Public

Workgroup Consultation

CMP423:

Generation Weighted Reference Node

Overview:

This modification seeks to amend the reference node to generation weighted instead of Demand weighted.

Modification process & timetable

1. **Proposal Form**
   12 October 2023
2. **Workgroup Consultation**
   29 May 2025 - 20 June 2025
3. **Workgroup Report**
   18 September 2025
4. **Code Administrator Consultation**
   09 October 2025 - 31 October 2025
5. **Draft Final Modification Report**
   20 November 2025
6. **Final Modification Report**
   09 December 2025
7. **Implementation**
   01 April 2027

Have 5 minutes? Read our Executive summary
Have 60 minutes? Read the full Workgroup Consultation
Have 180 minutes? Read the full Workgroup Consultation and Annexes.

Status summary: The Workgroup are seeking your views on the work completed to date to form the final solution to the issue raised.

This modification is expected to have a: High impact on Generation and Demand

Governance route	Standard Governance modification with assessment by a Workgroup.	
Who can I talk to about the change?	**Proposer:** John Tindal, SSE John.tindal@SSE.com Phone: 01738 341835	**Code Administrator Chair**: Claire Goult Claire.Goult@neso.energy Phone: 07938 737807
How do I respond?	Send your response proforma to cusc.team@neso.energy by **5pm** on **20 June 2025**	

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Executive Summary

This modification seeks to change the reference node from Demand weighted to generation weighted.

What is the issue?

The Transmission Network Use of System (TNUoS) Transport model currently calculates incremental flows by bringing total generation and Demand into balance by pro-rata increasing all Demand using a 'Demand weighted reference node'. This does not appropriately reflect how the system would respond to changes in User decisions and distorts the relative locational price signals produced by the methodology.

What is the solution and when will it come into effect?

Proposer's solution: Switching from a Demand weighted reference node to a generation weighted reference node.

Implementation date: 01 April 2027

What is the impact if this change is made?

High impact on Generation and Demand.

Interactions

This proposal was developed through the TNUoS Task Force and has interactions with other Task Force work and modifications. This includes CMP432 (Locational Onshore Security Factor), CMP440 (Re-introduction of Demand TNUoS locational signals by removal of the zero price floor), CMP442 (Introducing the option to fix Generator TNUoS charges) and CMP444 (Introducing a cap and floor to wider generation TNUoS charges).

What is the issue?

The relevant defect identified by this proposal is that the TNUoS transport model currently calculates incremental flows by bringing total generation and Demand into balance by pro-rata increasing all Demand using a "Demand weighted reference node". For the reasons described in more detail below, this approach of using a Demand weighted reference node is an issue because it is not cost reflective. It does not appropriately reflect how the system would respond to changes in User decisions, and it distorts the relative locational price signals produced by the charging methodology.

The current Demand weighted reference node also creates an issue for effective competition. This is because the existing methodology is expected to result in collecting an increasing total TNUoS cost from generation wider locational charges, which would further worsen the competitive disadvantage of Great Britain (GB) Generators compared with Generators in other markets.

This modification proposes to rectify this defect by switching from a Demand weighted reference node to a generation weighted reference node instead.

Why change?

The Connection and Use of System Code (CUSC) describes a relevant key principle of TNUoS charging as to reflect incremental cost i.e. the change in system cost caused by a network User from the decisions that User makes:

"*The underlying rationale behind Transmission Network Use of System charges is that efficient economic signals are provided to Users when services are priced to reflect the* ***incremental costs*** *of supplying them. Therefore, charges should* ***reflect the impact that Users of the transmission system at different locations would have on the Transmission Owner's costs, if they were to increase or decrease their use of the respective systems.*** *These costs are primarily defined as the investment costs in the transmission system, maintenance of the transmission system and maintaining a system capable of providing a secure bulk supply of energy.*"[1] (CUSC 14.14.6, emphasis added)

In order to reflect a correct incremental cost, it is necessary for the TNUoS charging methodology to appropriately model what resulting impact on the system would be caused by a User decision. For example, if a Generator were to increase, or reduce

[1] (CUSC - SECTION 1)

generation capacity at a particular location, then: how would the rest of the system be likely to react in response to that decision and what corresponding incremental change in cost of network would that cause?

The TNUoS Transport and Tariff model calculates the impact of such decisions in terms of incremental changes in Megawatt kilometre (MWkm) power flows which may be either positive, or negative, contributing to higher, or lower charges (or credits) respectively. The model does this by adding 1 Megawatt (MW) of generation at each node in turn and applies adjustments to ensure that total generation and Demand remain equal and measuring the resulting change in MWkm flow across the whole of the transmission network.

The issue this modification addresses is whether the pro-rata adjustment to bring generation and Demand into balance should be carried out by the current approach of a pro-rata increase in Demand, or a pro-rata reduction in generation.

Specific issues a CUSC Workgroup could consider include:

- Implications for the network sharing calculation in Transport and Tariff model
- Review potential locations for new generation such as via the Transmission Entry Capacity (TEC) Register, seabed leasing, or other planning sources
- Assess the impact on tariffs that may arise from changes in the way circuits may be placed into either Peak Security and Year Round buckets

What is the solution?

Proposer's solution

Before Project TransmiT, the choice of reference node did not change either the magnitude, or relative locational signals faced by different Users because all Users paid their locational tariff and Residual tariff on the same charging base, so it was not a material issue of concern.

However, after Project TransmiT and within the current methodology, the choice of either generation, or Demand weighted reference node does now matter, because it would change both the magnitude of charges, as well as the relative locational signals paid by different parties. This is because different Generators pay different elements of TNUoS charge, so changes in the value of tariff elements will impact different Generators differently. For example, conventional Generators pay the Peak Security tariff, while

intermittent Generators do not, all Generators pay the Year Round Shared tariff by their own different station specific Annual Load Factors (ALF), and conventional carbon Generators have their ALF applied to their Year Round Not-Shared tariff, while other Generators pay this at 100% of TEC.

The choice of reference node now also affects both the absolute and relative charges paid by Demand customers. This has arisen since the Demand Residual is now applied to a different charging base from the locational Demand charges. If demand charges were to be further changed to apply Peak Security and Year Round charges to different charging bases, then changing the reference node would further impact the magnitude and relative price signals paid by different demand Users.

Switching to a generation weighted reference node would be better than the baseline in a number of ways, including those described below:

1) **Better cost reflectivity: Charges would better reflect incremental transmission system cost/benefit that is caused by a User's decisions.**

In practice, generation scales to meet Demand, Demand does not scale to meet generation. This principle of scaling generation to meet Demand applies in the reality of operating the energy system and also applies in the way the NESO Network Options Assessment (NOA) process and the Security and Quality of Supply Standards (SQSS) operate.

Generation charges: Generation weighted Reference Node is more cost reflective for generation charges

In practice, incremental increase (or decrease) in generation at one location will tend to cause a corresponding offsetting decrease (or increase) in generation at another location. It will not tend to cause changes in Demand.

This is demonstrated in a number of practical ways, such as the way government sets targets for generation to meet Demand, where the relevant question is where that target generation capacity will be located. This is demonstrated in auctions, such as the Contracts for Difference auction with budget caps where Generators compete with each other and one Generator winning a contract would tend to displace a different Generator who did not win a contract. Similarly, for the Capacity Mechanism, Generators also compete with each other to deliver a target required capacity, whereby one Generator winning a contract will tend to displace a different Generator that did not, and if a Generator closes, then more generation capacity needs to be procured through a future auction to replace it.

This principle of generation tending to balance with other generation applies to both Generator investment and closure decisions:

- **Impact of an increase in generation best reflected by a corresponding decrease in generation elsewhere:** Reductions in existing generation can only take place in locations where there is already existing generation that can close. Any corresponding reduction in hypothetical alternative generation, would also be best reflected by a weighted average of existing generation, because alternative new generation would be more likely to be weighted towards locations where there is already generation (as reflected by a generation weighted node), not weighted towards locations where there is already Demand.

- **Impact of a reduction in generation best reflected by a corresponding increase in generation elsewhere:** For the purpose of providing a risk weighted average, corresponding increases in generation should take place in locations where there is already generation. This is because additional generation is more likely to occur at places where there is already generation (as reflected by a generation weighted reference node) due to other limiting factors, such as: where there is access to gas grid, cooling, brown field sites, planning consents, wind resource, seabed availability. By contrast, it is not appropriate for corresponding increases in generation to be weighted towards areas dominated by Demand, such as London city centre.

Demand charges: Generation weighted Reference Node is more cost reflective for Demand

Increases (or reductions) in Demand will also tend to be met with corresponding increases (or reductions) in generation, not by offsetting changes in demand elsewhere. This can also be demonstrated in practice by government targets of generation required to meet changes in expected Demand, as well as scheme targets to procure appropriate generation capacities within the Contract for Difference (CfD) and Capacity Mechanism to meet any changes in the expected level of Demand.

By contrast, the current Demand weighted reference node does not reflect reality, so is not cost reflective of the impact of Demand decisions on incremental network costs. Demand investment/closure decisions tend to be open-ended and independent of each other, so:

- **<u>Increased</u> Demand at one location**: An increase in Demand at a location does not tend to cause a corresponding closure of existing Demand at a different location. More realistically, an increase in Demand would cause an increased requirement for increased generation, so its impact would best be reflected by modelling a pro-rata increase in generation (as reflected by a generation weighted reference node).
- **<u>Reduced</u> Demand at one location**: A reduction in Demand at a location does not tend to cause a corresponding increase in other Demand at other locations. More realistically, a reduction in Demand would cause a reduced requirement for generation, so its impact would best be reflected by modelling a pro-rata reduction in generation (as reflected by a generation weighted reference node).

Better reflect the different generation scaling used by SQSS and CBA for Demand Security and Economy

The SQSS and NESO network cost benefit modelling used by the Network Options Appraisal and now strategic planning including the Centralised Strategic Network Plan, all use an approach of generation serving Demand consistent with this modification's move to a generation weighted reference node.

This is described in more detail in **Annex 07.**

2) Better effective competition for GB generation vs international markets

An effect of the modification would be to reduce average Generator Wider TNUoS charges. This would reduce competitive distortions for transmission connected generation and large distribution connected Generators in GB, who pay TNUoS charges, compared with Generators in international markets and small distribution connected Generators in GB, who do not pay GB TNUoS charges.

3) Better effective competition between GB generation and Demand

More level playing field of price signal between voltage of connection, co-location, or behind customer meters

i) **Locational signals**: Reduce distortion caused by Demand "floor at £zero" and make Demand and generation locational charges more equal/opposite.

ii) **Residual charges**: Reduce magnitude of both Demand Residual and Generator Adjustment Credit:

- Better enable Demand to take action to reduce their own TNUoS charges because demand Residual charges are reduced as more of Demand charge is weighted towards locational instead of Residual.
- Reduce distortions caused by different parties being exposed to different adjustments, or residuals. Better align the business case for generation and Demand across different voltages, co-located arrangements, and behind customer meters.

Workgroup considerations

The Workgroup convened 6 times to discuss the identified issue within the scope of the defect, develop potential solutions, and evaluate the proposal in relation to the Applicable Code Objectives.

Consideration of the Proposer's solution

Cost reflectivity: of scaling generation to meet Demand

The Proposer outlined the background and rationale for raising the modification. The Proposer clarified that the TNUoS transport model currently calculates incremental flows by bringing total generation and Demand into balance by pro-rata increasing all Demand using a "Demand weighted reference node". The Proposer argued the current methodology is not cost reflective and is detrimental for effective competition. Therefore, proposing to switch from a Demand weighted reference node to a generation weighted reference node.

The Proposer provided a consultant's report titled 'CMP423 – Generation or Demand weighted reference node?' (**Annex 03**) to the Workgroup. This report provided a detailed rationale and concluded the following:

- *The characteristics of the GB transmission system expansion suggest that a generation weighted reference node is more appropriate than a Demand weighted reference node for the ICRP calculation of incremental MWkms on which to base TNUoS tariffs"*
- *However, the GB transmission system is expanding rapidly across key transmission boundaries. In planning how much to expand transmission, the National Energy*

System Operator will be able to explicitly take into account the impact of new generation on the operating patterns of existing generation.

- *Given that, in response to incremental generation at one point, the planned transmission system build can be reduced elsewhere, a Demand weighted reference node would seem to overestimate the actual incremental MWkms required.*
- *CMP423 offers a straightforward approach to correcting this by replacing the Demand weighted reference node with a generation weighted reference node (actually replacing Demand scaling with generation scaling against a constant level of Demand).*"

One Workgroup member observed that if generation is increased, Demand will also increase, or generation will need to decrease elsewhere. Another Workgroup member noted that the scenario resulting in the lowest residual charge would be more cost reflective. However, an Authority representative mentioned that the solution should be agreed upon before the analysis, with the results supporting the solution and its initial rationale.

A Workgroup member questioned what the defect of the modification is and how the solution addresses it. The Proposer explained that the defect is the cost reflectivity associated with using a Demand weighted reference node. They advised, in their opinion, that a generation weighted reference node better represents the flexing in generation seen in reality.

Some Workgroup members queried whether changes in Demand patterns would impact the proposed benefit of the solution and another member noted that the Year Round background Demand should reflect Year Round conditions, rather than Peak Demand.

Effective competition: Beneficial impacts of a generation weighted reference node

It was suggested that moving to a generation weighted reference node will have a number of beneficial impacts on effective competition beyond the direct improvement in cost reflectivity. These relate to firstly reducing the size of the Generator Adjustment Credit, and secondly reducing the prevalence of negative Demand charges.

i. Better effective competition by reducing the magnitude of Generator adjustment credit

European regulation 838/2010[2] was introduced to better facilitate effective competition of generation across the EU energy market as part of moving towards greater

[2] Regulation - 838/2010 - EN - EUR-Lex

harmonisation, or at least prevent diversion, in the network different network charges paid by Generators in different markets acros the EU. This was described in the report Charging the wrong way, by RIDG:[3]

> *"A recent European Commission report points out that that "Cross-border competition between generators is likely to induce regulatory competition between Member States and, as such, likely to serve as an implicit upper limit to all types of [generator] charges, preventing larger divergence of within the EU… it is likely that the [generator] charges of the largest Member States in Continental Europe become the benchmark."[4] In other words – the commission expects rational regulators to avoid disadvantaging their own generation fleet by aligning network charging with neighbouring countries. By not doing that, regulators risk undermining the competitiveness of domestic power plants compared to imported power that can offer lower prices because it is not exposed to the same regulation."*

Currently, GB Generator Wider TNUoS charges breach the upper limit of this harmonising range of €2.50 per MWh, and the NESO 10 year forecast showed this upper breach generation Wider locational TNUoS charges collecting too much to be progressiely worsening over time. This upper breach was shown to be requiring a growing generation adjustment credit to bring average charges back into line, rising from £11.64 per kW in 2029/30 to £20.10 per kW by 2033/34[5].

Moving to a generation weighted reference node would be better for effective competition in this regard in at least two ways.

Firstly, P423 Original will deliver Generator Wider locational TNUoS charges that are more consistent with the EU harmonisation objective by ensuring the underlying charges comply with the limiting regulation themselves, reducing the need for a separate adjustemt credit. This effect is shown in analysis presented by NESO, including the impact on the Generator Adjistment Credit, below.

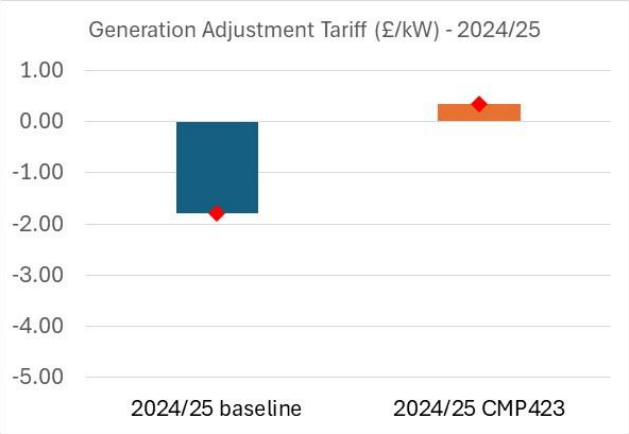
Secondly, CMP423 Original will result in GB Generator charges that are towards the lower end of the €0 to €2.50 per MWh range. This better aligns with the EU Commission expectation that competition across Europe would make it efficient for Generator network charges to tend towards an average of €0 per MWh.

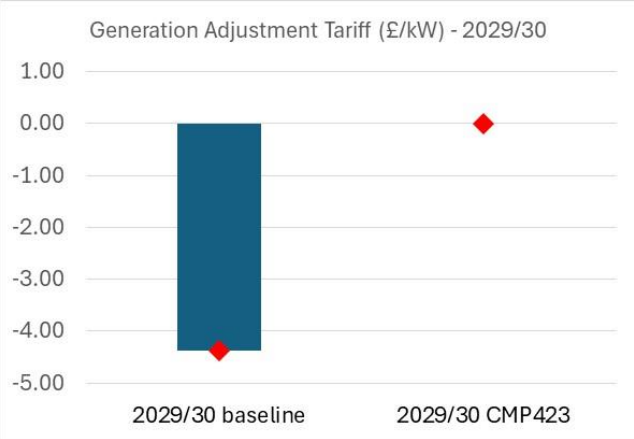
[3] Charging the wrong way, RIDG,2021

[4] EUR-Lex Access to European Law

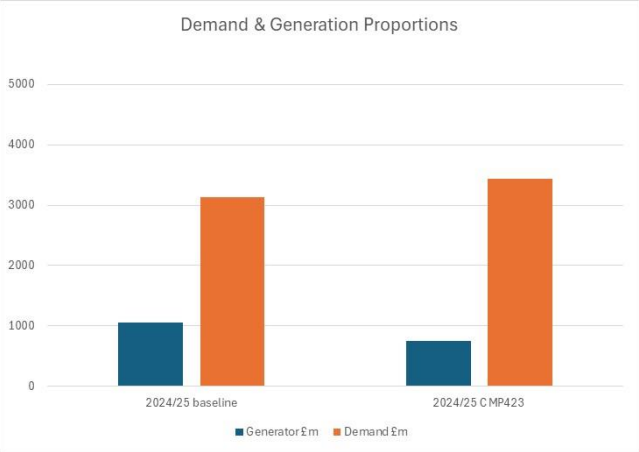
[5] 10 Year Projection 2024-25 to 2033-24 External Report Tables v1.2.xlsx

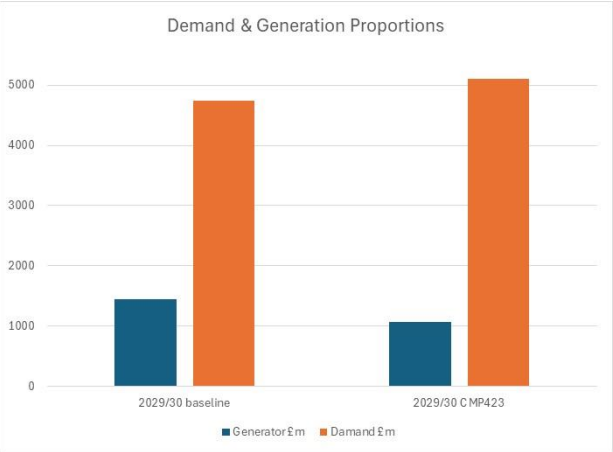
The graph below shows the Generator adjustment credit as a substantial negative number (credit) in the Baseline, then either positive (charge), or zero following CMP423.





Demand and generation proportions





One Workgroup member queried whether there was an overall increase to consumer costs as a result of the modification. The NESO SME noted that the results shown were purely based on TNUoS costs and that there may be other impacts that offset the costs and even provide benefits in the long term.

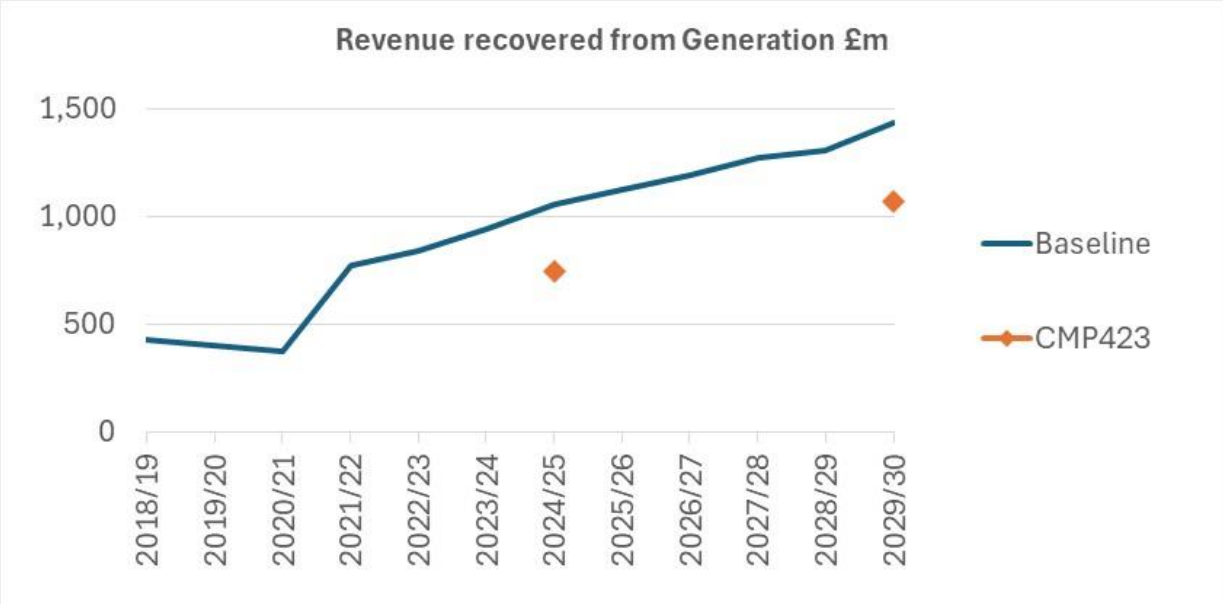
A later section of this report outlines the potential reduction in cost to customers from reduced CfD strike prices.

Historical context of Demand and generation charges

For Generator charges, Ofgem's Targeted Charging Review (TCR) decision resulted in a large step-change increase in the total revenue collected from Generators from 2021/22. The implementation of CMP423 would therefore go some way to mitigate this impact and reduce the total revenue collected from Generators closer to where they would have been before the TCR increase. This was explained by NESO (then ESO) in 2021:

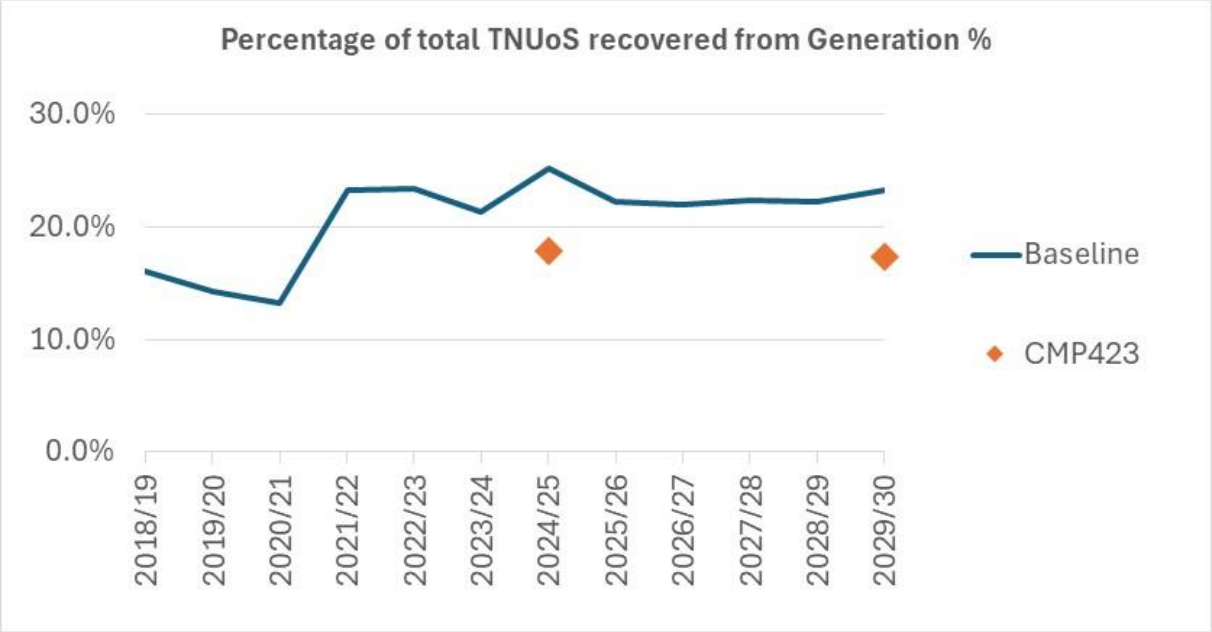
> *"The revenue to be recovered from generators is £774m, an increase of £399m from 2020/21 and a decrease of £39m since the Draft tariffs. This increase from 2020/21 is mainly driven by the implementation of TGR. Local tariffs have been removed from the EU generation cap calculation. The generation residual has been removed from TNUoS charge, but to ensure compliance with the EU generation cap, an adjustment element has been introduced instead."* (NESO final TNUoS tariff report for 2021/22)

The Proposer provided the following graph (**Annex 08**) based on historical NESO data. This shows the step-change increase in revenue collected from Generators from 2021/22, so CMP423 returns Generator charges to the pre-2021/22 trend level.



The following graph uses the same data as above (**Annex 08**), but expressed in percentage terms. This shows the large step-change increase in Generator charges from 2021/22 as a percentage of total TNUoS collected and that CMP423 returns the Generator share closer to previous levels.

The Proposer suggested CMP423 is more consistent with the principles of Ofgem's Targeted Charging Review decision that it is best value for customers for revenue collection to be wholly from final Demand.



ii. **Better effective competition by reducing the occurrence of negative Demand charges**

It was sugested that CMP423 Original will reduce the occurrence of negative Demand charges, and this will firstly improve effective competition between Demand customers at different locations, as well as secondly improve effective competition between Demand and generation.

Demand TNUoS charges have always been floored at £zero to prevent a perverse operational signal to increase Demand at peak in order to earn TNUoS Demand credits. This is a particular issue for Demand because Demand TNUoS is based on time of use, so can distort operational dispatch, compared with Generator TNUoS, which is based on TEC capacity, and does not distort operational dispatch.

The current Demand weighted reference node creates a particuar problem for Demand charges, since it results in Demand in the southern most parts of GB being close to £zero (not exceeding £10 per kW), and Demand charges everywhere else being negative, so floored at £zero. This means Baseline results in very flat locational Demand charge with ineffectice locational signals for Demand, as shown in the NESO analysis section of this report.

This floor at £zero issue only recently arose following Ofgem's TCR decision to remove the Demand residual from the Triad charge and apply it as a fixed charge per site

instead, through CMP335 and CMP336 implemented in charges from April 2023. Prior to this, the Demand residual charge was large enough that Demand TNUoS Triad charges never, in practice, became negative, enabling the full locational gradient of price signals to apply to Demand. At the time of the TCR decision, Ofgem acknowleged that the effect of the floor at £zero policy effectivelly flattening the Demand gradient was an issue and expected this to be resolved via a subsequent CUSC modification proposal.

> *"3.31. Consequently, the Workgroup developed three proposals for dealing with any negative forward-looking charges. As noted above, the forward-looking element of the demand charge will be under consideration as part of our proposed further work on transmission charges , and so it is feasible that* ***the mechanisms that deal with negative forward-looking charges may be impacted****. It is possible that as a result, changes to locational signals introduced by CMP343 may be altered, or* ***the mechanism itself may only be temporary, because it is subsequently superseded by other TNUoS reforms***."
> (Ofgem Decision CMP343)

Since Ofgem's TCR decision, and arising from the Charging Futures TNUoS Task Force, modification CMP440 has been raised for the "Re-introduction of Demand TNUoS locational signals by removal of the zero price floor". The proposed from CMP440 is to spread the negative Demand charge over a larger number of periods to dilute the incentive for Demand to increase its load at peak periods.

In this regard, moving to a generation weighted reference node complements CMP440 in resolving the issue identified in Ofgem's TCR decision by reducing both the number of negative tariff zones and reducing the magnitude of negative charges for those that remain. In this way, it reduces the magnitude of the defect CMP440 is trying to resolve and mitigates unintended consequences by reducing the magnitude of any remaining distortionary incentive for customers to increase their load at peak times.

In this way, CMP423 (complementing CMP440), delivers on Ofgem's expectation following the TCR decision on CMP343 and the TNUoS Task Force to better deal with negative forward looking charges for Demand. Reinstating the full locational gradient for Demand will have a number of beneficial impacts, including:

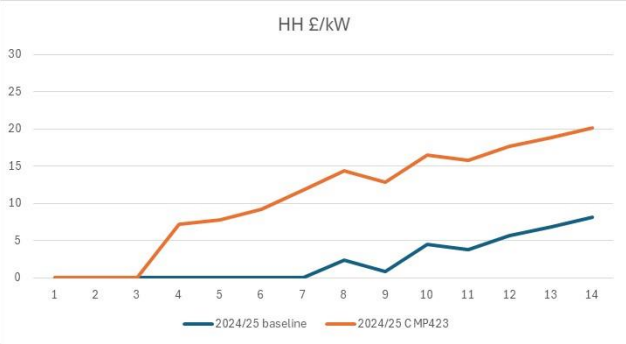
Firstly, improving effective competition between Demand at different locations. One of the challenges identified during the REMA process is how to best provide an incentive for Demand to locate closer to areas with surplus generation. CMP423 would go a long way to delivering this solution and combined with CMP440 can deliver a Demand TNUoS signal that is better, more predictabe and more effective compared with a zonal pricing.

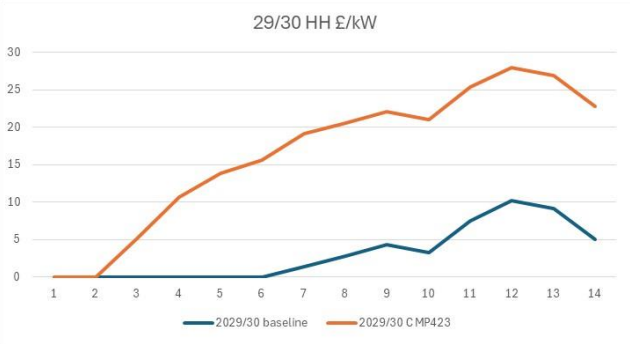
Secondly, improving effective competition between Demand and generation. It would move closer to Demand and generation Wider locational charges being broadly equal and opposite to each other

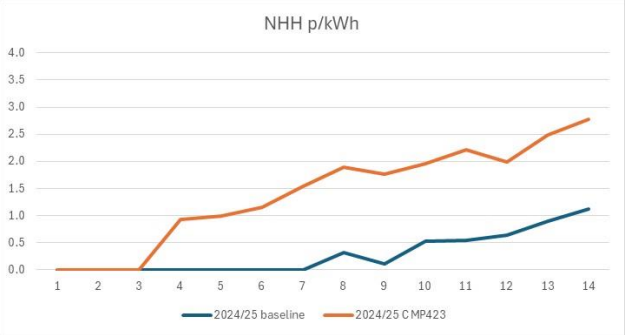
The NESO tariff and revenue analysis (**Annex 04**) shows that CMP423 will increase the value of Demand locational tariffs.

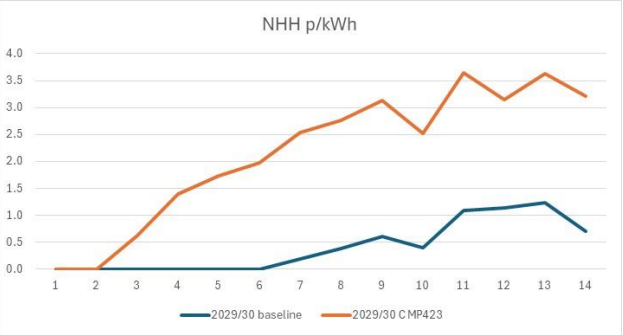
This will increase the relative locational Demand signal across more zones, because most northern zones will no longer fall below the floor at £zero.

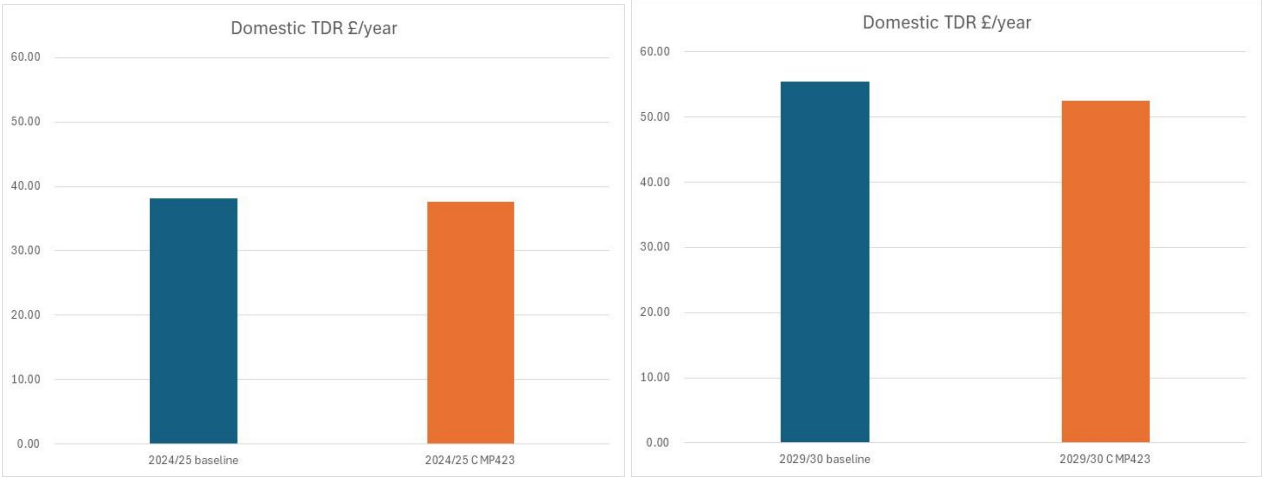
It will rebalance revenue collection from Demand with relatively more revenue being collected from the Demand locational charges, which will tend to reduce the value recovered from the Demand residual charges.





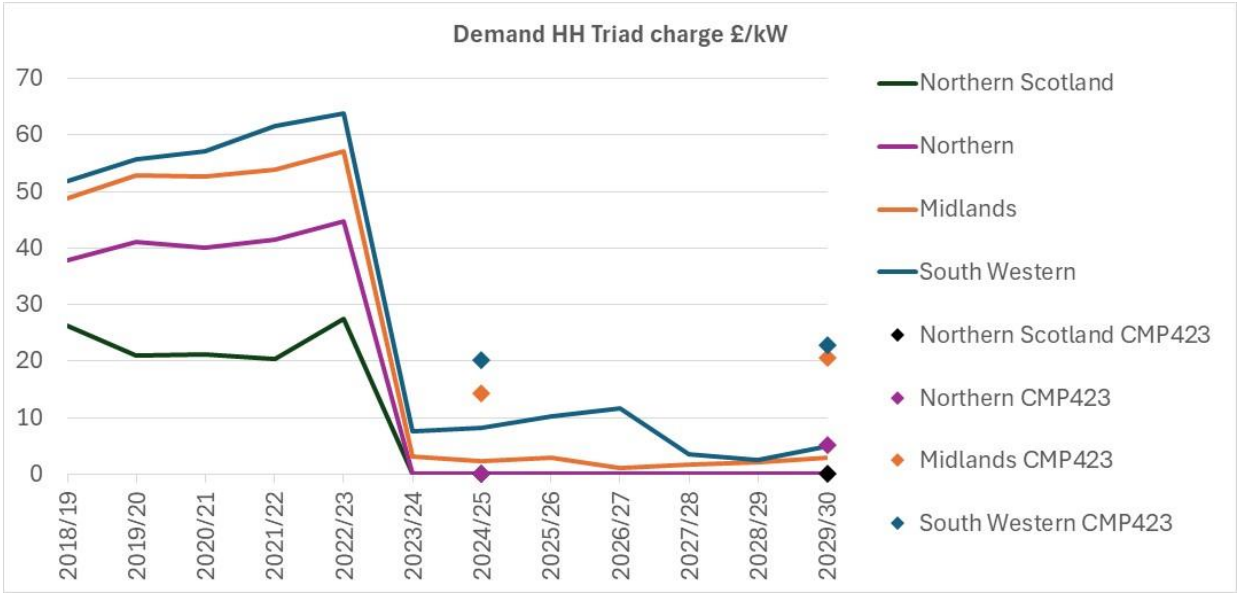






For Demand charges prior to 2023/24, the Triad charge was much larger than it is currently for 2025/26, the floor at £zero was not a limiting factor and Demand customers were exposed to the full range of locational price signals across GB. While CMP423 would not return Demand locational charges to their full pre-2023/24 levels, it would go some way towards it.

The Proposer provided the following graph using historical NESO data to illustrate this effect. The data is available in **Annex 08**.



Consideration of the solution: Scaling of Storage and Interconnectors

One Workgroup member queried whether Interconnectors and Storage acted as a substitute for Generators, noting that they thought they served an arbitrage function instead, as generation still needs to occur for them to work. The NESO SME agreed to investigate how scaling factors could be removed from the analysis and the possibility of running the model excluding Interconnectors and Storage. One Workgroup member queried whether excluding these Users was appropriate.

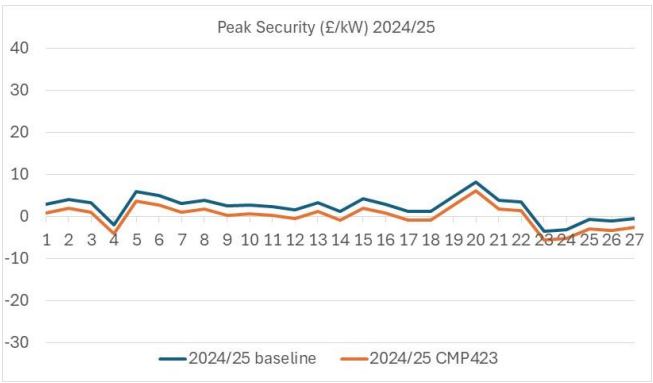
NESO presented tariff and revenue impact analysis (**Annex 04**) with and without scaling Storage and Interconnectors. Following the Workgroup discussion and consideration of NESO modelling, the Proposer decided that the Original solution would treat Storage and Interconnectors in the same way, and pro-rata scale them in the same way as other forms of generation when applying the Generator weighted reference node.

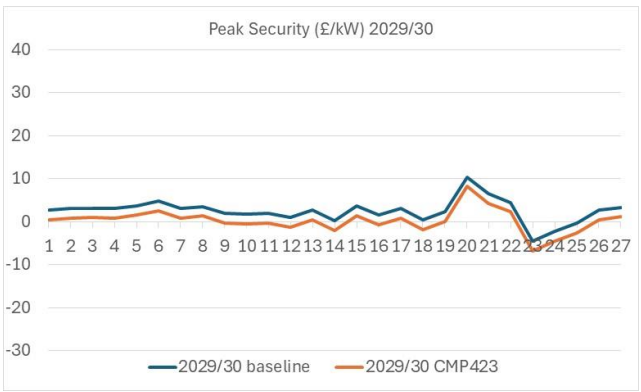
Impact on Generator charges - NESO Analysis

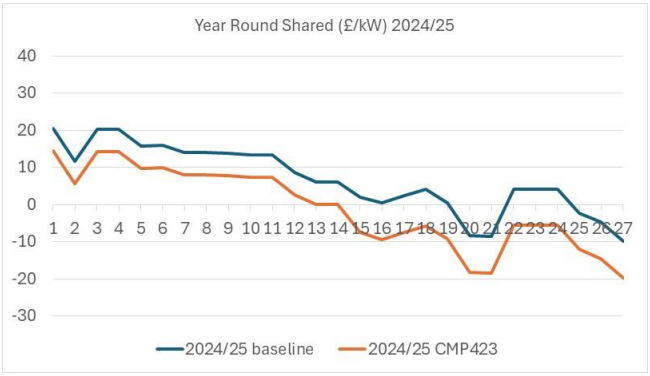
The NESO SME presented analysis (**Annex 05**) which illustrated the multi-year impact of CMP423 on tariffs and revenue for 2024/25 and 2029/30 the last year of the five-year forecast and the interaction with CMP444 Introducing a cap and floor to wider generation TNUoS charges and WACM1 which is currently with the Authority for decision.

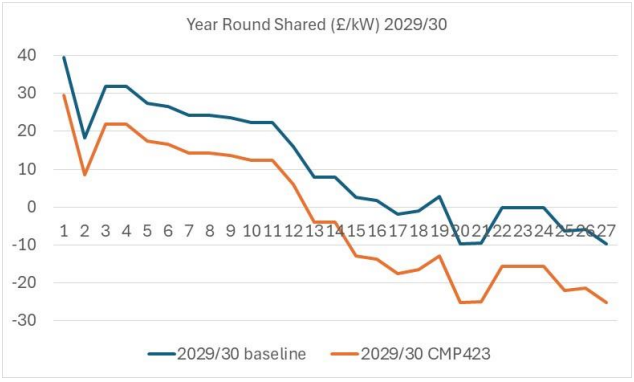
The NESO SME produced analysis for the two specific years, 2024/25 and 2029/30, to the Workgroup to provide insight into how the impact of the modification may evolve over time. A selection of relevant graphs are provided below:

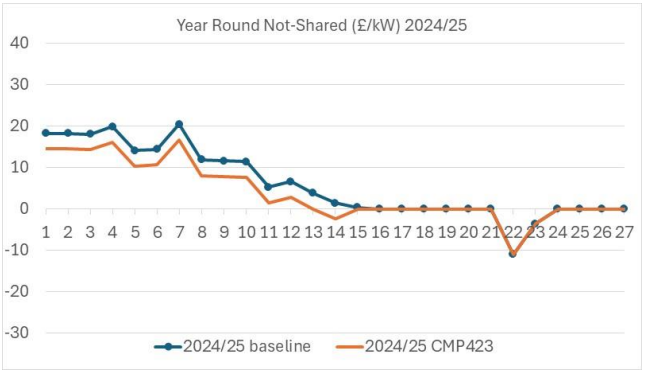
Impact on £/kW generation tariff elements

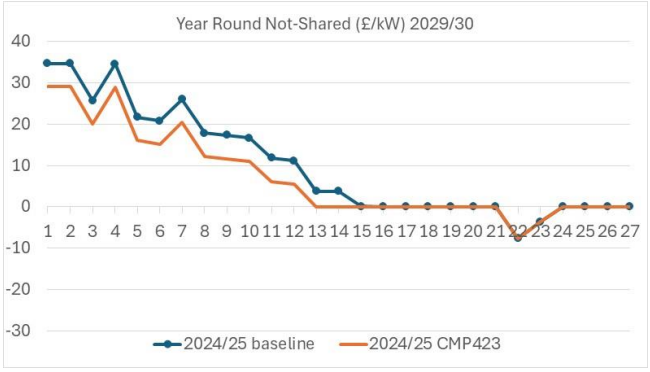




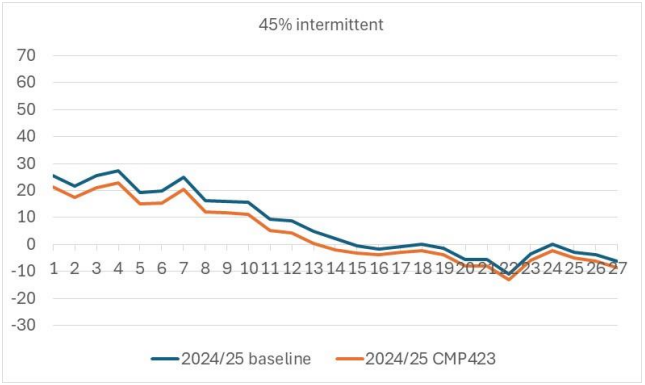


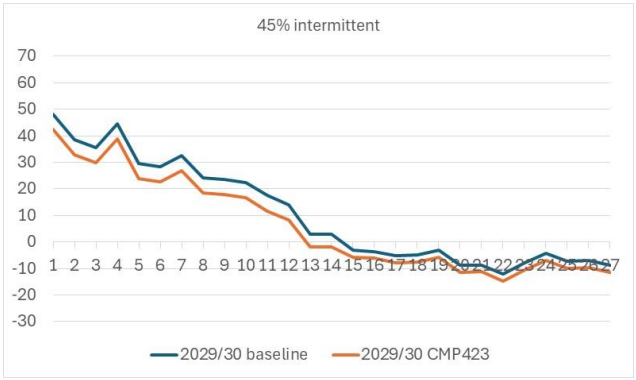


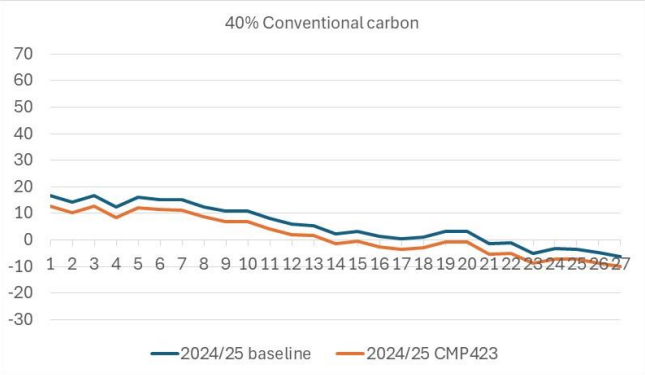


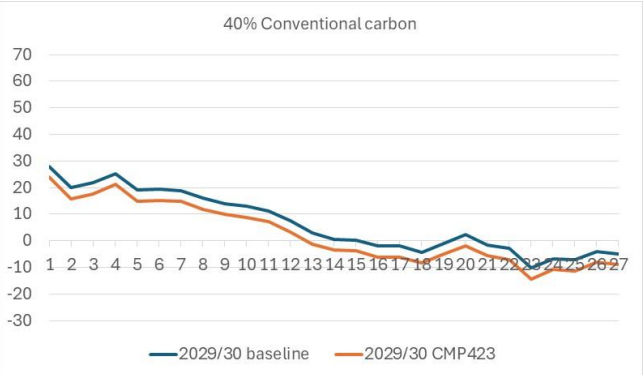


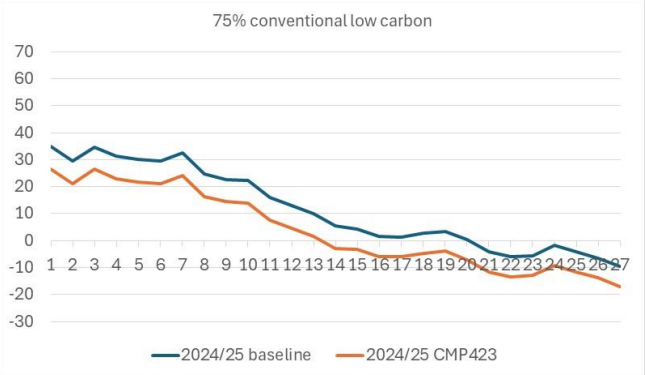
Impact on £/kW charges paid by different technologies

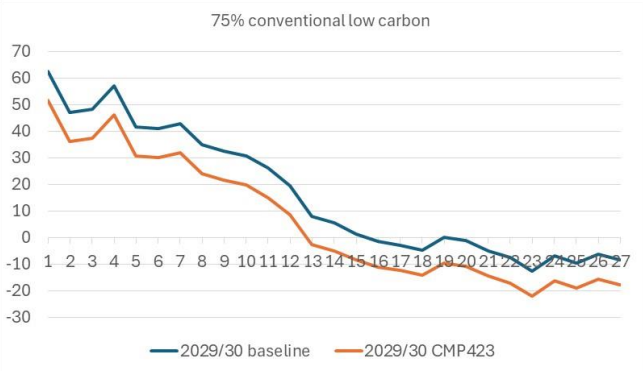










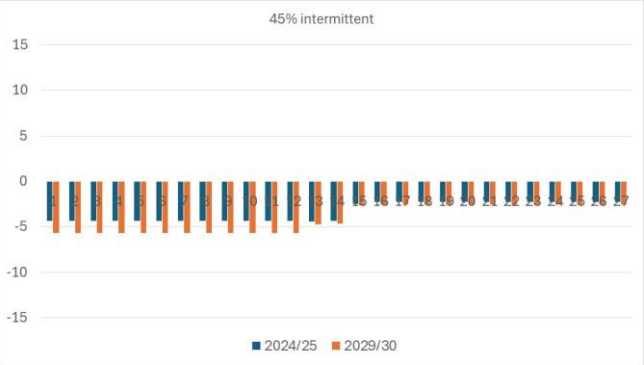


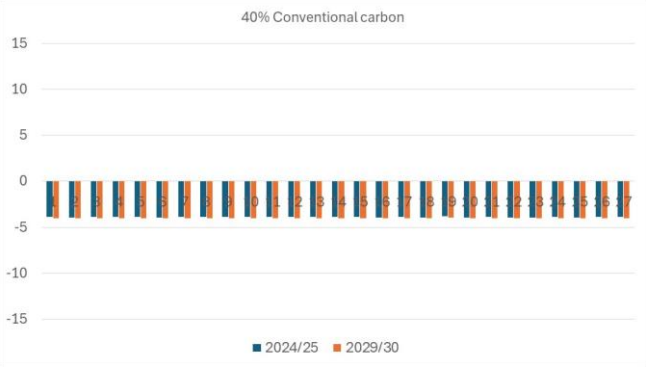
Change in £/kW charge due to CMP423

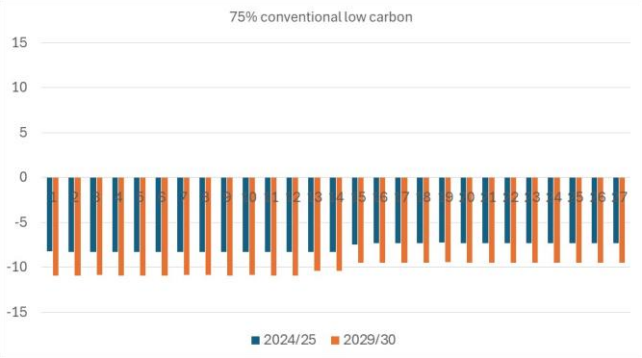
For 45% intermittend Generators, the reduction in charge is larger in northern zones because part of the northern reduction is in the Year Round not shared tariff, on which intermittent Generators pay 100% of their TEC. In southern zones, the network is fully shared, so the reduction in locational charge is only from the Year Round shared tariff on which the impact is reduced according to a Generator's ALF.

For 40% conventional carbon Generators, the reduction in charge in northern zones is smaller than that for intermittent Generators, as conventional carbon Generators have their ALF discount applied to both the Year Round shared and not shared tariff elements. However, the reduction in southern zones is larger than for intermittent Generators because conventional carbon Generators receive a reduction from both the Peak Security and Year Round tariff elements.

The reduction in charges is largest for 75% conventional low carbon generation, because they pay the Year Round not shared tariff on 100% of their TEC, obtain a larger benefit from the reduction in Year Round shared tariff due to their higher ALF, and they benefit from the reduction in both the Peak Security as well as Year Round tariff elements.



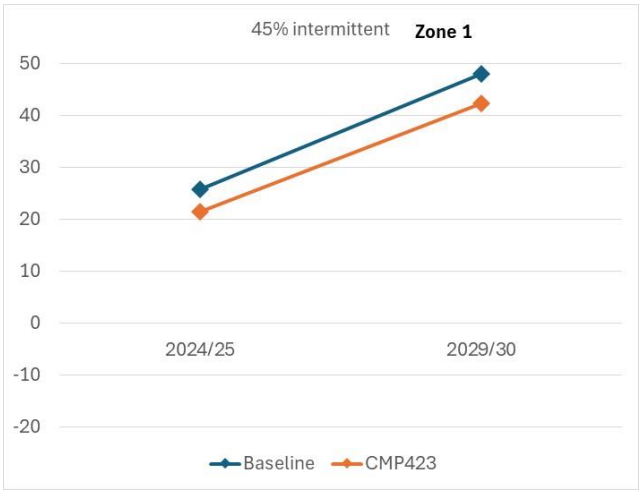


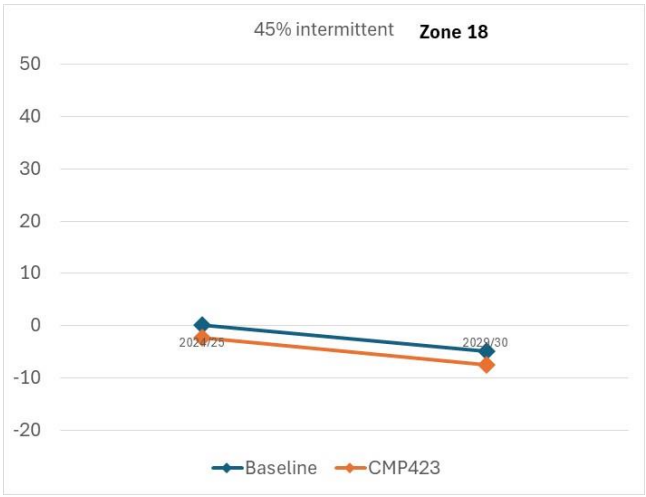


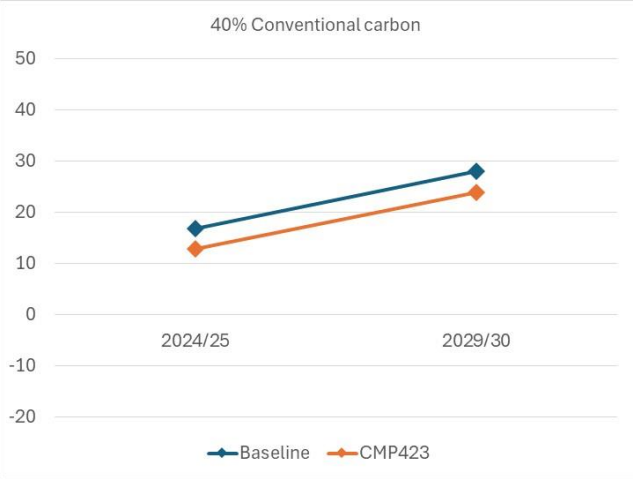
Change in £/kW Generator charges over time

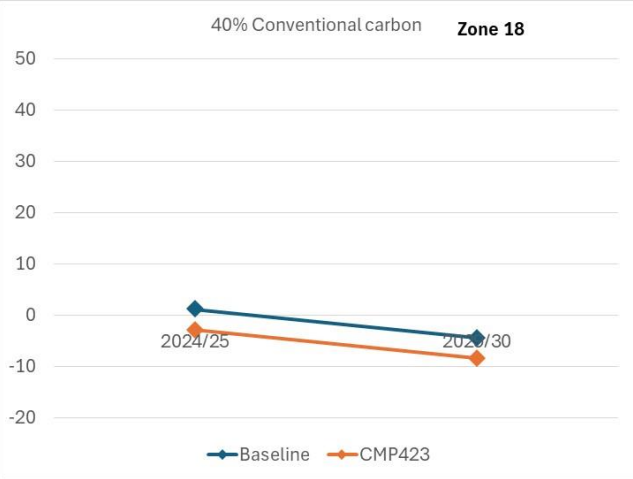
The NESO analysis showed that the trend change in TNUoS charges over time dominates the reduction in Generator charges from CMP423. In particular, for northern Generators, this proposal will partially mitigate the large increase in charges over time, so that even after this modification, Generators in northern zones would still pay charges that are considerably more expensive than in 2024/25.

Correspondingly, Generators in southern zones where charges are expected to become cheaper (or credits become larger), would also continue this trend.





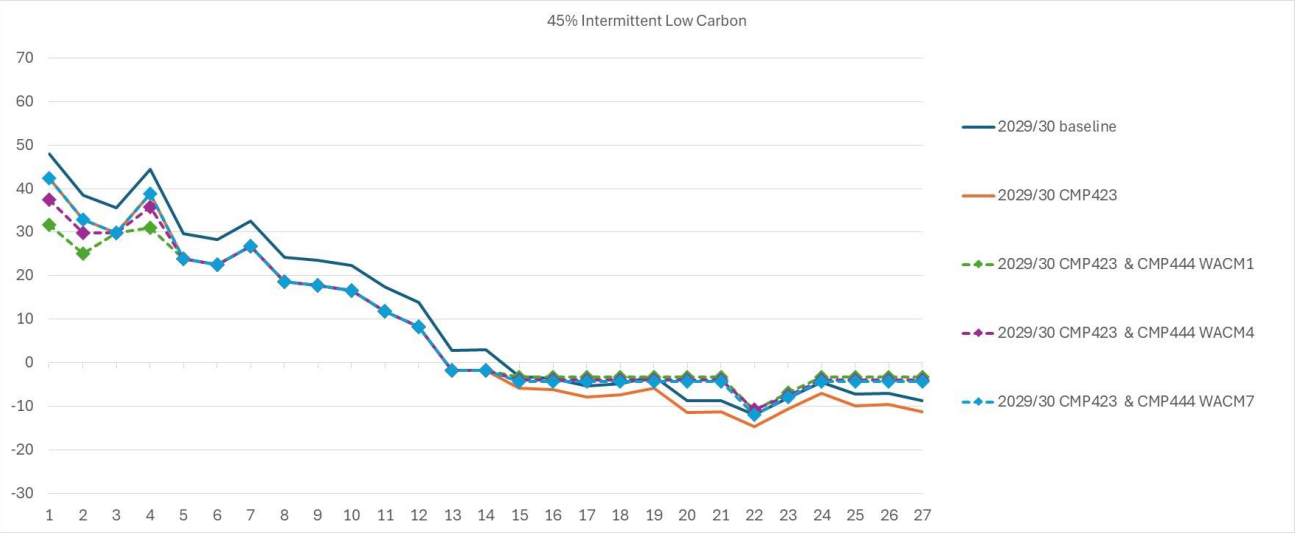


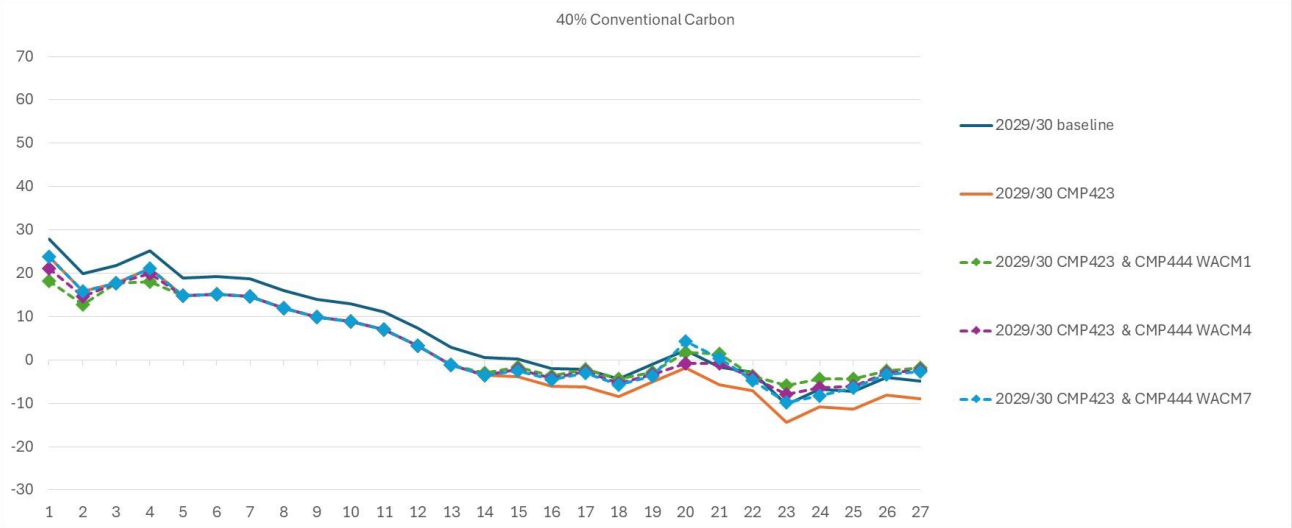


Interaction of CMP423 Generator charges with different Cap and Floor CMP444 WACMs

NESO carried out additional analysis (**Annex 06**) of the interaction between CMP423 and three different WACMs of CMP444: WACM1, WACM4 and WACM7. This showed:

- **Northern Generators zone 1-4**: Combination with CMP444 WACM1 and WACM4 resulted in lower charges compared with CMP423 by itself, while CMP444 WACM7 did not result in any difference because the CMP423 tariffs resulted in charges below the cap.
- **Northern Generators zones 5-14**: None of the cap and floor WACMs made any difference to Generator charges for CMP423, because neither the cap, or the floor were triggered in those zones.
- **Southern Generators zones 15-27**: Combination with CMP444 tended to result in smaller credits compared with CMP423 by itself. This is due to charges resulting from CMP423 breaching the floor.


45% Intermittent Low Carbon
70
60
50
40
30
20
10
0
-10
-20
-30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
2029/30 baseline
2029/30 CMP423
2029/30 CMP423 & CMP444 WACM1
2029/30 CMP423 & CMP444 WACM4
2029/30 CMP423 & CMP444 WACM7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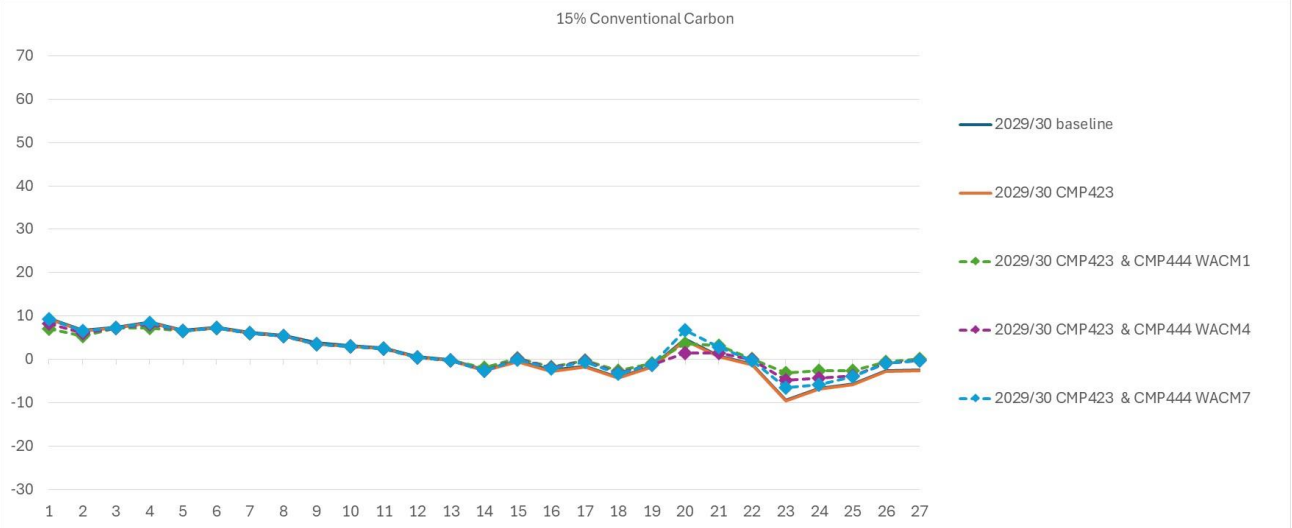
70
60
50
40
30
20
10
0
-10
-20
-30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
2029/30 baseline
2029/30 CMP423
2029/30 CMP423 & CMP444 WACM1
2029/30 CMP423 & CMP444 WACM4
2029/30 CMP423 & CMP444 WACM7


15% Conventional Carbon
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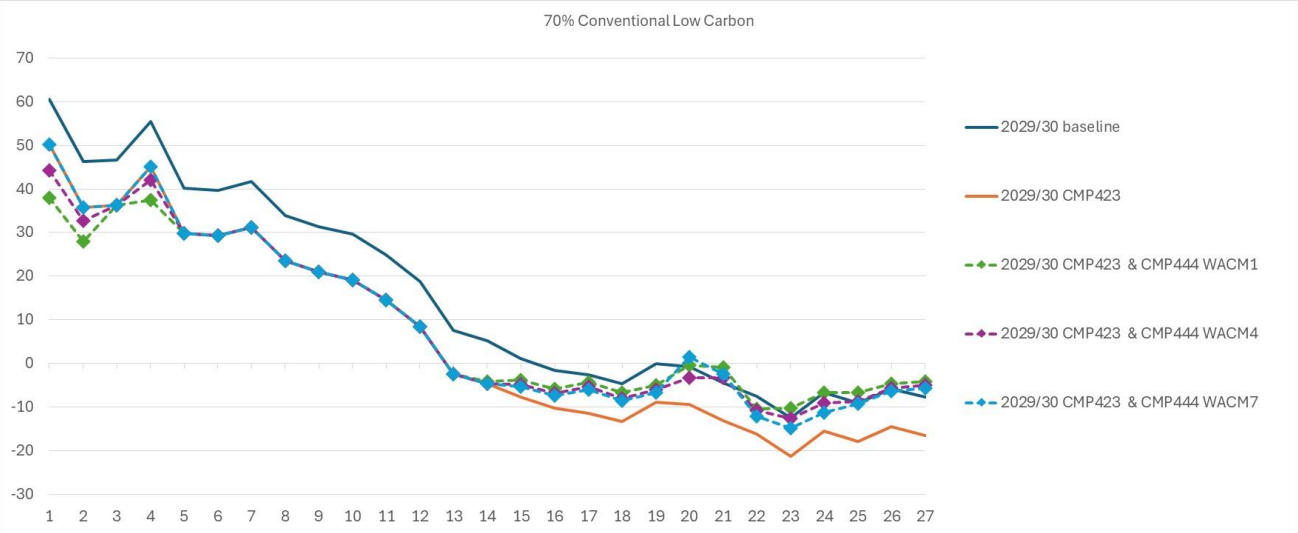
60
50
40
30
20
10
0
-10
-20
-30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
2029/30 baseline
2029/30 CMP423
2029/30 CMP423 & CMP444 WACM1
2029/30 CMP423 & CMP444 WACM4
2029/30 CMP423 & CMP444 WACM7



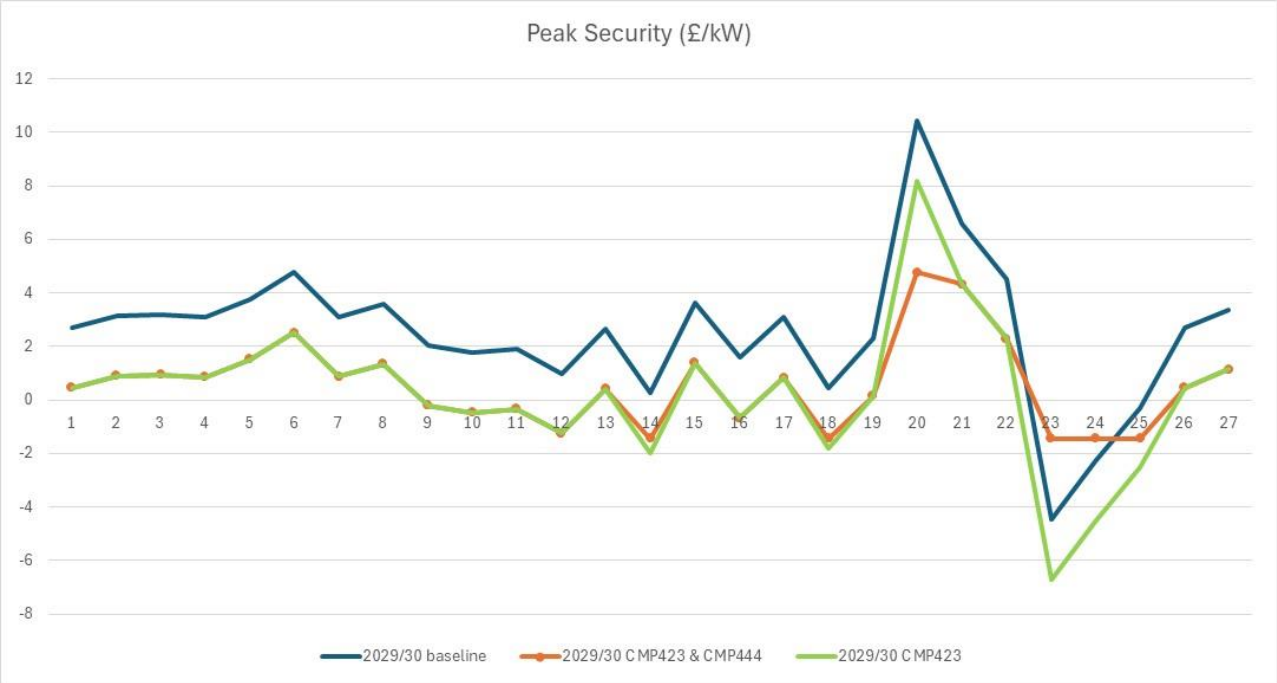
Interaction with CMP444 WACM1 Generator TNUoS Cap and Floor: Generator tariffs

NESO carried out analysis of what the combined impact on tariffs would be in the event that both this modification CMP423 and CMP444 "Generator TNUoS cap and floor" applied in charging year 2029/30 (**Annex 06**).

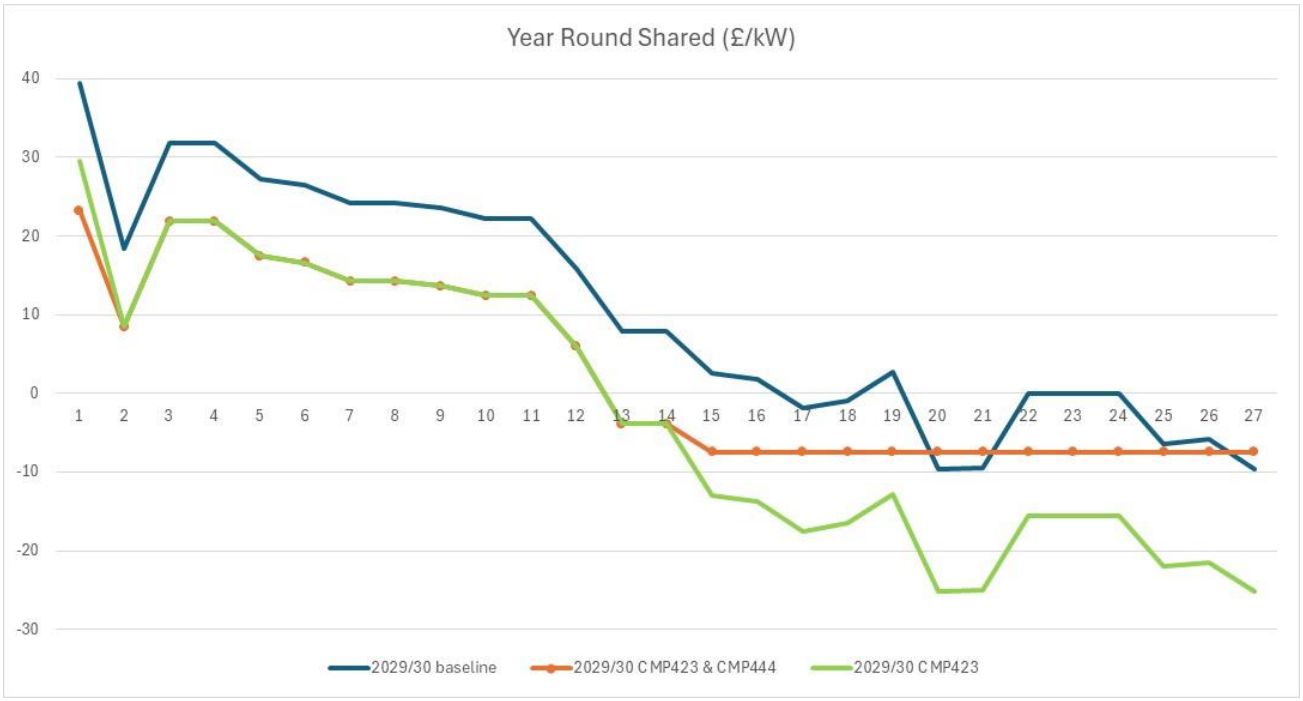
CMP444 had a number of alternatives and at the time of this analysis, it was not clear which alternative for CMP444, if any, Ofgem may approve. For the purpose of this comparison, NESO modelled the combined impact of CMP444 WACM1 because this had the largest number of votes of support in the CMP444 Workgroup. The choice of CMP444 WACM1 should not be taken as NESO recommending that alternative, or as any view of the likelyhood of which CMP444 option Ofgem may approve.

The NESO analysis showed that the impact of this modification CMP423 would be limited by the presence of the cap and floor for some tariff elements for some zones.

The graph below shows that for the Peak Security tariff, this tariff element would be limited by the cap for zone 20, and limited by the floor in zones 23, 24 and 25.

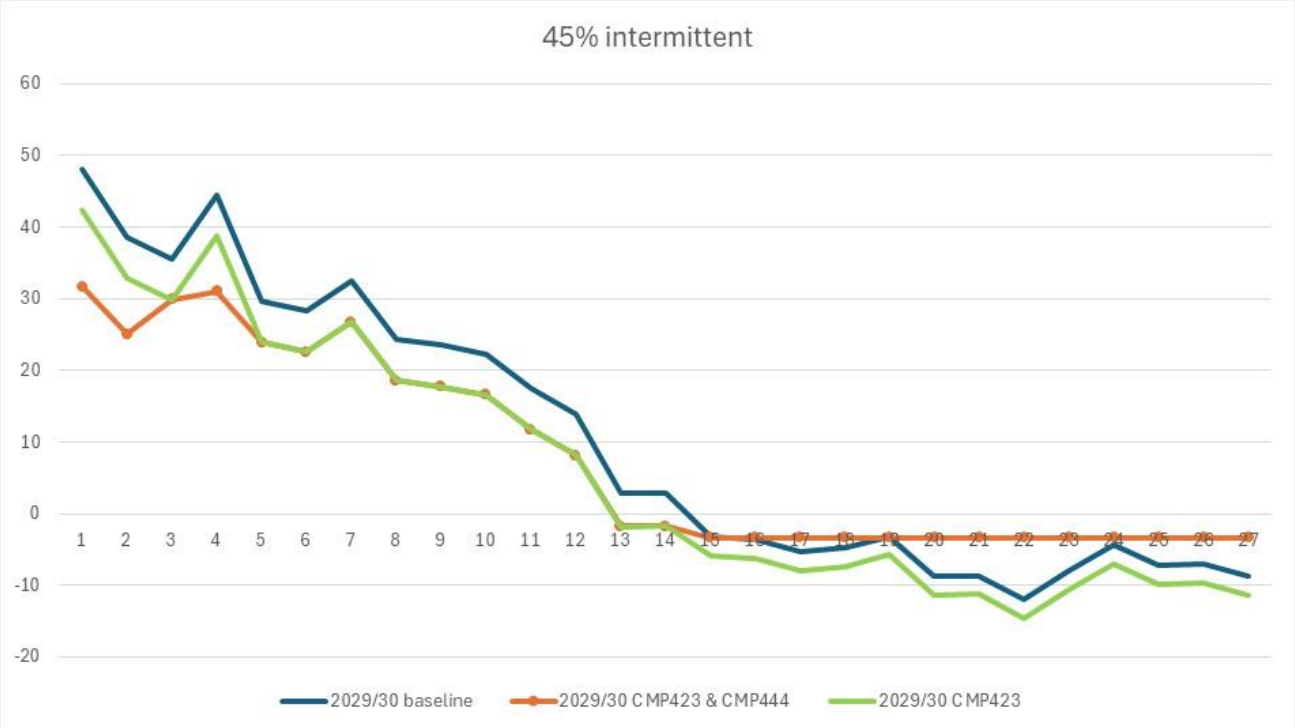


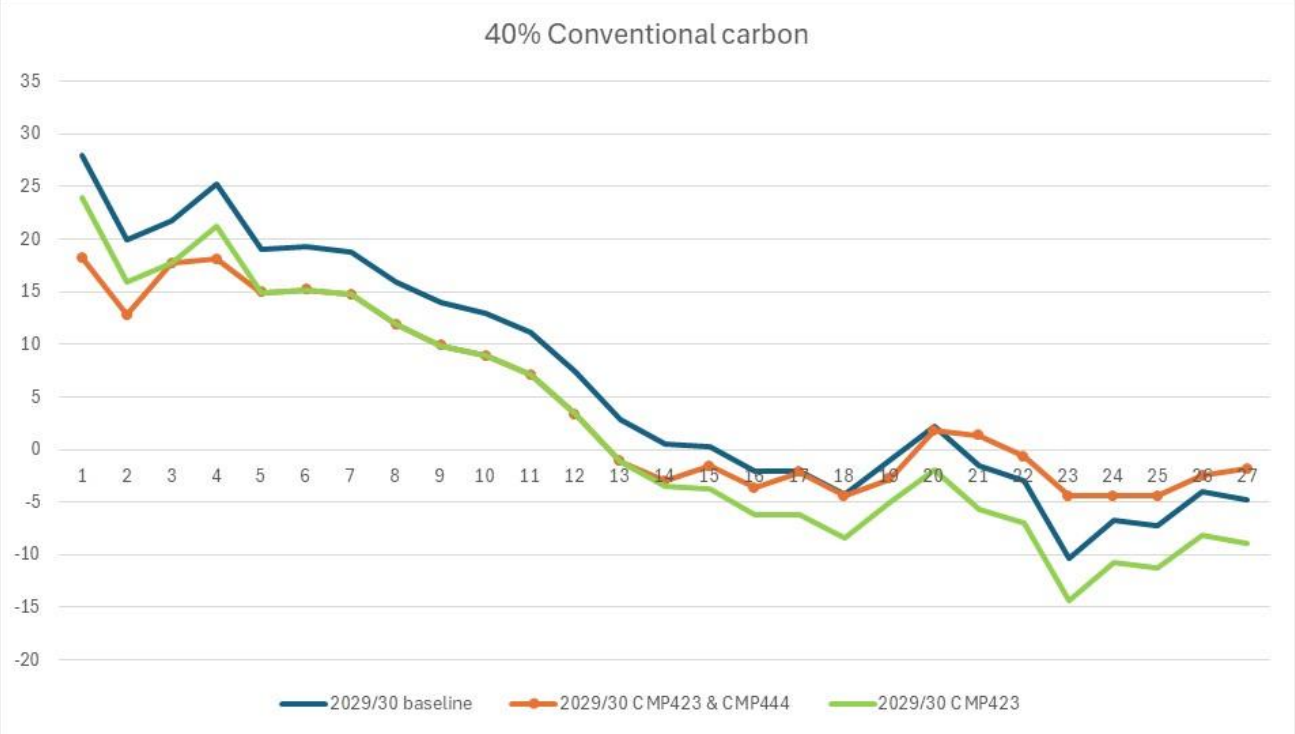
The graph below for the Year Round Shared tariff shows that this tariff element would be limited by the cap in zone 1, and limited by the floor in zones 15 to 27.

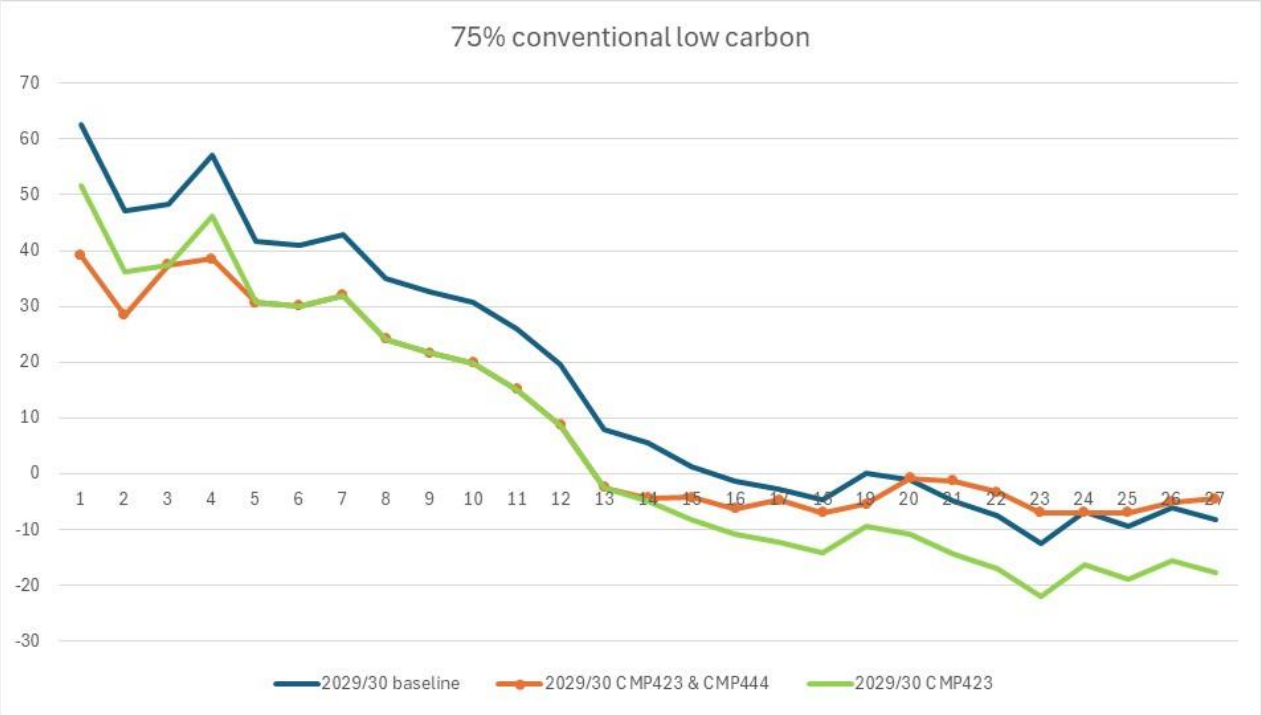


The graph below for the Year Round Shared tariff shows that this tariff element would be limited by the cap in zones 1, 2 and 3, and limited by the floor in zones 22 and 23.

Interaction with CMP444 Generator TNUoS Cap and Floor: Generator charges

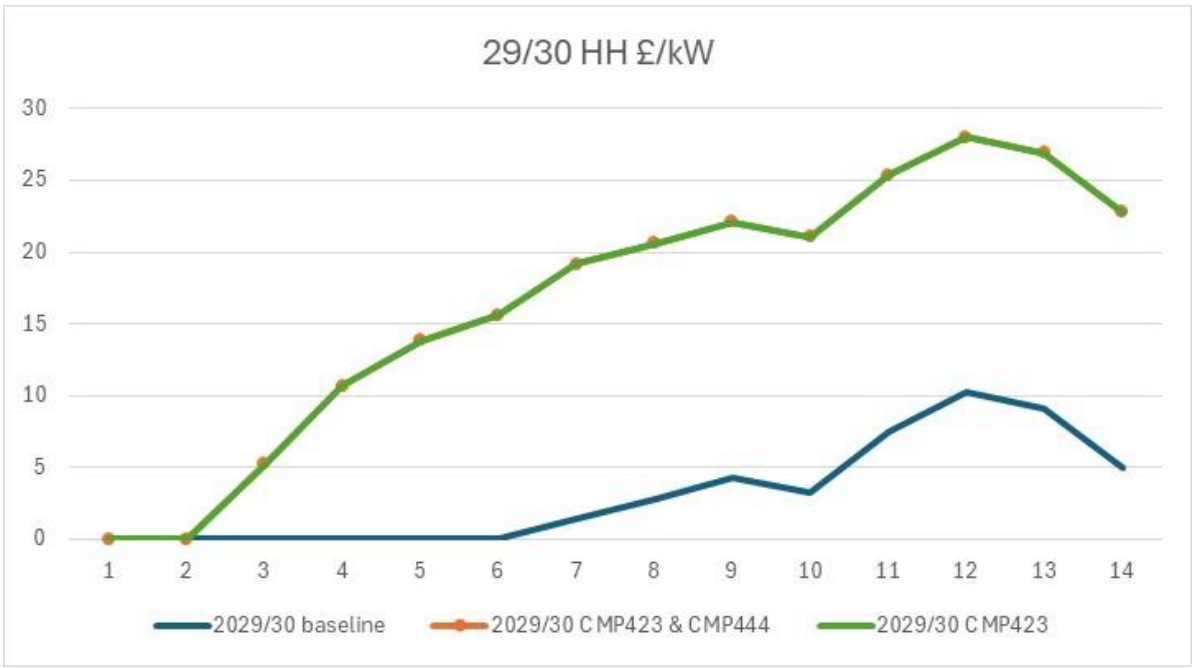


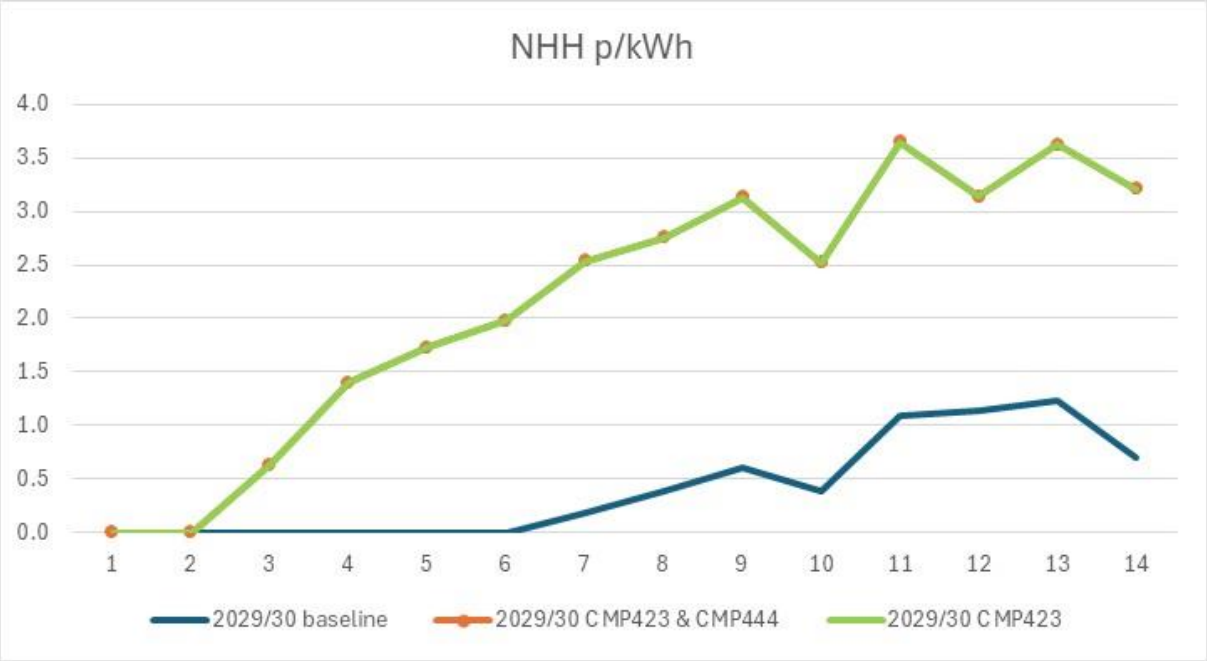




Interaction with CMP444 Generator TNUoS Cap and Floor: Demand charges

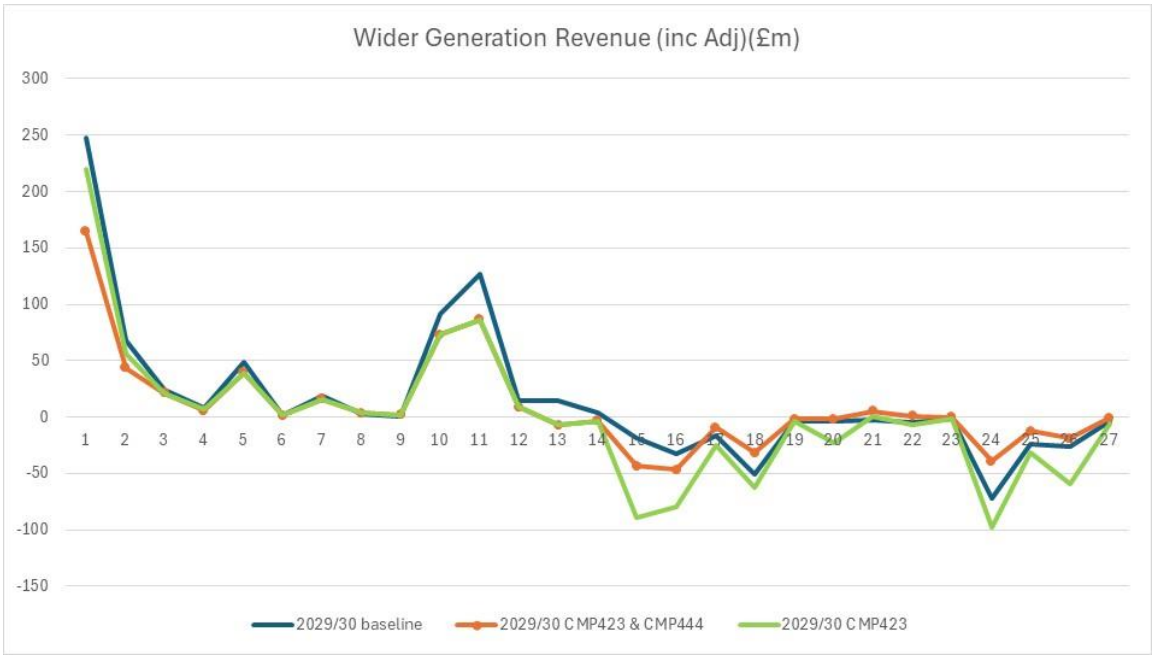
The Wider locational Demand charges are unaffected by CMP444, so combining the effect of CMP444 would have no impact on the value of Wider locational Demand charges following CMP423.





Interaction with CMP444 Generator TNUoS Cap and Floor: Demand and generation proportions

The NESO analysis showed that by combining the impact of CMP444 along with CMP423, this would increase the proportion of revenue colected from Generators and correspondingly reduce the proportion of revenue collected from Demand. This is due to the combined impact of CMP444 and CMP423 meaning the floor would have a more restrictive impact on the credits paid to southern Generators, than the cap would have a restrictive impact on the charges paid to northern Generators. This is illustrated in the graph below.



Impact on cost to customers via reduced CfD Strike Prices

One Workgroup member queried whether there was likely to be an impact on CfD prices as a result of the distributional impact of the modification.

A report by Aurora, Consumer Savings Under TNUoS Reform Proposals Report outlined the benefit to GB customers of two TNUoS modifications (CMP444 and CMP432) by reducing the cost of TNUoS, therefore reducing the cost of CfD Strike Prices. The Proposer calculated that by taking the numbers from the Aurora report, the benefit to customers between 2028-2050 equates to roughly £75m for every £1 reduction in CfD Strike price. The Aurora report assumed that Scottish Generators set the CfD clearing price 90% of the time.

The Proposer suggested this can be combined with the NESO analysis indicated that CMP423 would reduce TNUoS charges for Scottish 51% ALF (as assumed by Aurora) intermittent generation, by £6.32 per kW for 2029/30, which equates to a saving of £1.41 per MWh.

Taken together, this suggests that if CMP423 reduced TNUoS charges and CfD Strike Prices by c£1.41 over the period, then it could deliver a saving to customers of c£107m in terms of reduced cost to customers of CfD payments.

Terms of Reference Discussion

a) Consider EBR implications

The Workgroup agreed that this modifications has no implications for EBR.

b) Consider implications for the network sharing calculation in the Transport and Tariff model

The Proposer noted that the Connectivity map within the Transport and Tariff model may change if the reference node was amended.

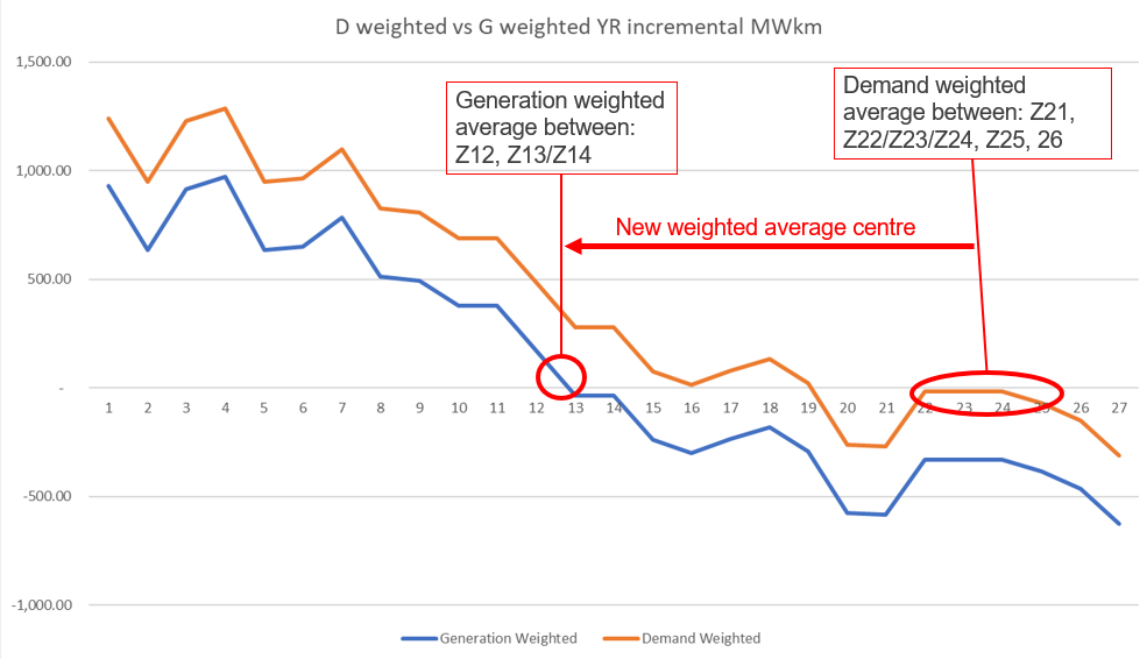
The Proposer explained why the Original solution includes a change in the Transport and Tariff model sharing connectivity diagram and what that change should be.

- **Proposed feature:**
  - **Update "TxNetwork" tab table**: Network connectivity diagram currently reflects the old Demand weighted reference node, so will need to be updated to reflect the new generation weighted reference node.

- **Update "Connection map" tab diagram**: Only for explanatory purpose

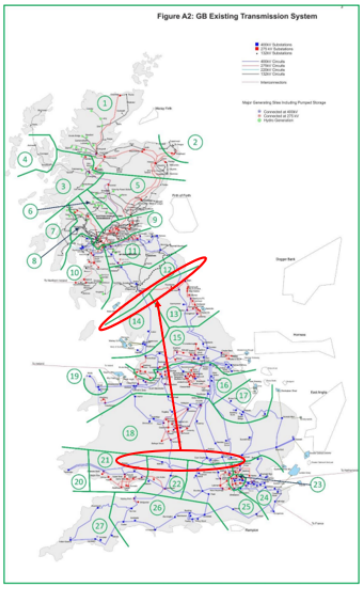
- **Impact of updating connectivity diagram**: Only affects sharing split between Year Round Shared versus Year Round Not-shared. Does not impact Peak Security tariffs, and does not impact total Year Round tariff (Shared plus Not-shared).
- **The impact of <u>not</u> updating the Reference Node in the Connectivity diagram:** Would distort the sharing calculation. Changing the reference node in the VBA code would only change the Year Round Shared tariff, leaving the Year Round Not-shared tariff unchanged.

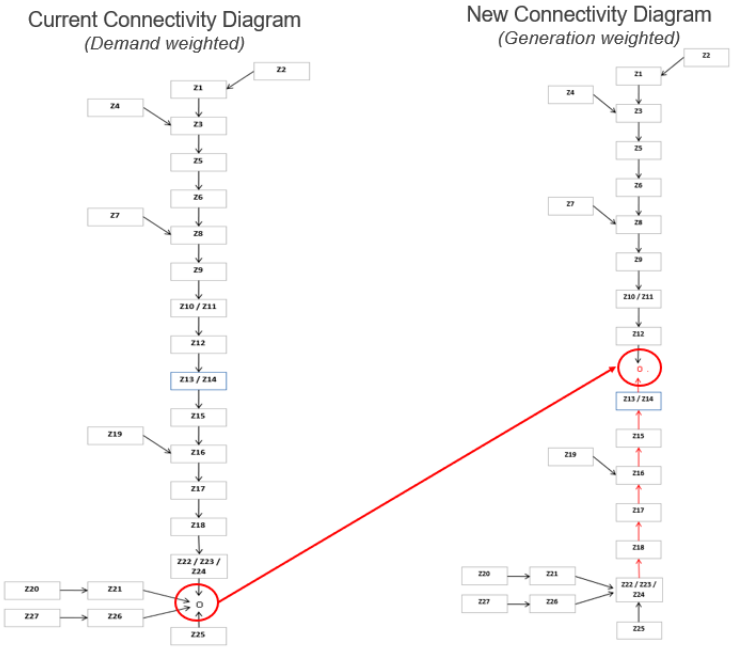
The Proposer explained that by changing to a generation weighted reference node, the Year Round incremental MWkm weighted average zero point moves north, as shown in the graph below.



The Proposer described how that change would be reflected in the TNUoS Transport and Tariff model, as per the figures below.

Connectivity diagram reflect weighted average reference node





The Proposer clarified that this change would be practically relected in the Transport and Tariff model "TxNetwork" tab.

The Workgroup discussed and agreed that the analysis covers the implications for the network sharing calculation in the Transport and Tariff model.

c) Consider potential locations for new generation such as via the TEC Register, seabed leasing, or other planning sources

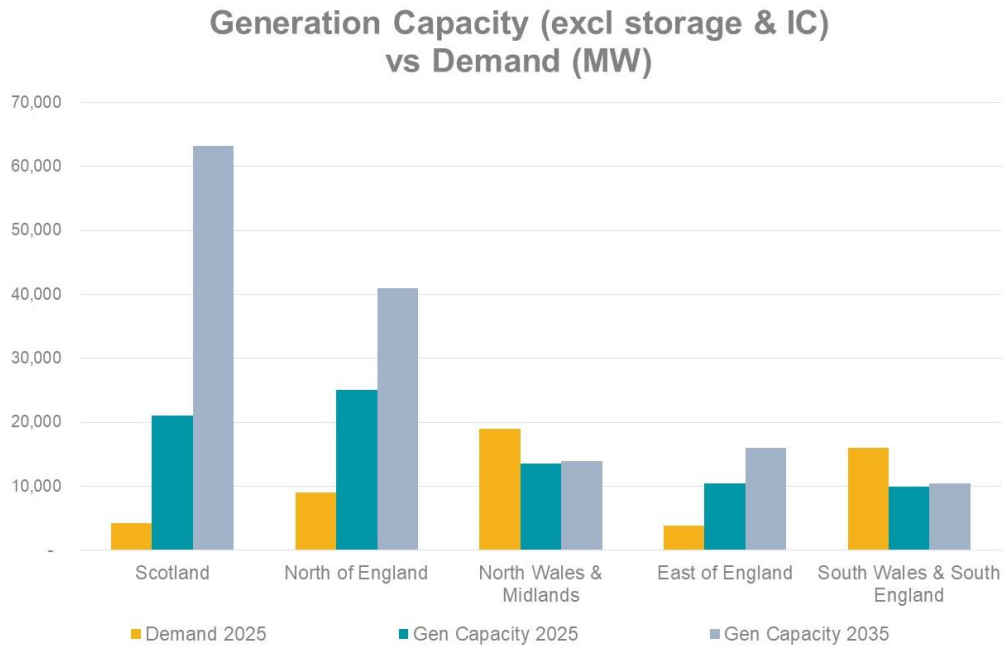
The Workgroup asked for clarification to be sought from the CUSC panel on what is meant by Terms of Reference (c). A Panel member responded to say his interpretation is to consider where the new generation will be geographically located and the impact this will have on the CMP423 solution i.e. the generation weighted reference node.

Running the model with different scenarios, such as placing a large Generator in the north and then in the south, to explicitly show the impact on tariffs was the approach agreed by the Workgroup to address this Terms of Reference.

A Workgroup member requested that the Proposer look at trends in FES Scenarios in relation to this Term of Reference and asked for the graphs shown to be extended to cover the levels of Generation by zone with Peak Demand and Year Round Demand. One

Workgroup member queried what the change in Generation capacity would look like out to 2040, so the Proposer agreed to extend the graphics they had presented.

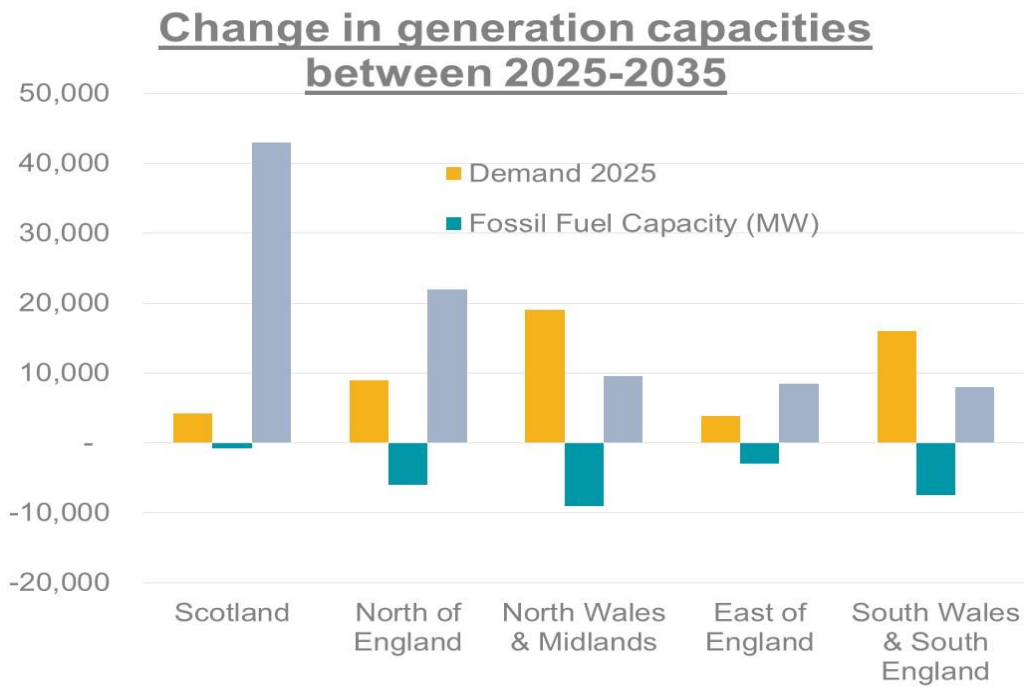
The Proposer presented some analysis regarding how the location of generation and Demand may change over time, based on the NESO FES Leading The Way scenario. The Proposer explained that this showed that while the relative locations of Demand remained relatively unchanged between 2025 and 2035, there was a large change in the locational capacities of generation. The Proposer expressed that this data supported the principle of CMP423 in as far as it showed that additional generation capacity is expected to disproportionately locate in areas where there is already generation located, and by contrast, new generation is not expected to be driven by locations where Demand is located.[6]



Using the same FES data, the Proposer also showed a graph of the changes in generation capacity broken down by technology type. They stated that this showed:

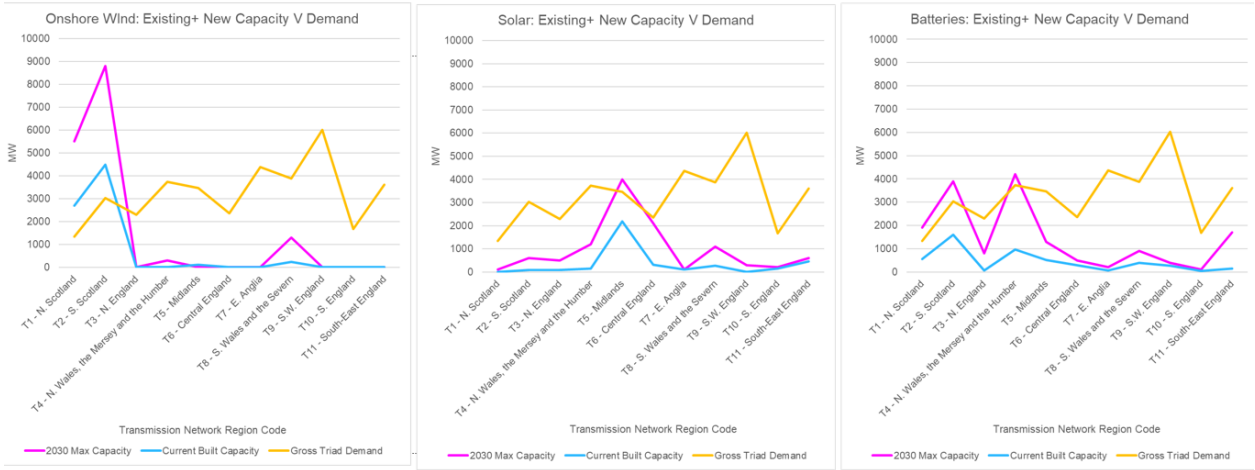
- Low carbon & renewables capacities increase significantly in Scotland and North of England.
- For N.Wales & Midlands, and S.Wales & S.England, low carbon build is similar to reduction in fossil fuel capacity.
    - Only a small overall increase in southern Capacity

[6] *Data estimated based on ETYS 2023 report, Leading the Way FES Scenario*



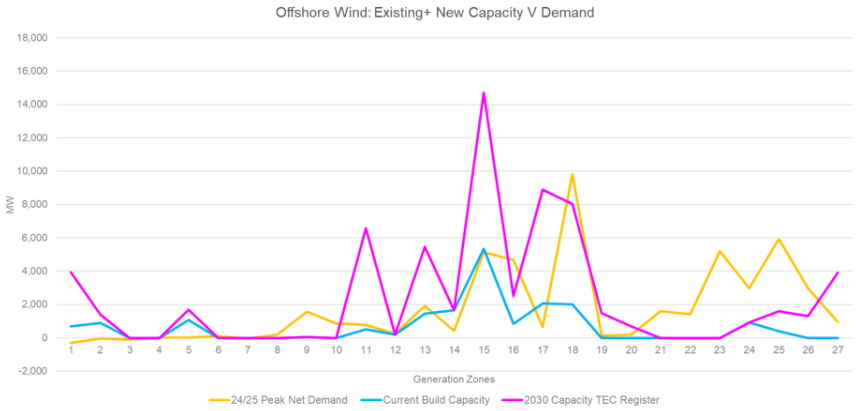
The Proposer presented further analysis on the locations of new generation, and explained that this further supports the position that new generation is more likely to locate where there is existing generation, rather than locate where there is existing Demand. The presentation was summarised in the figures below.

Location of new generation is closer to existing generation than demand



Source: 6 - For Publication - Connections_Reform_Data_Impact_Assessment_Part_B_Data_Workbook (3) December - Connections Reform Data Assessment

Location of new generation is closer to existing generation than demand



Source: TEC Register

d) Consider the impact on tariffs that may arise from changes in the way circuits may be placed into either Peak Security and Year Round buckets.

An Authority representative confirmed that when determining which background a circuit sits in, depends on which scenario it has the biggest flow, rather than the biggest change in flow. One Workgroup member advised they thought that the modification would not have an impact on the way circuits are placed into buckets. A NESO SME confirmed this as reflected within the analysis.

The Proposer presented that the change in reference node has no impact on which buckets the circuits are placed into. The buckets are determined by the background flow before considering the incremental flows and reference node, therefore circuits will remain in the same buckets, regardless of the change in reference node.

The Workgroup concluded that this modification does not have any impact on the way circuits may be placed into either Peak Security, or Year Round buckets.

e) Consider the impact on Demand customers contribution from a different location signal especially those unable to react to those signals

The impact on Demand customers is explained in the section of this document regarding the NESO tariff impact analysis (Pages 16 to 18).

f) Consider interactions with other Task Force modifications

One Workgroup member queried how enduring the solution was, given the current developments within the TNUoS Taskforce. The Proposer also advised there is likely to be a new modification raised in the future regarding Demand charges, which could change the impact of CMP423, and advised that interactions could be assessed when this modification was raised.

The Proposer highlighted the following quotes from the Ofgem published decision letter on urgency for CMP423 to Workgroup members.

Ofgem urgency decision for CMP423:

- *"We agree with the rationale that if this Proposal was to be progressed, it should be **done on time to feed into the cap and floor design**."*
- *"However, although we are not granting urgency for CMP423, we do agree with the Proposer that the timing of any CMP423 decision should be considered in the context of, and be made **ahead of, any fixed price TNUoS methodology as proposed through CMP442**, as this would then allow any relevant changes to the methodology to be incorporated into NESO's forecast to allow tariffs to be fixed at an appropriate level."* [Emphasis added]

The Workgroup highlighted CMP440 and the discussion is captured on page 16.

g) Consider if the assumption that change in generation will displace generation elsewhere is an appropriate assumption now and in the future.

This Term of Reference is addressed in the sections of this report "Proposers solution" (page 7) and "Consideration of the Proposer's solution" (page 10). The discussion is not repeated here to avoid duplication.

h) Consider whether the reduction within generation charges approaches the euro floor in the limiting regulation and what would happen in that circumstance

The Proposer presented to the Workgroup their understanding of the implications of CMP423 for the € 2.50 Euro cap. The Proposer explained why the Adjustment Tariff would maintain Generator charges within the €0 to €2.50 range by bringing average generation charges weither up to €0, or down to €2.50 per MWh (with error margin). The included the following references from the CUSC.

CUSC 14.14.5

"vii.) If having applied the exclusion of Charges for Physical Assets Required for Connection The Company identifies that an adjustment to TNUoS Charges is required to

remain compliant with the Limiting Regulation then an Adjustment Tariff will be applied to all Generators in the following circumstances.

a) ***The Adjustment Tariff will be applied if The Company identifies that either:***

a. Annual average TNUoS charges payable by Generator Users will ***fall below €0/MWh***

OR

b. Annual average TNUoS charges payable by Generator Users will ***exceed €2.50/MWh adjusted by a risk margin*** *to allow for error in tariff setting.*

b) Where annual average TNUoS charges to Generators are positive under the GCharge (Forecast) the Adjustment Tariff will be applied if the Adjustment Revenue is less than £0. The Adjustment Revenue is expressed as:

$$AdjRevenue = (GO * ((CapEC * (1 - y)) * ER)) - GCharge(Forecast)$$

c) Where annual average TNUoS charges to Generators are negative under the GCharge (Forecast) the Adjustment Revenue will be the difference between £0 and the total recovered from Generators. The Adjustment Revenue will be expressed as:

$$AdjRevenue = 0 - GCharge(Forecast)"$$

CUSC 14.23

"Adjustment Tariff

(vi) We now need to calculate the Adjustment Tariff. This is calculated by taking the Adjustment Revenue and dividing this by the Chargable Generation Capacity (as per to 14.14.5 (viii) (h)) create a £/kW figure" [emphasis added]

i) Consider the scope of work identified and whether this is achievable within the timeframe outlined in the Ofgem Urgency decision letter

The Workgroup viewed that the scope of work identified is achievable within the timeframe outlined in the Ofgem urgency decision letter.

Cross Code Impacts

The Proposer suggested analysing the impact of the proposed changes on different technologies, such as batteries and Photovoltaic (PV) to better understand the overall impact.

Draft legal text

The Proposer suggested the draft Legal text with proposed changes to CUSC Section 14 in a number of paragraphs: 14.15.27, 14.15.29, 14.15.52 and 14.21 to 14.24. These changes can be found in **Annex 09**.

The NESO Workgroup member provided an update on the legal text, stating that the worked examples in Section 14.21, 14.23 and 14.24 need to be reviewed and updated to align with the CMP423 solution, and that the appropriateness of all the worked examples in the CUSC will be considered at a later date.

What is the impact of this change?

Proposer's assessment against Code Objectives

Proposer's assessment against CUSC Charging Objectives	
Relevant Objective	**Identified impact**
(d) That compliance with the use of system charging methodology facilitates effective competition in the generation and supply of electricity and (so far as is consistent therewith) facilitates competition in the sale, distribution and purchase of electricity;	**Positive** Improves competition by reducing competitive disadvantage of Generators who pay expensive GB TNUoS charges (transmission connected and large distribution connected), compared with Generators in other countries and markets who do not. Also improves effective competition with small distribution connected Generators and Demand. Improves predictability of

	TNUoS charges. Further details can be found within the 'Proposer's Solution' section.
(e) That compliance with the use of system charging methodology results in charges which reflect, as far as is reasonably practicable, the costs (excluding any payments between transmission licensees which are made under and accordance with the STC) incurred by transmission licensees in their transmission businesses and which are compatible with standard licence condition C11 requirements of a connect and manage connection);	**Positive** More cost reflective of the drivers of network investment according to a CBA and SQSS. Further details can be found within the 'Proposer's Solution' section.
(f) That, so far as is consistent with sub-paragraphs (a) and (b), the use of system charging methodology, as far as is reasonably practicable, properly takes account of the developments in transmission licensees' transmission businesses and the ISOP business*;	**Positive** There appears to be a growing difference in average locations of generation versus Demand. This means any detrimental impacts caused by using an inappropriate reference node is already large and likely to worsen over time. This adds to the importance of addressing this defect in a timely way.
(g) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency **; and	**Neutral**
(h) Promoting efficiency in the implementation and	**Neutral**

administration of the system charging methodology.	

** See Electricity System Operator Licence*

***The Electricity Regulation referred to in objective (g) is Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (recast) as it has effect immediately before IP completion day as read with the modifications set out in the SI 2020/1006.*

Proposer's assessment of the impact of the modification on the stakeholder / consumer benefit categories	
Stakeholder / consumer benefit categories	**Identified impact**
Improved safety and reliability of the system	**Positive** By making charges more cost reflective and improving effective competition, this will tend to make it easier for other policy tools to deliver safety and reliability of the system.
Lower bills than would otherwise be the case	**Positive** By making charges more cost reflective and improving effective competition, this will tend to incentivise more efficient investment decisions for both generation and Demand Users. This will tend to result in a more economically efficient energy system at lower total system cost and a lower cost to customers over the long term.
Benefits for society as a whole	**Positive** By making charges more cost reflective and improving effective competition, this will tend to incentivise more efficient investment decisions for both generation and Demand Users. This will tend to result in a more economically efficient energy system at lower total system cost and a lower cost to customers over the long term.
Reduced environmental	**Positive**

damage	By making charges more cost reflective and improving effective competition, this will tend to incentivise more efficient investment decisions for both generation and Demand Users. This will tend to result in a more economically efficient energy system at lower total system cost and a lower cost to customers over the long term.
Improved quality of service	**Positive** By making charges more cost reflective and improving effective competition, this will tend to incentivise more efficient investment decisions for both generation and Demand Users. This will tend to result in a more economically efficient energy system at lower total system cost and a lower cost to customers over the long term.

When will this change take place?

Implementation date

01 April 2027

Date decision required by

No later than 30 September 2026 as it requires a change to Section 14 (Charging Methodologies).

Sufficiently before implementation to give Users sufficient notice to appropriately take the change into account in their contractual terms and commercial decisions.

It would be beneficial for the AR7 CfD auction round to receive a decision as early as possible during 2026. This is to provide successful CfD bidders better certainty of their TNUoS charges before they reach final investment decision.

Implementation approach

The only change that would be required would be to the way the Tariff and Transport model calculates tariffs. There would be no change to the structure of the tariffs, or any other aspect of charging.

Interactions

☐CUSC	☐BSC	☐STC	☐SQSS
☐European Network Codes	☐ EBR Article 18 T&Cs[1]	☒Other modifications	☐Other

This proposal was developed through the TNUoS Task Force and has interactions with other Task Force work and modifications. This includes CMP432 (Locational Onshore Security Factor), CMP440 (Re-introduction of Demand TNUoS locational signals by removal of the zero price floor), CMP442 (Introducing the option to fix Generator TNUoS charges) and CMP444 (Introducing a cap and floor to wider generation TNUoS charges).

How to respond

Standard Workgroup Consultation questions

1. Do you believe that the Original Proposal better facilitates the Applicable Objectives versus the current baseline?
2. Do you support the proposed implementation approach?
3. Do you have any other comments?
4. Do you wish to raise a Workgroup Consultation Alternative request for the Workgroup to consider?
5. Does the draft legal text satisfy the intent of the modification?
6. Do you agree with the Workgroup's assessment that the modification does not impact the European Electricity Balancing Regulation (EBR) Article 18 terms and conditions held within the Code?

Specific Workgroup Consultation questions

7. Is it beneficial that the modification would largely reinstate the gradient of locational Demand charges?
8. Do you have any comments on the change in revenue collection proportions between generation and Demand?
9. Do you have any comments on the interactions between CMP423 with other modifications, including CMP432, CMP440, CMP442 and CMP444?
10. Regarding terms of reference (g), do you have comments on whether the assumption that a change in generation will displace generation elsewhere is appropriate both now and, in the future, and how this applies or is relevant to the modification?

The Workgroup is seeking the views of CUSC Users and other interested parties in relation to the issues noted in this document and specifically in response to the questions above.

Please send your response to cusc.team@neso.energy using the response pro-forma which can be found on the CMP423 modification page.

In accordance with Governance Rules if you wish to raise a Workgroup Consultation Alternative Request please fill in the form which you can find at the above link.

If you wish to submit a confidential response, mark the relevant box on your consultation proforma. Confidential responses will be disclosed to the Authority in full but, unless agreed otherwise, will not be shared with the Panel, Workgroup or the industry and may therefore not influence the debate to the same extent as a non-confidential response.

Acronyms, key terms and reference material

Acronym / key term	Meaning
ACS	Average Cold Spell
ALF	Annual Load Factor
AR7	Allocation Round 7
BSC	Balancing and Settlement Code
CBA	Costs, Benefits, and Assumptions
CfD	Contracts for Difference
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
EBR	Electricity Balancing Regulation

ESO	Electricity System Operator
ETYS	Electricity Ten Year Statement
EU	European Union
FES	Future Energy Scenarios
GB	Great Britain
HH	Half Hourly
ICRP	Investment Cost Related Pricing
kW	Kilowatt
MW	Megawatt
MWkm	Megawatt kilometre
NETS	National Electricity Transmission System
NESO	National Energy System Operator
NETS SO	National Electricity Transmission System Operator
NHH	Non-Half hourly
NOA	Network Options Assessment
PV	Photovoltaic (solar panel)
REMA	Review of Electricity Market Arrangements
SME	Subject Matter Expert
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
T&Cs	Terms and Conditions
TCR	Targeted Charging Review
TDR	Transmission Demand Residual
TEC	Transmission Entry Capacity

TNUoS	Transmission Network Use of System
VBA	Visual Basic for Applications
WACM	Workgroup Alternative CUSC Modification
£/MWh	Pounds Mega Watt per kilometre

Annexes

Annex	Information
Annex 01	CMP423 Proposal form
Annex 02	CMP423 Terms of Reference
Annex 03	CMP423 Trident Economics Report
Annex 04	CMP423 Tariff and Revenue Impacts
Annex 05	CMP423 Multi Year Impact Analysis and CMP444 WACM1 Analysis
Annex 06	CMP423 Interaction of CMP432 and CMP444 WACM1, WACM4 and WACM7 Analysis
Annex 07	CMP423 Generation Scaling by SQSS, CBA and FES
Annex 08	CMP423 Additional Proposer Analysis
Annex 09	CMP423 Draft Legal Text