Imperfections 2025-2026 Consult

Net Zero Energy Response

July 2025

Introduction

Net Zero Energy (NZE) is a 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 two 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).

Ireland is at a critical stage in its journey to decarbonisation. The EPA recently updated its' greenhouse gas emissions projections for Ireland for the period of 2024-2055. In this analysis they found that planned climate policies and measures, if fully implemented, could deliver up to ***23 per cent emissions reduction by 2030 compared to 2018***, down from the 29 per cent reduction projected last year. ***This widening gap to the emissions reduction target of 51 per cent in Ireland's Climate Act*** is driven by updated information provided by Governmental bodies.

To deliver on our targets and vision for a zero-carbon future in a cost-effective manner, it is vital that industry expertise is harnessed and supported so that Ireland can be a country that is run wholly on clean, renewable energy.

Table 2 of this consultation tells a shocking story. 2016 to 2025 saw an increase of €555.5m in Dispatch and Balancing Costs (DBC)- ***an almost 5-fold increase in 10 years.*** While the 2023 saw a reduction of ~22% on the 2022 costs this was down to fuel cost reduction rather than any structural solution and it has proven to be a temporary blip in an otherwise upward trajectory. This colossal amount of money is the cost to Irish energy consumers of constraining

on fossil-fuel generation, which has not achieved a position in the energy market, to its' minimum stable level in order to maintain stability on the grid.

Figure 1: DBC/ Constraints Cost over time

Yet despite these shocking numbers, this consultation fails to focus on the salient point- how can we get rid of the need to constrain on fossil fuel generators to stabilise the grid? We see no in-depth analysis of the drivers and mitigations. Section 4 and 5 of SEM-25-028 provides barely a single page of scant detail on mitigation plans and refers to the EirGrid multi-year plan without solid targets or metric for success either on a cost or emissions basis. These costs are, quite simply, out of control as things stand.

Forget about assessing different options to use to model volatile commodity prices. Forget about progressing a Trading and Settlement Code modifications to allow for bi-annual review of the Imperfections Charge. Concentrate on the one key question:

"*What actions the TSOs could take to minimise Imperfections Charges*"

The answer is alot- there are clear actions to be taken by the **System Operators and Regulatory Authorities** but these actions are not being progressed with the speed warranted by these escalating DBC costs, in our opinion.

We will set out here the solution to removing the vast majority of this c. €700m per annum cost from the Irish consumer using only proven technology. SEMC and the System Operators should now place absolute focus on developing and managing a programme of work to remove the system operational constraints which result in these ballooning costs. We have seen a lot of government and public focus on the rising costs of Ireland's new Children's Hospital, currently forecast at around €2.2bn. If we remove the Dispatch and Balancing Costs which drive this Imperfections Charge, in little more than 3 years we will have saved enough money to fund the entire cost for the hospital. It is a staggering

amount of money which can be put back in the pockets of the Irish citizens by way of a clear action plan to deploy proven technology and it is an issue that should be placed at the very top of SEMC priorities.

2025-2026 Imperfections Charge Consultation Response – Key Points

This consultation proposes an Imperfection Charge of €699m for 2025-2026. While the paper does spend time analysing the costs and key drivers for the cost increases we find this analysis to be lacking in detail. The section describing mitigation measures ('in Section 4 and 5 of the paper) makes reference to the EirGrid multi-year plan on imperfections and constraints[1]. This document is a welcome addition from EirGrid and contains actions to be taken over the coming years but these actions need focus.

In addition to delivering on the actions in the multi-year plan, EirGrid must also bring transparency to the reporting on the emissions impact of the System Operator Dispatch actions. There is not only a huge cost to having to redispatch plant in our power system- there is also a massive emissions impact. This is an action in Climate Action Plan 2025 that is currently running late[2] but we see no detail on the progress in relation to the 2nd part of the action on reporting of emissions from System Operator dispatch actions.

We would ask that this action be progressed to maintain the correct focus and incentives to deal with the impacts of Imperfections from an emissions as well as a cost perspective.

EL/24/22	**Implementation of enhanced emissions reporting framework for electricity emissions for large energy users and the system operators dispatch actions**	As per headline action	Regular reporting	Q4 2024	SEAI/CRU/EirGrid/ ESBN (Reporting lead :DECC)	DETE, IDA, DECC

Mitigation Measures

The section dealing with mitigation measures for a c. €700m per annum Dispatch and Balancing cost accounts for one page in Section 4 and 5 and is included here in its' entirety for reference.

[1] https://consult.eirgrid.ie/en/system/files/consultation-outcomes-reports/PR5%20Imperfections%20and%20Constraints%20Multi-Year%20Plan%202025-2029.pdf
[2] https://www.gov.ie/en/department-of-the-taoiseach/publications/climate-action-plan-progress-reports/#climate-action-plan-2025

4. Ongoing actions to Reduce Imperfection Costs.

In May 2023, EirGrid published the "TSO Imperfections & Constraints Multi-Year Plan 2023-2027". Within this document, the TSOs outlined a multiyear plan to manage and reduce imperfections and constraints in the electricity system. These actions include updating reserve policies, reviewing and reducing transmission constraints, lowering the minimum number of conventional units online, conducting trials to reduce system inertia, developing procedures for new interconnectors, and enhancing imperfection reporting. These measures aim to optimise system efficiency, support renewable energy integration, and reduce operational costs. Under the current price control framework (PR5:2021-2025), the TSO is financially incentivised to deliver on the actions set out in its multi-year plan.

In Q2 2025, the System Operator for Northern Ireland (SONI) reduced the Minimum Number of Inflexible Units (MINNIU) Technical Constraint Group (TCG) from three units to two.

[13] https://www.neso.energy/industry-information/balancing-costs

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In addition to this the RAs are considering the operation of the Bidding Code of Practice (BCOP) as the basis of the bidding rules in the SEM.

Furthermore, the introduction of the North-South Interconnector will potentially alleviate system constraints and therefore Imperfections Costs. The SEMC has requested regular updates from the TSOs and Transmission Asset Owner (TAO) on its delivery.

5. Consideration of Ways to Reduce Future Imperfections Costs

One potential way to reduce imperfections costs in the future (relative to what they would otherwise be) would be to modify the Trading and Settlement Code so that only those units dispatched away from their Final Physical Notification (FPN) by the TSO for balancing energy reasons would be settled at the imbalance price. Units dispatched away from their FPN by the TSO for non-energy reasons, such as to meet a system constraint, would be settled on their complex Commercial Offer Data (COD) only. The SEM Committee is seeking stakeholders' comments on potential actions the TSOs, RAs or SEM Committee could take to reduce Imperfections Costs in the SEM.

In their 'Outturn Report' EirGrid state:

"Imperfections costs are an inherent feature of the SEM design and arise due to the differences between the ex-ante market schedule and the real-time dispatch."

How can we expect to manage our Imperfections Charge cost when the 2nd paragraph of the Executive Summary appears to accept the inevitability of these costs and fails to analyse in any significant detail key mitigation measures which have been modelled extensively over recent years (i.e. zero-carbon system services) nor include solid metrics on either a cost or emissions basis in their multi-year plan.

We call on SEMC to provide more comprehensive analysis of the mitigation options for these costs and to push to enhance EirGrid's multi-year plan for the reduction of Imperfections Cost so that it includes solid targets for cost and emissions reductions.

Managing the Imperfections Charge Cost

The Imperfections Charge is made up of several components but is driven primarily by the Dispatch and Balancing Cost (DBC) which, in turn, is the sum of Constraint Payments, Uninstructed Imbalance Payments and Testing Charges. However, the main driver for DBC over recent years and hence the Imperfections Charge is Constraint costs as can be seen in Table 2 from the consultation:

€ Million	TSOs' Proposed 2025-26	2024-25	2023-24	2022-23	2021-22	2020-21	2019-20	2018-19	2017-18
Total Constraints Costs (DBC)	608.81	475.62	539.98	694.14	341.01	271.09	256.97	190.44	177.6
CEP Art. 13(7)	91	158							
Fixed Cost Payments	-	-	-	-	-	15.38	14.35	7.19	2.7
K-factor Adjustment	183.43	(66.41)	(91.17)	140.36	(10.18)	(0.37)	84.44	(13.86)	(7.34)
Total Imperfections Charge	883.24	**567.21**	**448.81**	**834.53**	**330.83**	**286.10**	**355.76**	**183.77**	**173.02**
Forecast Demand (GWh)	39,650	38,800	38,950	38,200	36,000	33,600	34,200	35,200	34,550
Imperfections Price / MWh	22.28	**14.62**	**11.52**	**21.85**	**9.19**	**8.51**	**10.40**	**5.22**	**5.00**

Table 2: *Imperfections Charge over time*

Fuel costs remains a central variable to these costs and there is one simple solution to mitigating this cost- remove the fuel costs associated with the constrained run.

In order to understand and manage the Imperfections Charge, we need to understand and manage the constraint costs. Currently, the TSOs apply limits, known as 'Operational Constraints'[3], to the operation of power stations and power demand to ensure there are sufficient system services available on the grid at all times to maintain the safe and secure flow of electricity. Traditionally, system services have been provided in large part by fossil-fuelled power stations that often must be turned on or 'positioned' by the TSOs, when they otherwise would not be running, so they are available to provide these services. These power stations receive compensation to cover the additional fuel and carbon costs they need to operate in order to provide these services. These constraint costs currently entirely responsible for the DBC cost. It is worth noting that this also results in significantly increased CO2 emissions from our electricity sector and the curtailment of renewable generation.

EirGrid recognises that, in order to run the system at high levels of renewable penetration and meet the 2030 targets without excessive curtailment of renewable, there will be a technical need for new-build zero-carbon system services technologies. However, our concern is that EirGrid are currently focussed on delivering these technologies in the medium-term, when they are technically needed, rather than in the short-term, when they are economically beneficial.

In July 2019, EirGrid ran an auction-based procurement for a subset of system services which was successful in attracting the largest battery suppliers and investors in the world to Ireland. EirGrid recognised that auctions were a solution to provide revenue certainty to capital-intensive system service technologies such as batteries and stimulate new-build projects for these services. Other battery projects have made investment decisions based on access to the DS3 tariff regime.

EirGrid has successfully created a large competitive market for utility scale batteries. This was achieved by setting clear performance standards and running both tariff and auction procurements. This kick-started an industry, and there are now over 2GW of pipeline of battery projects, with around 700MW operational as of today. This level of competition should be great for consumers, but unfortunately not all the benefits of these batteries can be accessed yet.

What should happen when hundreds of MW of reserve from batteries are available is that EirGrid's operators should be able to save hundreds of millions of euros of constraint costs by avoiding having to constrain on (or down) fossil-fuel plant, often when zero-carbon free wind is also plentiful. But there can be a range of reasons why a fossil-fuel plant could be constrained on. If a plant is constrained on for inertia needs, then the reserve comes "for free", and vice versa. Only when both inertia and reserves constraints have been resolved using zero-carbon sources is it possible to realise the fuel saving and turn off (or up) the fossil fuel plant. Essentially, the goal must be to release fossil-fuel plant to focus only on providing energy, by sourcing all system services from zero carbon sources.

In 2019, Energy Storage Ireland published the *Store,Respond and Save* report[4] based on modelling work carried out by Baringa. This report explored the potential for deploying zero-carbon system services to the grid in order to replace the grid system services currently provided mainly by conventional fossil-fuel generators. The report deals with proven zero-carbon system service technologies that have already been deployed in Ireland and internationally- technologies such as

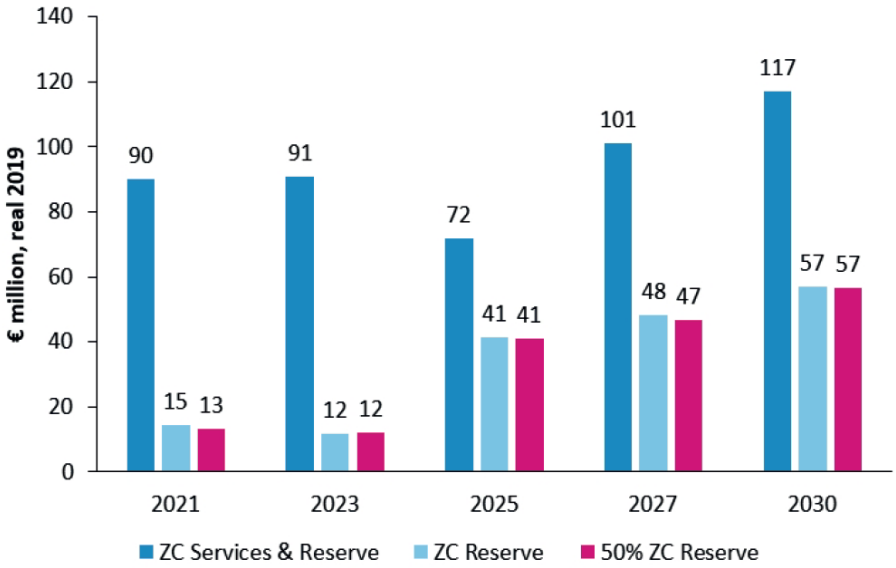
[3] https://www.sem-o.com/sites/semo/files/2025-05/Wk20_2025_Weekly_Operational_Constraints_Update.pdf

[4] https://windenergyireland.com/images/files/iwea-baringastorerespondsavereport.pdf

batteries, demand side response and synchronous condensers. This report shows that, already today, we would be saving at least €90m per annum by transitioning to zero-carbon system services and that figure rises to at least €117m[5] in 2030. But, in reality, these savings are now shown to be vastly conservative, given the recent rise in fuel costs we have seen.

A key point to note from this report is that simply sourcing the reserve services from zero-carbon sources will only result in a small portion of the savings possible. We believe that EirGrid is only getting

Figure 2 Annual operational cost savings generated by using zero-carbon technologies to meet reserve and system services



a fraction of the value it should be by way of reserve requirement coming from batteries (or other zero-carbon sources) until it manages to remove other constraints causing conventional units to be constrained on. The graph above comes from the Baringa "*Store, Respond and Save*" report6:

This graph for example shows that in 2021, the advantage of going from 50% of reserves coming from battery to 100% only increases the savings from €13m a year to €15m a year. The other operational constraints must be removed to go further. Then and only then is it possible to access the full savings of €117m in 2030).

Given the level of battery build-out in Ireland to date, it appears we have got ahead of ourselves a bit. The lack of zero-carbon sources of inertia on the grid today is costing the Irish consumer millions of Euros and hundreds of thousands of tonnes of CO_2 emissions per annum because EirGrid still has to turn on CCGT's and/ or coal for inertia.

The solution is to build non-fossil fuelled sources of independently dispatchable inertia. We are very happy to see the successful completion of the LCIS Phase 1 auction and we eagerly await the connection of these units to the grid in 2027. The UK National Grid procured a number of these

[5] In fact, the most up-to-date modelling for 2030 appears in the recent Wind Energy Ireland/ Baringa Endgame report and shows a saving of €262m from deploying zero-carbon system services in 2030 https://www.baringa.com/BaringaWebsite/media/BaringaMedia/PDF/20210629-Baringa-Endgame-Final-Version.pdf

[6] https://www.iwea.com/images/files/iwea-baringastorerespondsavereport.pdf

projects in 2020 via the Stability Pathfinder Phase 1. These projects are now up and running and delivering benefits to the GB consumer[7].

While the LCIS Phase 1 auction was a very welcome development it will only deliver half the required volume of inertia in 2030. It must now be progressed to LCIS Phase 2 to deliver the full volume of inertia as early as possible in the decade. We welcome the recent publication of the 1st consultation in relation to LCIS Phase 2[8] and would ask that this process is progressed without delay. This allows Ireland to reap the benefit of the massive DBC (as well as emissions) saving available by deploying zero-carbon inertia as early as possible in the decade. This will reduce and ultimately remove the DBC cost and will be a key factor in helping the power sector in Ireland reach its' 75% decarbonisation target by 2030.

The EirGrid Operational Policy Roadmap 2025-205 was released in March of this year[9]. As things stand, EirGrid has an unambitious target for the removal of the minimum generation constraint, planning to reduce this from 8 units today to 3 units in 2030 and to get to 0 units only by 2035. Now that the Irish power sector has a clear carbon target it is time for EirGrid to respond and set clear and ambitious carbon targets and associated operational constraint targets. To remove the DBC there must be an ambitious target to reduce the operational constraints which result in the running of fossil fuel generators for grid services to zero. This min gen target should be possible to bring forward by at least 3 years if we can manage to run LCIS Phase 2 in 2026 and get those units online by 2030 .

We strongly urge EirGrid to provide clarity on the intention to source all system services from zero-carbon sources by 2030.

Conclusion

We believe the current system of management for the Imperfections Charge is inadequate, resulting in an entirely avoidable burden on consumers. We think that more focus is needed on adequate management of these costs and transparent reporting for the Irish consumer. This could comprise for example a working group comprised of system operators, regulators and industry bodies which is responsible for modelling, tracking and reporting on progress in bringing this cost to near zero levels. We would be happy to discuss the detail of our response further should this be useful.

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[7] https://www.nationalgrideso.com/news/first-phase-stability-pathfinders-delivered
[8] https://consult.eirgrid.ie/en/consultation/low-carbon-inertia-service-procurement-phase-2-%E2%80%93-requirements-contractual-and-procurement-0
[9] https://cms.eirgrid.ie/sites/default/files/publications/EirGrid-SONI-Operational-Policy-Roadmap-2025-2035.pdf