind and 3hr storage is unviable, no matter how many MW of the 3hr storage is available. Therefore, a mechanism must be created in the CRM to ensure that once the “optimum” level of 3hr storage is achieved, a lower, and

perhaps zero, value is then ascribed to 3hr storage. Furthermore, todays CRM ascribes identical value to 6hr storage and 300hr storage. But the future power system clearly needs a balanced diet of both, so the CRM needs a mechanism to adjust the values such that the optimum mix is achieved. For example, the derating factor methodology could incorporate a mechanism that models the value of each duration of storage and as the optimum volume is reached, derating factors for that particular duration would fall rapidly, to avoid incentivising overbuild.

This is a problem for today, not a decade from now. With the CRM giving out 10-year contracts (and possibly 15 year), then each year from now risks locking in the wrong capacity mix.

Conclusion

NZE welcomes this detailed examination of the CRM and hopes that momentum can now be maintained- to review the responses received, engage with stakeholders and get to a position where specific measures are taken to improve on the delivery of capacity in Ireland over the short-to-medium term. We are happy to discuss our submission in more detail as required.

- End -