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Workgroup Report

CMP432: Improve "Locational Onshore Security Factor" for TNUoS Wider Tariffs

Overview: This modification seeks to improve the cost reflectivity of transmission charging methodology by removing the "Locational Onshore Security Factor", so that Wider locational Transmission Network Use of System (TNUoS) charges better reflect the way Transmission Owners (TOs) plan for a secure network based on the Security and Quality of Supply Standard (SQSS) requirements.

Modification process & timetable

1. **Proposal Form** – 07 March 2024
2. **Workgroup Consultation** – 27 February 2025 to 07 March 2025
3. **Workgroup Report** – 23 April 2025
4. **Code Administrator Consultation** – 28 April 2025 to 06 May 2025
5. **Draft Modification Report** – 12 May 2025
6. **Final Modification Report** – 15 May 2025
7. **Implementation** – 01 April 2026

Have 10 minutes? Read our Executive summary
Have 90 minutes? Read the full Workgroup Report
Have 240 minutes? Read the full Workgroup Report and Annexes.

Status summary: The Workgroup have finalised the Proposer's solution with no alternative solutions. They are now seeking approval from the Panel that the Workgroup have met their Terms of Reference and can proceed to Code Administrator Consultation.

This modification is expected to have a: High impact on Generators and Suppliers

Governance route	Urgent modification to proceed under a timetable agreed by the Authority (with an Authority decision)	
Who can I talk to about the change?	**Proposer:** John Tindal, SSE John.tindal@sse.com Phone: 01738 547308	**Code Administrator Chair**: Sarah Williams Sarah.williams@nationalenergyso.com Phone: 07593 899145

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Executive Summary

What is the issue?

This modification has been raised as the Proposer believes that the Locational Onshore Security Factor applied to TNUoS Wider locational tariffs is not cost reflective of the way the Main Interconnected Transmission System (MITS) is planned by TOs using the SQSS. This is because it is a measure of average existing security, while, by contrast, charges should reflect the incremental cost associated with incremental security.

Incremental increases in MITS network transfer capability do not generally require any additional cost of incremental security where the Transmission System is already sufficiently secure. This is because incremental network reinforcement is kept secure by the already existing secure redundant network capacity.

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

Proposer's solution:

It is proposed that the existing Locational Onshore Security Factor uplift should be removed from all TNUoS Wider locational tariffs for both Peak Security and Year-Round.

This can be achieved by either setting the Locational Onshore Security Factor to 1.0 or removing it from the methodology from the Charging and Use of System Code (CUSC) altogether. After discussions with the Workgroup the Proposer decided to go with the removal of the Locational Onshore Security Factor as the final solution.

It is important to note that Local charges will remain unchanged.

Implementation date: 01 April 2026.

Summary of potential alternative solution(s) and implementation date(s):

No Alternatives have been raised.

What is the impact if this change is made?

High impact on Generators and Consumers – If approved, this modification would remove the effect of the Locational Onshore Security Factor multiplier by removing it as a variable from the Wider tariff calculation entirely. The proposed solution for CMP432 is to remove the Security Factor as a variable in the CUSC because this is cleaner and avoids leaving redundant legal text in the CUSC.

The impact on tariffs would be to reduce the differentials of the North-South Wider TNUoS tariffs for both generation and demand charges.

NESO have carried out an assessment of tariffs described in more detail on **Annex 4** This shows that:

- For Generators, the Original solution would reduce the value of generation tariffs in Northern areas and increase them in Southern areas. It would also increase the value of the TNUoS adjustment tariff (that is applied to all Generators equally).
- For demand, the Original solution would reduce the value of Wider TNUoS charges in Southern areas. However, it would not change demand locational charges in Northern areas where those demand charges are negative but floored at £zero. The 5-year tariff impact analysis (**Annex 10**) provided to the Workgroup by NESO showed that removing the Security Factor would not change the split of TNUoS revenue collection between generation and demand (apart from a relatively small increase in collection from demand in one year), because the 2.50 Euro cap on Generator charges would continue to apply both before and after the Security Factor is removed. However, since the modification would reduce the revenue collected from demand locational charges, it would require a corresponding increase in the level of demand residual tariffs charged to customers.

Workgroup conclusions: The Workgroup concluded by majority that the Original better facilitated the Applicable Objectives than the Baseline.

Interactions

There is an interaction with CUSC modification CMP444. Both CMP432 and CMP444 could be implemented; they are not incompatible. Consideration should be given to the combined effect. For example, a generation plant far from demand centres might have reduced TNUoS through CMP432 but which still go high enough in future to hit, and then be limited by, the Cap brought in under CMP444.

What is the issue?

The following section sets out the Proposer's view of the defect and rationale for raising the modification proposal and should not be taken to represent the unanimous opinion of the Workgroup.

The modification defect is that the Locational Onshore Security Factor applied to TNUoS Wider locational tariffs is not cost reflective because it doesn't match with how the MITS is planned by TO's using the SQSS. This is due to the SQSS design principle is that the level of network security is determined by considering the average existing security. By contrast, the network charging principle is to reflect the incremental cost of investment.

Therefore, the current approach to applying an incremental Locational Onshore Security Factor charge for every MWkm of investment is not reflective of the actual investment cost incurred by TOs. Transmission charges therefore overcharge for security.

Typically, MITS network transfer capability does not generally require any additional cost of incremental security where the Transmission System is already sufficiently secure.

If the current methodology was accurate, any increase in network transfer capability would necessitate a proportional increase in security capacity. However, this is not what occurs in practice—because the network does not become less secure as transfer capacity increases. The baseline security measures are already in place.

This is akin to being charged for a new safety railing each time more people cross a bridge—even though the bridge was originally constructed with a robust railing designed to accommodate a reasonable volume of pedestrian traffic. The security has already been accounted for, and additional users do not compromise it.

The SQSS ensures that the MITS network is sufficiently secure.

The TNUoS Transport and Tariff model calculates a value to reflect the cost of reinforcing the transmission network to provide incremental power transport capability, so:

- If additional MITS network capacity does not require additional redundant network capacity for security, then;
- TNUoS Wider locational price signal should not charge for additional redundant network capacity for security.

SQSS Requirements

TOs plan network additions using SQSS criteria. This requires a level of surplus network capacity is available as a form of reserve, so the network can continue to accommodate flows in the event of particular network faults or outages. An example of a fault condition that must be secured against is an outage/fault on the two largest separate circuits, a situation referred to as "N-2"[1].

The following illustrates the implications of the SQSS security requirement, which should be the basis for any security factor in the CUSC. The SQSS requires that a boundary is initially sufficiently secure against relevant fault conditions specified in absolute terms, such as N-2 requiring a surplus network capacity equivalent to two redundant circuits.

Where additional network transfer capacity built across that boundary leaves the relevant fault conditions the same as it was before, then the security provided by the already existing two redundant circuits means the network remains sufficiently secure after the additional transfer capacity is added. This additional transfer capacity would not trigger a requirement for any additional redundant network capacity to be added for additional security. The added transfer capacity would be equal to the capacity of the new circuits, an implied Locational Onshore Security Factor of 1.0.

In this way, the network that initially had sufficient redundant capacity to meet the security conditions, continues to have sufficient redundant capacity to meet security conditions and no additional redundant secure capacity is required.

TNUoS Transport and Tariff Model

The TNUoS Transport and Tariff model takes a different approach from the SQSS.

Instead of modelling security as a specific test, it assumes that the capacity of redundant secure network always increases on a pro-rata basis with increases in network transfer capacity. TNUoS does this by assuming security is a factor multiplier of all MITS network reinforcement. The current TNUoS tariff methodology has the effect of assuming:

[1] The principle of *N*-2 security in transmission expansion planning requires the system to maintain a constant power supply with a two-component failure, e.g. two transmission lines.

- For each 1 MWkm of required new network capacity, then (based on the current "Security Factor"), 1.76 times that capacity is actually built.
- Capacity of redundant secure network capacity is modelled to increase pro-rata with all increases in network transfer capacity.

If this pro-rata increase in security did happen in practice, then it would lead to the network being over-secure compared with the SQSS requirements.

The result is that the TNUoS Transport and Tariff Model is over-forecasting how much network will be planned to meet SQSS requirements. Applying a factor of 1.76 instead of 1.0 effectively results in consumers and Generators paying for security reinforcements within the TNUoS Tariffs which do not reflect actual incremental network build.

This gives rise to the issue that the CUSC TNUoS charging methodology treatment of system security is not cost reflective of what actually occurs with transmission network planning.

Why change?

The CUSC TNUoS charging methodology treatment of system security should be more cost reflective of network planning, so should better incentivise economically efficient investment decisions for both generation and demand.

By functioning as a multiplier, the Locational Onshore Security Factor artificially amplifies the locational signal. In principle, this should not be the intended purpose of the Security Factor. In practice, it leads to Users at the periphery of the network shouldering a disproportionate share of the overall security costs, even though security is a system-wide necessity. As a result, the financial burden is unfairly concentrated on a subset of Users, rather than being distributed in line with the collective nature of network security.

The proposed change would also be better for effective competition because it would improve predictability of Wider locational charges by reducing their sensitivity to variations in input variables, such as Expansion Constant, or changes in the location of generation, demand, or network reinforcement.

Additionally, there will be two positive impacts on consumer costs, from (i) fundamentally lower demand charges, and from (ii) a shallower delta between Northern and Southern projects, which is expected to positively impact CfD clearing prices.

The above improvements to cost reflectivity and effective competition through reduced risk should be a third benefit to reduce costs to consumers over the long-term. This is because it would better incentivise economically efficient investment decisions, as well as reduce risk margins and reduce cost of capital.

What is the solution?

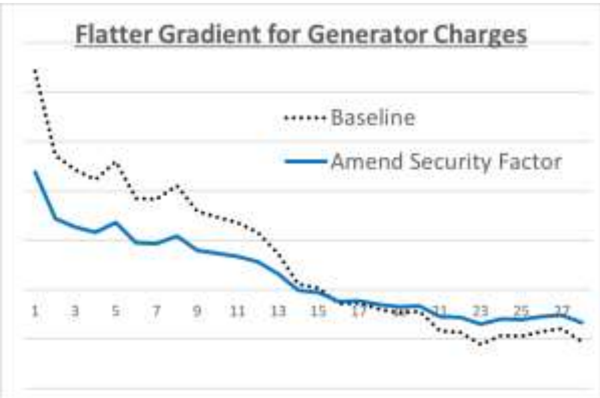
Proposer's solution

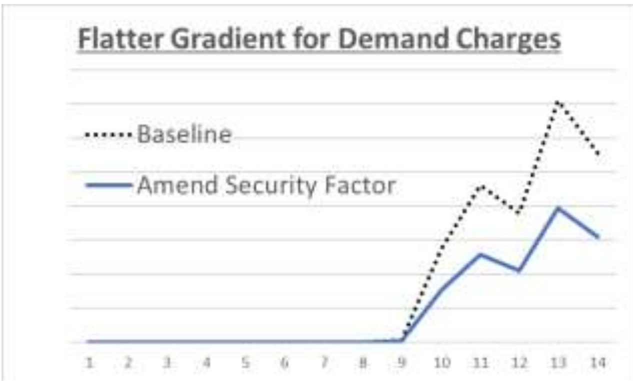
It is proposed that the existing Locational Onshore Security Factor uplift should be removed from all TNUoS Wider locational tariffs for both Peak Security and Year-Round, for both generation and demand tariffs.

Note it is the intent that local charges would remain unchanged.

<u>Examples of Charges Before and After Amending the Security Factor</u>

In the modification proposal form, the Proposer gave examples based on forecast charges in 2035, generation assumes a 45% Annual Load Factor (ALF) intermittent Generator. This analysis was based on published NESO 10-year tariff forecast showing the impact only on Wider locational and does not take account of any changes to the Generator Adjustment Credit.





<u>Results for Generators</u>

- Flatter gradient for locational charges: reduced differential between North & South as charges become smaller charges and credits become smaller credits.
- Increased magnitude of Generator adjustment tariff: There will be a reduction in total revenue recovered from Generators by removing the locational onshore security factor. This will reduce the value above the limit set by the Euro cap.

Results for Demand

- Flatter gradient for locational charges: reduced Southern charges, while Northern charges remain floored at £zero.

- Higher Demand Residual charges: smaller collection from demand locational charges.

Workgroup considerations

The Workgroup convened 14 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

The Proposer introduced their solution to remove the existing Locational Onshore Security Factor uplift from TNUoS Wider locational tariffs for both Peak Security and Year-Round, for both generation and demand tariffs. The Proposer noted that the principle of charging should reflect incremental costs rather than the existing network security, referencing CUSC 14.14.6.

One Workgroup member agreed that costs should reflect incremental usage, not total capacity, to ensure accurate pricing. The Workgroup member advised that security costs should only be added if truly necessary.

The Proposer stated that the solution could be implemented into the CUSC in two ways, and invited the Workgroup to provide feedback on this:

- **OPTION 1**: Remove references to the Locational Onshore Security Factor entirely from the CUSC and all Wider charge calculations.
- **OPTION 2**: Amend the value of the Locational Onshore Security Factor for Wider Tariffs to be 1.00 (instead of 1.76 at present).

It was agreed that the proposed solution should be **Option 1** - to remove the Locational Onshore Security Factor entirely. This is because it is a cleaner and more efficient solution compared with **Option 2** of retaining legal text for an adjustment factor of 1.0 that has no effect on the value of tariff calculation methodology.

A Workgroup member stated that while the current methodology may aim to balance cost reflectivity, stability, and fairness, this balance is being critically undermined by the use of an inflated Locational Onshore Security Factor. The issue is not whether the model is internally consistent or historically reasoned, but that it is producing outcomes that are economically and strategically unsustainable. The Security Factor by acting as a multiplier on the locational signal—is leading to charges so high that they risk eroding value from operational assets and rendering many future projects, particularly in Scotland, financially unviable. This is not a theoretical concern: if connecting to the grid becomes prohibitively expensive for clean energy projects in key regions, then the UK's ability to meet its Clean Power 2030 Action Plan targets is directly threatened.

The broader intent of locational charging is to incentivise efficient investment and usage of the network. However, if the signal becomes so distorted by overestimated security assumptions that it actively deters necessary renewable deployment in areas rich in wind or other resources, the signal fails in both economic and policy terms. Clean energy developers cannot invest where grid access is uneconomical. Whatever theoretical consistency the current methodology claims, it must be subordinate to delivering a network that enables, not obstructs, a net zero future. Any approach that disregards this real-world impact risks undermining the energy transition itself and the legitimacy of the network arrangements. This view was supported by a number of other Workgroup members.

Incremental Costs price signal versus average cost recovery and fairness discussion

The Proposer considered the difference between incremental and actual costs and advocated for an incremental approach that reflects the contribution to reinforcement.

The Proposer explained that the current Security Factor calculated based on average existing cost is not cost reflective, because it is overly inclusive as it includes sunk costs for existing security that do not vary with network expansion. The Proposer argued that an incremental price signal should only reflect the value of incremental costs and should not attempt to reflect the value of sunk costs that do not vary with network expansion.

The Proposer explained that this is consistent with economic principles that efficient prices signals should reflect incremental cost, and it is consistent with the CUSC principles that charges should reflect incremental cost, as per CUSC sections 14.14.6 and

14.14.11. The Proposer stated that this principle is also consistent with Ofgem's Targeted Charging Review, Access and Forward-Looking Charges review and Balancing Services Use of System (BSUoS) Task Forces conclusions that Generator charges should reflect incremental cost, that fairness relates to revenue collection and that it is in the best interest of customers for revenue collection to be wholly on final demand, not on generation.

The CUSC explains that TNUoS charges should reflect incremental cost rather than average cost:

> *"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."* (CUSC 14.14.6, emphasis added)
>
> *"In setting and reviewing these charges The Company has a number of further objectives. These are to:*
>
> - *offer clarity of principles and transparency of the methodology;*
> - *inform existing Users and potential new entrants with accurate and stable cost messages;*
> - *charge on the basis of services provided and **on the basis of incremental rather than average costs**, and so promote the optimal use of and investment in the transmission system; and*
> - *be implementable within practical cost parameters and time-scales"* (CUSC 14.14.11, emphasis added)

The Proposer also explained that in some circumstances, it can be appropriate for price signals to use a measure of average existing cost, but only if it is being used as a proxy for the value of incremental cost, and only in circumstances if that value of average cost does actually appropriately reflect the value of incremental cost. The Proposer argued that since the Transmission System is already sufficiently secure and the provision of incremental security is systematically lower than the value of average existing security, then the incremental price signal should reflect the lower value of incremental security (i.e. no additional security), not the higher value of average existing security.

It was agreed by Workgroup members that the TNUoS Transport model uses a measure of the expansion of the existing network to calculate TNUoS tariffs. However, the Proposer explained that the purpose of the existing transport methodology is to use the MWkm weighted average cost of the existing network as a proxy measure to reflect the long-run incremental cost of network expansion. The Proposer stated that removing, or setting Security Factor to 1.0, to better reflect the long-run incremental cost of security would make it more consistent with the current Transport Model approach to reflect the long-run incremental cost of network expansion.

The Proposer argued that if incremental network expansion did take place with the same degree of security as the existing network, as TNUoS charges currently assume, this would imply an ever-increasing provision of security which does not reflect the way the network is built in practice.

The Workgroup discussed the use of deeper connection charges. The Proposer explained that it would be incorrect to claim that a move to deeper connection charges, with its associated shortcomings, would be the only way to provide charges based on incremental cost. The Proposer explained that it would be incorrect and represent a false choice to claim that charging had to be based on either average existing cost, or deeper connection charges.

<u>NESO Secure Load Flow model (SECULF) Discussion</u>

The current calculation of the Locational Onshore Security Factor is conducted by NESO at the start of each price control (every five years) using a tool known as the "Secure Load Flow Model (SECULF)". The current value for the Locational Onshore Security Factor calculated by the SECULF model is 1.76. It was therefore considered appropriate for the Workgroup, in line with the Terms of Reference, to consider if the SECULF model and the value of 1.76 could be better understood.

The Proposer suggested that the SECULF model and its answer could be disregarded for the purposes of this modification. The reasons given were that firstly SECULF does not appear to measure what it claims to measure as it appears to assume its own answer rather being an accurate mease of existing network security, and secondly, SECULF attempts to measure the wrong thing by producing a view of average existing security, when charging should be based on incremental security instead.

Some Workgroup members concurred that the SECULF model can be disregarded for the purposes of CMP432. It is the Proposer's view that there is no historical evidence of the 1.76 factor being consistently applied in network planning, nor did NESO provide any justification for its origin. Furthermore, since the system is already secure enough to meet demand in the South, the SECULF methodology is no longer relevant when the primary focus is planning for the connection of Scottish generation. NESO had a different view that, the Locational Onshore Security Factor has been an established element of the TNUoS methodology for many years and NESO provides a Guidance Note to industry on its application.

One Workgroup member raised concerns about the SECULF model and whether it accurately reflects yearly changes and infrastructure needs. The Workgroup member advised that the model automatically adds new circuits but should instead focus on optimising the existing network.

The Proposer raised concerns with the lack of transparency in how security is calculated, as the methodology and key data are not accessible to Users. The Proposer further explained that the SECULF model assumes that longer circuits appear to inappropriately increase the SECULF measure of security but advised that this may not be accurate. In practice and without access to the necessary SECULF calculations, it is difficult to verify these assumptions and fully understand their impact.

The Proposer requested access to the NESO SECULF model, and the Visual Basic for Applications (VBA) Code within the Transport and Tariff model however the NESO representative advised that the model was NESO intellectual property and elements within the model are commercially sensitive and could not be shared. After Workgroup discussions and challenges to NESO on confidentiality, an action was taken away to seek a legal position. Potential solutions to resolve these concerns were suggested to deal with the intellectual property issue by requiring a license agreement, and deal with the confidential information issue by replacing confidential data with public domain data prior to publishing. Both solutions are already used by NESO in publishing the TNUoS Transport and Tariff model, but NESO rejected using these solutions for the SECULF model. If the data cannot be released a written response from NESO was requested by the Proposer. The Proposer suggested an independent audit of the SECULF model, which the NESO representative agreed to raise internally. However, it was determined that this solution would not be feasible within the timeframe of this urgent modification.

The Authority Representative advised NESO to share as much information as possible in relation to how Security Factors are calculated to provide transparency. NESO committed to provide a Teach-in session to the Workgroup on the SECULF model. In the meantime, NESO circulated a PowerPoint presentation pack, and questions were collated to be taken away.

The Authority Representative noted NESO's explanation around the operation of the model as it is today and how we get from that SQSS piece to a revised DC Load Flow (DCLF) model and the Security Factor of 1.76 would be helpful to the Workgroup.

The Authority Representative noted the interaction of CMP432 with CMP444, advising that a decision on this modification is expected to be made before the decision on CMP444, and it will be well in advance of the Contract for Difference (CfD) Allocation Round 7 (AR7). A Workgroup member noted that the timing is currently problematic. There is a need for all market participants to have clarity sooner, particularly for bidders into AR7 in summer 2025 to have a decision on both CMP444 and CMP432 prior to submitting bids.

Evidence of how the network is built in practice for security discussion

The Proposer provided the Workgroup with examples of the West Coast bootstrap and other network reinforcements to demonstrate security impacts using data from the NESO Electricity Ten Year Statements (ETYS) publications. This showed that, in practice, network reinforcement capacity does tend to increase boundary transfer capability at a ratio of 1:1 which is consistent with a Security Factor of 1.0. This was contrasted to the SECULF approach which levied a charge consistent with a security increase of 1.76 on the system boundary. This does not reflect actual system build, which is the crux of the defect.

A Workgroup member provided examples of network planning, including the Sizewell and West Coast bootstrap projects, to illustrate the impact of SQSS security considerations on network capacity and transfer capability.

The Proposer discussed the impact of strategic planning on network reinforcement and the role of individual Generators in causing incremental security costs. The Proposer and two Workgroup members argued that substantial network upgrades that triggered changes in fault conditions are driven by strategic planning, not incremental Generator investment decisions, so should not be part of a locational price signal. The Proposer explained that for locational investment price signals to be useful, they should reflect the incremental cost caused by User investment decisions and not reflect sunk costs, or other costs that are not impacted by that User's locational investment decisions.

There were comments regarding whether the figure should be 1.0, 1.76 or somewhere in between and if it is a different number, how that could be evidenced.

A SSE Consultant (on behalf of the Proposer) presented on the Locational Onshore Security Factor methodology, emphasising the addition of transmission capacity through new circuits rather than increasing the loading of existing circuits. The SSE Consultant highlighted the importance of considering the secured system when adding incremental generation.

The SSE Consultant raised concerns that the current Locational Onshore Security Factor methodology does not accurately reflect the realities of the GB Transmission System development, which primarily involves adding new transmission lines rather than increasing the capacity of existing ones.

When discussing the Terms of Reference for the modification, the Proposer advised it would be helpful to get input from the NESO strategic network planning team and TOs to better understand how network reinforcements work in practice. These parties were invited, however, no representative from NESO strategic planning team, or any of the TOs has been made available to support the Workgroup process.

The Authority Representative stated that there needs to be a clear approach to how bootstraps are charged, especially in relation to zoning and their interaction with existing methodologies. They emphasised that most of the Transmission System is not made of bootstraps, so any changes should be considered in the right context without losing sight of the overall system.

Presentation on how charging wrongly implies N- numbers

The Proposer explained that the current charging methodology implies that every time a new circuit is added, it would be appropriate to add an additional redundant circuit, leading to an ever-increasing number of redundant circuits (N-1, N-2, N-3, N-4, etc.). Stating that this is not reflective of actual network reinforcement practices.

The Proposer shared an example **(Annex 16a),** explaining that when a new circuit is added without changing the fault condition, the Security Factor should be 1.0. However, the current methodology assumes that additional security is always required, which is not the case in practice.

The Proposer argued that the long-run incremental price signal should reflect the actual incremental cost of security, which does not increase indefinitely with each new circuit. The Proposer opinion was that the current TNUoS charging methodology's assumption of continuous increases in the fault condition is incorrect.

Transmission Capacity Discussion

The Proposer discussed the impact of adding new circuits on transmission capacity and the importance of considering short-term ratings and dynamic systems and emphasised the need to understand the incremental transmission capacity required for new generation.

Two Workgroup members discussed the complexity of the Transmission System and the need to consider various factors such as thermal constraints, voltage stability, and reinforcement reasons when determining the Locational Onshore Security Factor.

The SSE Consultant highlighted that the addition of new transmission lines can significantly increase cross-boundary capability, demonstrating the impact of new lines on overall transmission capacity. Noting that this evidence supports a Locational Onshore Security Factor of one for certain boundaries, as the new lines provide sufficient capacity without the need for additional Security Factors.

The differences were described as:

- **Approach to Redundancy:** SQSS focuses on meeting specific redundancy standards through planned and unplanned outages, while the SECULF approach calculates redundancy based on incremental generation and existing line loading.
- **Application of Redundancy:** SQSS applies redundancy requirements uniformly across the Transmission System, whereas the SECULF methodology assesses redundancy node by node before deriving a best-fit relationship between unsecured and secured MWkms.
- **Transmission Capacity Development:** SQSS emphasises the addition of new circuits to meet redundancy standards, whereas SECULF often assumes increased loading of existing circuits rather than new circuits.

Security Factor Materiality Discussions

The Proposer advised that the current Locational Onshore Security Factor in the charging model amplifies locational signals, in a way that is not cost reflective and provides a locational security signal which substantially over-states the incremental cost of security. Suggesting setting the Security Factor to 1.0, or removing it from the Wider tariff calculation entirely, to better align with the incremental cost of network reinforcement.

Some Workgroup members agreed that the current Security Factor may have been artificially inflating charges, as the 1.76 Security Factor does not appear to have been consistently applied to each new circuit build, given that the system is already secure. This inconsistency makes the current approach highly non-cost reflective, leading to unjustified cost increases across the network.

These Workgroup members emphasised the significant impact of the Security Factor on consumer costs, both through direct fundamental demand charges and the steep pricing disparity between Southern and Northern Generators affecting CfD clearing prices. Given these material implications, they argued that it would be untenable to continue applying an unjustified 1.76 factor.

The Proposer presented the materiality of the Security Factor, showing that the highest impact is on Northern intermittent Generators. This is because the Security Factor amplifies the value of locational tariffs, so this modification has the largest impact on Generators in locations where the locational tariff is largest. Northern intermittent Generators are exposed to the largest locational tariff value and pay the highest proportion of that locational tariff because the Not Shared Year-Round tariff element is charged on 100% of Transmission Energy Capacity (TEC).

The Proposer explained that the impact on conventional carbon generation is relatively smaller, because the bulk of conventional carbon generation is located in the South where the value of locational tariffs, and therefore the impact of removing the Security Factor, is smaller. A Workgroup member disagreed with this perspective and noted that as TNUoS is a zero-sum calculation it was inevitable that large reductions in cost for some parties would mean large increases for others and noted for instance that the impact on their company was likely to be significant on the basis of the indicative tariffs produced.

Public

Impacts on Tariffs of removing the Locational Onshore Security Factor or setting it to 1.0.

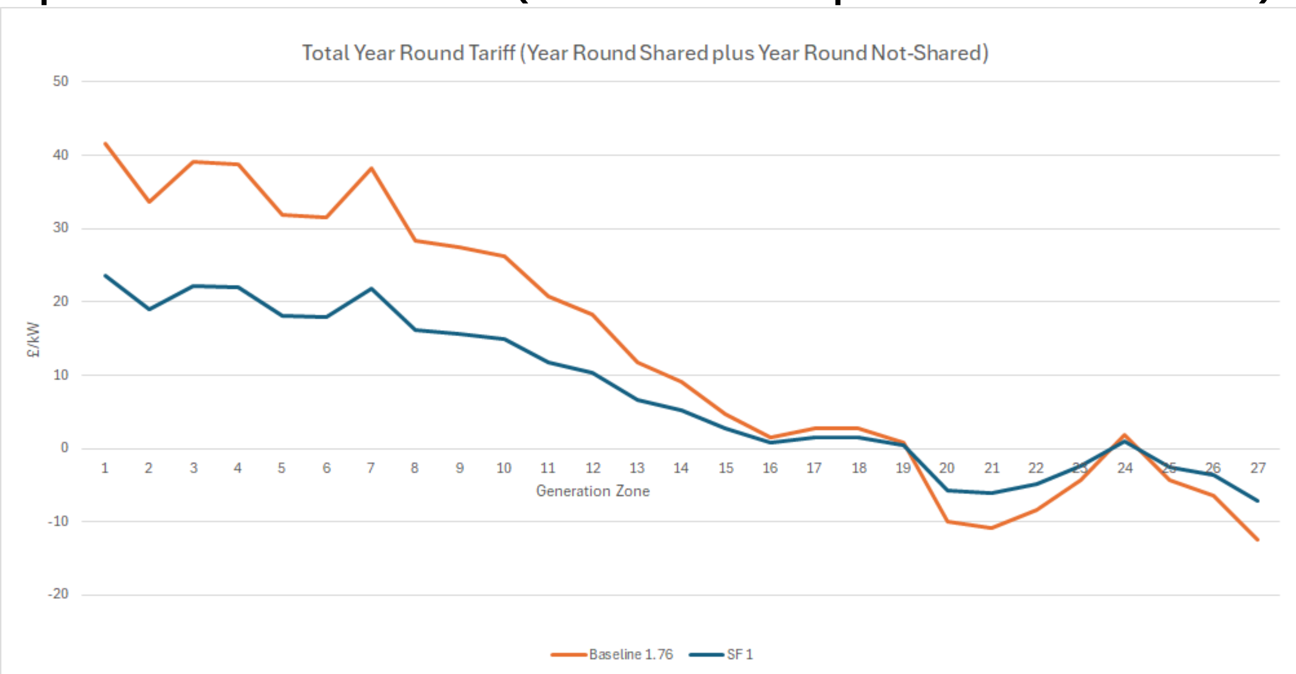
The Workgroup asked NESO to provide analysis on the impacts of removing the Locational Onshore Security Factor or setting to 1.0. The analysis can be found in **Annex 5** with a summary of impacts noted below for charging year 2025/26. Please note that the implementation date for this modification is April 2026.

Amending or removing or setting the Locational Onshore Security Factor to 1.0:

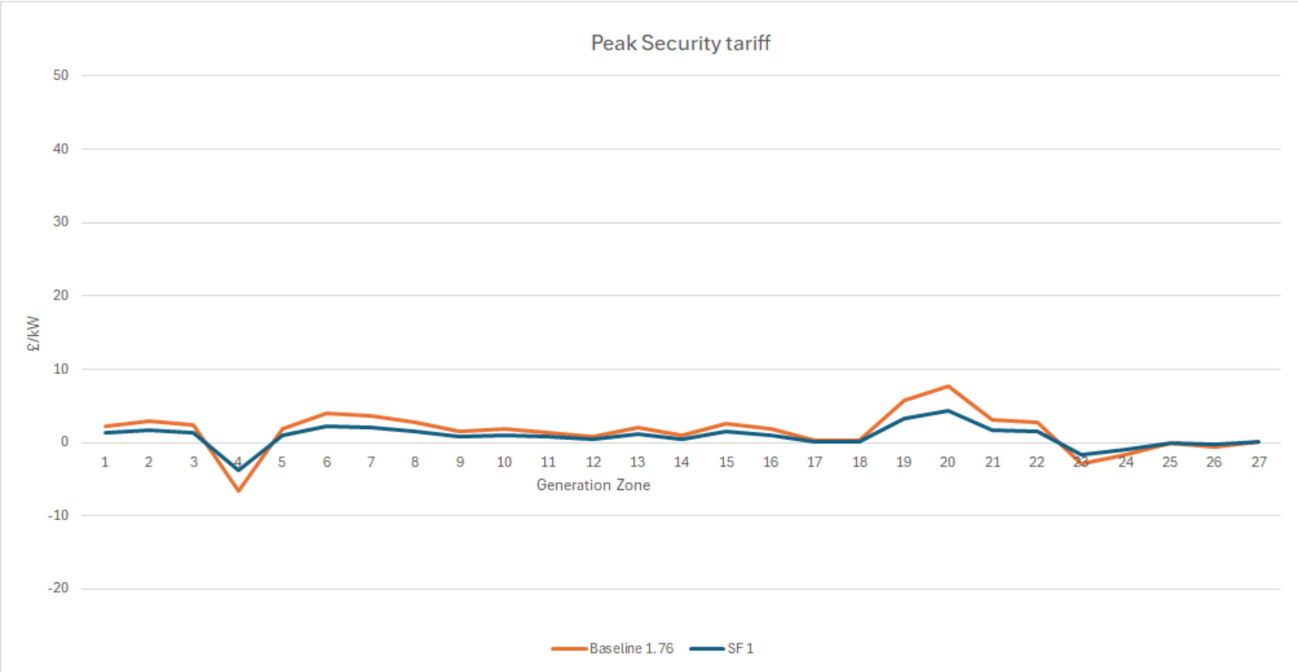
- It has the impact of reducing average wider locational tariffs by 43% this applies to both demand and generation
- It reduces generation tariffs to the extent that the tariffs fall the Euro cap range the Generator adjustment tariff would be zero
- The shortfall in revenue from the reduced locational tariffs would be picked up the demand residual fixed charge, this would increase by 3%
- There is an equal swing between reduced revenue generated from Generation (-4.6%) and an increase of revenue from Demand (1.3%) of £51.98m

The impacts are shown below are also contained in **Annex 5.**

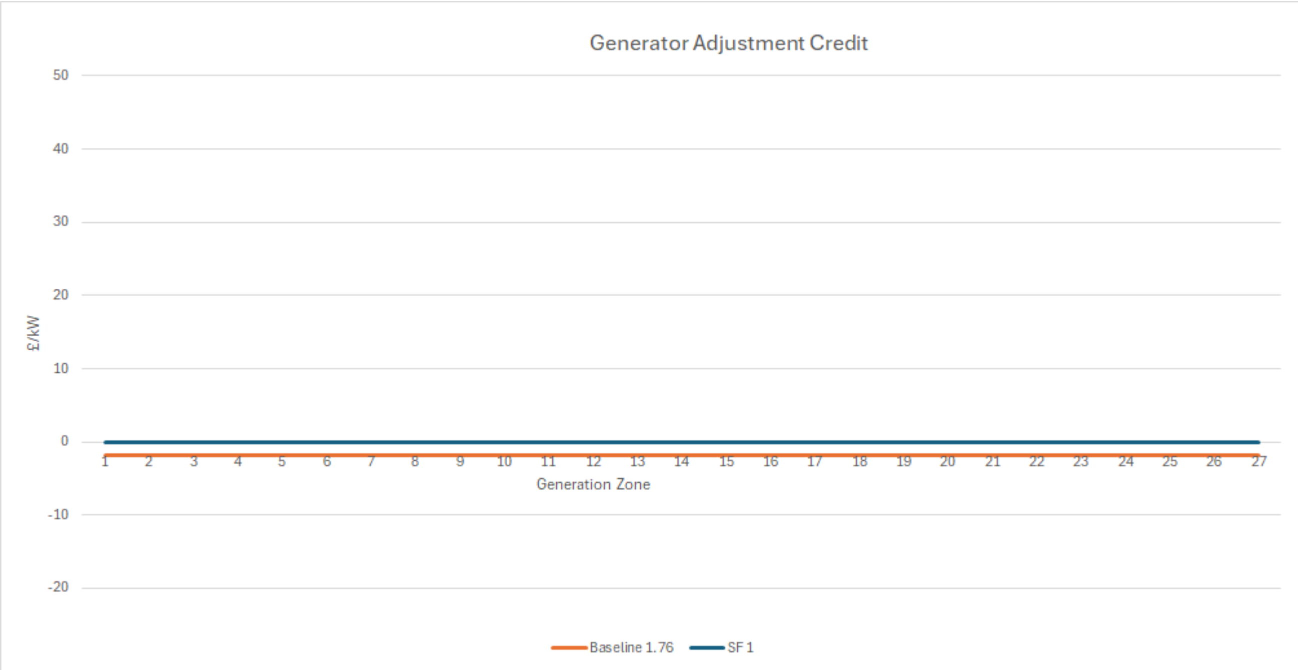
Impact on total Year-Round Tariff (Year-Round Shared plus Year Round not-shared)



Impact on Peak Security tariff



Impact on Generator Adjustment Credit



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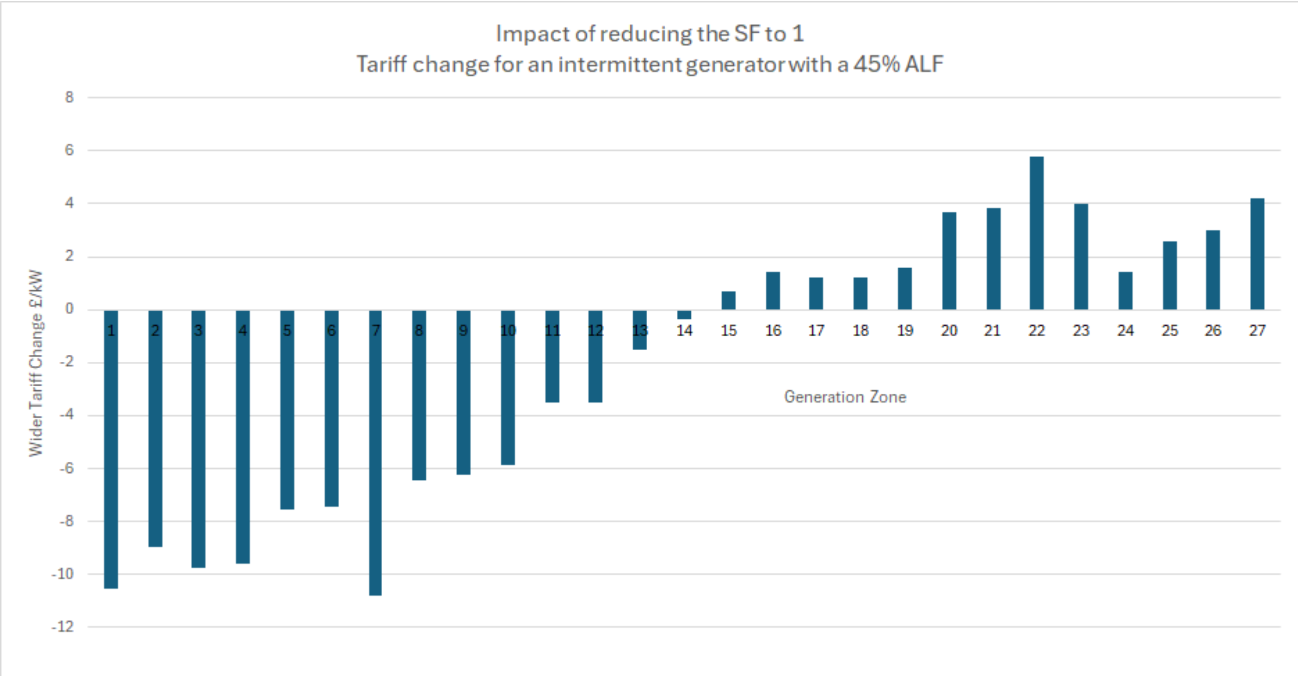
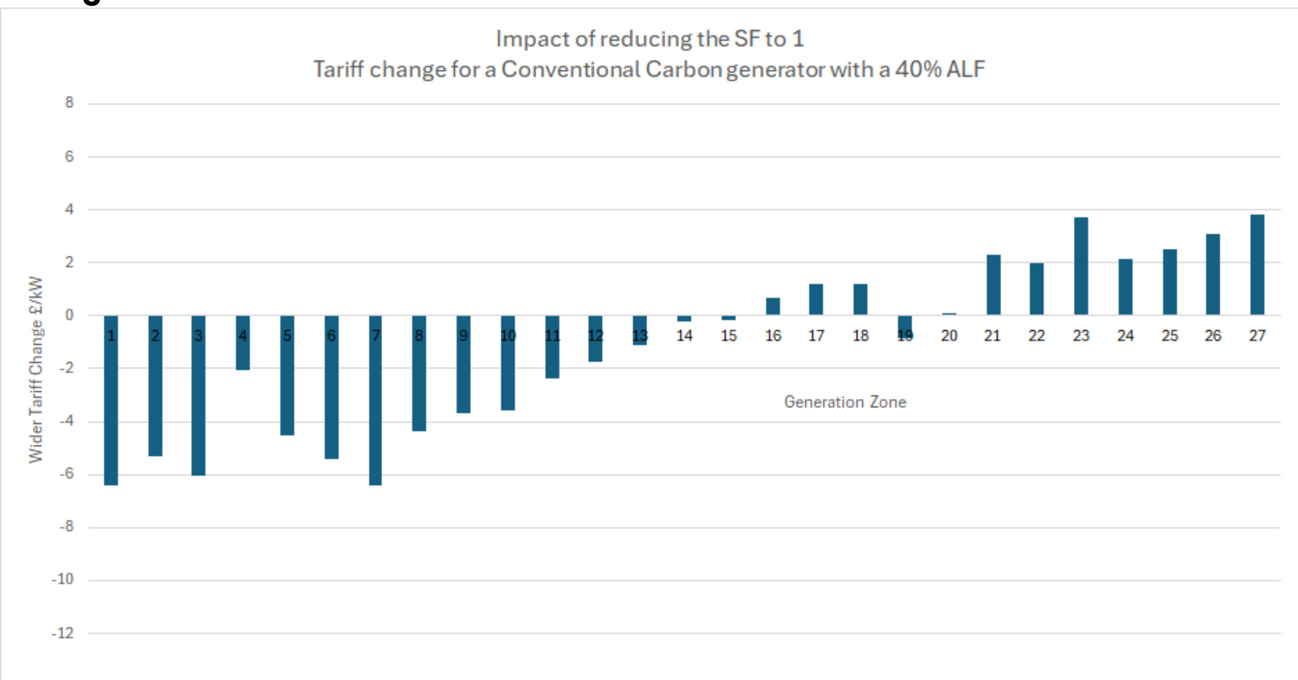
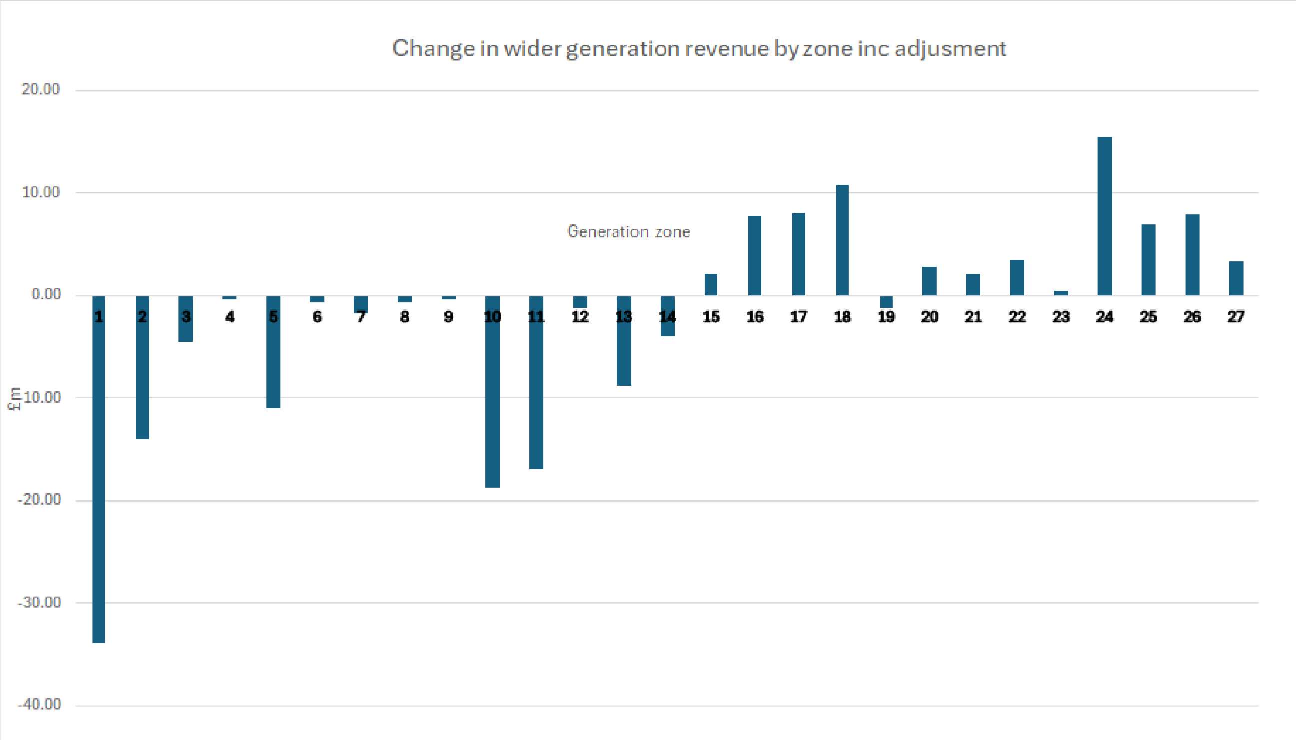
Change in tariffs for an intermittent Generator with a 45% ALF



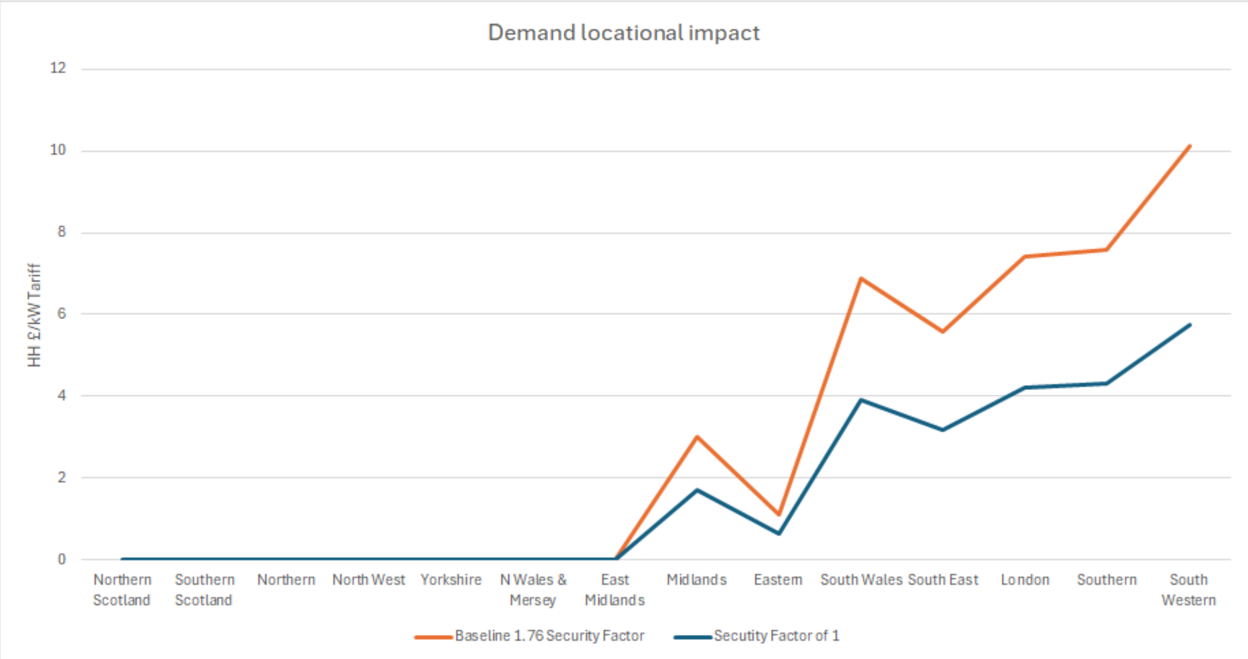
Change in tariffs for a conventional carbon Generator with a 40% ALF



Change in wider generation revenue by zone including adjustment to 1



Impact on Demand tariffs



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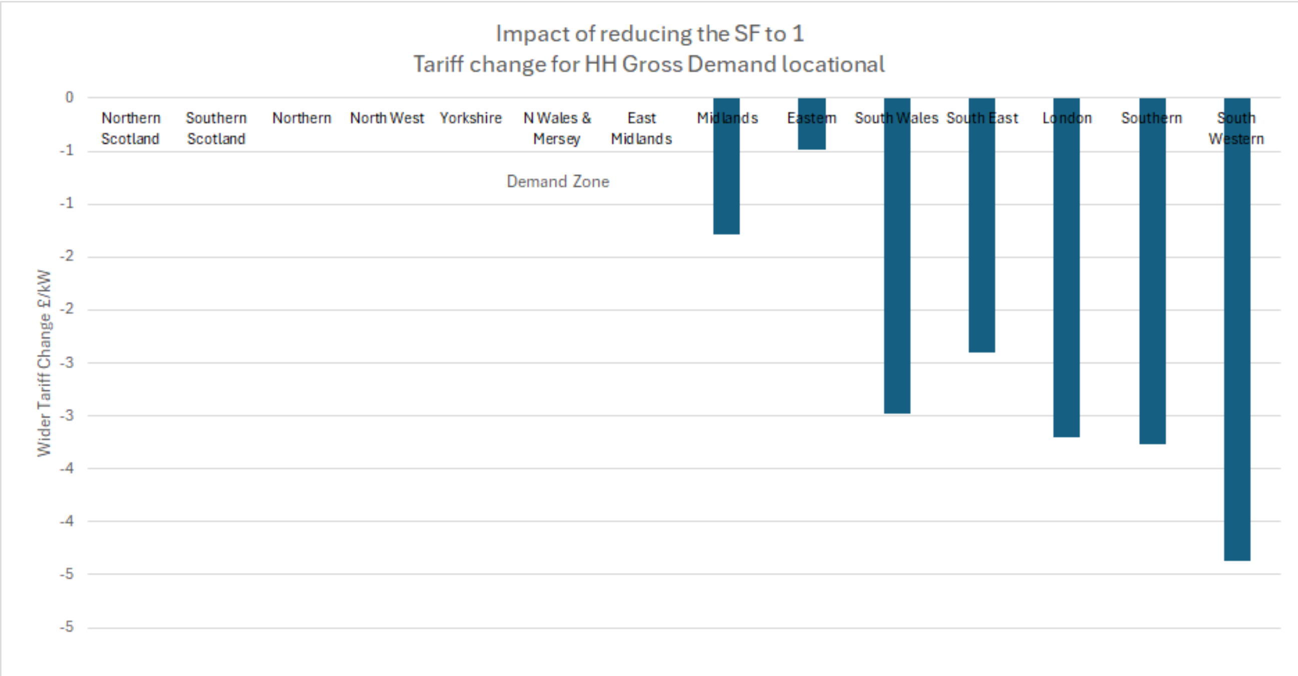
Change in demand tariffs



The Workgroup agreed that it will be helpful to carry out additional tariff impact analysis including the impact on later charging years, breakdown by different types of generation technology and interactions with other modifications including CMP444 (Cap and Floor), CMP440 (Demand Credits), CMP423 (Reference Node), and CMP315/375 (Expansion Constant). This would also consider the longer-term impact on the generation adjustment credits and demand residual.

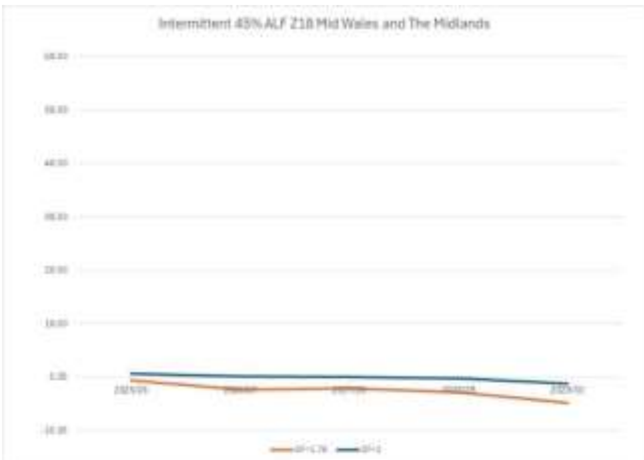
Following the Workgroup Consultation, NESO provided additional tariff analysis of the impact of the Original Proposal for the full NESO 5-year forecast from charging year 2025/26 to 2029/30.

Impact on tariff paid by Intermittent Low Carbon generator 45% ALF over time

The graphs below show the impact of the Original solution on 45% low carbon intermittent Generators over time comparing generation charging zone 1 with Generator charging zone 18, selected for the comparison because zone 18 has the Southern zone with the largest capacity of intermittent low carbon generation as shown in the NESO published 5-year forecast for 2029/30.

The Proposer noted that the impact of the Original solution is that by 2029/30, intermittent low carbon Generators in both Northern and Southern zones would be paying broadly the same tariff values as they are currently paying in 2025/26. The Proposer expressed the view that impact of the modification is best characterised as mitigating the large increase in Northern intermittent low carbon Generator tariffs that would otherwise have happened in the baseline. The Proposer also suggested that, by contrast, it is not accurate to characterise the Original solution as causing a reduction in tariffs paid by Northern intermittent low carbon Generators over the long term, because their tariffs are still shown to increase over time in the long-term, compared with current levels.

Impact on tariff paid by intermittent Low Carbon generator 45% ALF over time



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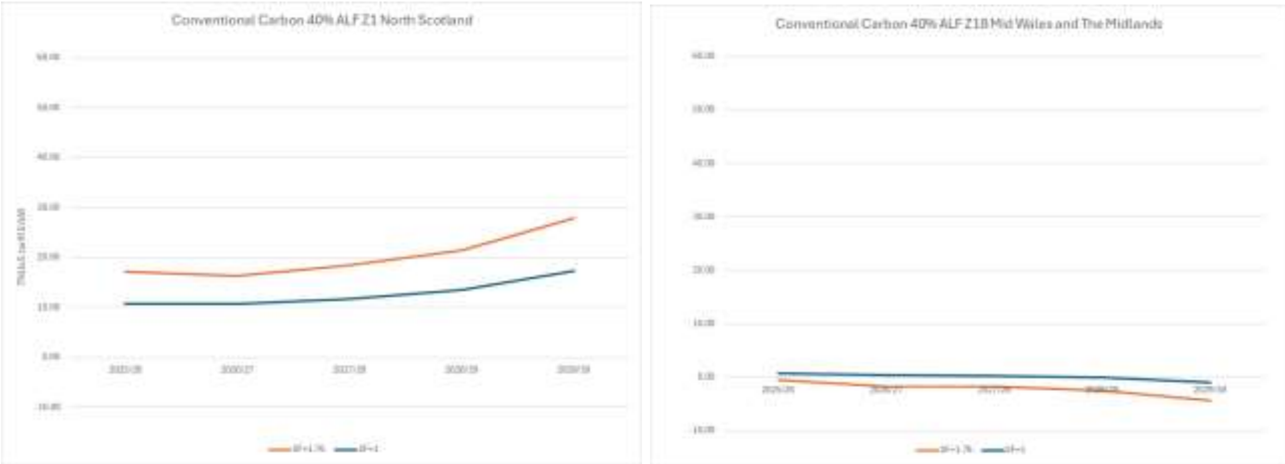
Impact on tariff paid by Conventional Carbon Generator 40% ALF over time.



The Proposer concluded from NESO's 5-year forecast tariff analysis (**Annex 10**) that the Original solution would not cause a change in revenue collection between generation and demand over the longer term. The NESO analysis only showed an increase in collection from demand for two years, firstly for 2025/26, however, that is the current charging year and will not be impacted by this modification proposal. The only other year showing an increase in collection from demand is 2027/28, where the impact is relatively small compared with the total value of TNUoS collected.

NESO explained that the reason why the Original solution does not result in a change in revenue collection between generation and demand over the longer-term is that the total collected from Generators is limited by the 2.50 Euro cap on average Generator charges both before and after the Original solution has been applied to tariffs.

Impact on change in revenue collection between generation and demand

Baseline Global Locational Security Factor 1.76					
	2025/26	2026/27	2027/28	2028/29	2029/30
Revenue from Generation (£m)	1,129	1,193	1,275	1,310	1,440
Revenue from Demand (£m)	3,957	4,234	4,427	4,591	4,735

CMP432 Global Locational Security Factor 1					
	2025/26	2026/27	2027/28	2028/29	2029/30
Revenue from Generation (£m)	1,077	1,193	1,260	1,310	1,440
Revenue from Demand (£m)	4,009	4,234	4,443	4,591	4,735

Impact					
	2025/26	2026/27	2027/28	2028/29	2029/30
Change in revenue from Generation (£m)	-52	0	-16	0	0
Change in revenue from Demand (£m)	52	0	16	0	0

Argument for an average Locational Onshore Security Factor

A Workgroup member presented to the Workgroup an alternative perspective (**Annex 11**) on the proposed solution which disagreed with the perspective put forward by the Proposer and argued that it would be inappropriate to implement CMP432. While accepting the premise that efficient economic signals should be sent when the incremental (or marginal) cost effects of a market participant's actions are reflected, the Workgroup member stated that the current charge structure and Investment Cost Related Pricing (ICRP) model deliberately do not fully reflect these costs, as they balance cost reflectivity with stability and fair charging.

The Workgroup member stated that a full marginal approach to charging would involve a deeper charging method that reflects the actual or expected impact of a party's investment decision on the transmission network. If a party's decision resulted in a need for new network investment, the party would be charged the cost of that investment. Similarly, if no investment was needed to accommodate the party, no charge would be levied. As network investment tends to occur in specific “chunks” of MWs, if a party triggered investment that exceeded its own needs, it would bear the full cost under a marginal approach.

The Workgroup member added that the current methodology only charges a party based on its proportionate use of the network. Indeed, the methodology shifted from a previous approach where local network reinforcements were charged on a deep basis, referred to as “shallowish” charging, to a fully shallow arrangement. This change was made because it was deemed unfair to burden such Users with substantial costs, especially since this creates spare capacity that subsequent Users can benefit from. The principle of charging Users only for their “fair share” of the network means that subsequent Users and existing Users are charged the same cost, which reflects the cost of new network and network that has already been built.

The Workgroup member noted that this proportionate approach not only applies to the number of MWs of network that is used by the User, but also to the number of years that the User uses the network for. Network investment has a long asset life and is assumed to be made for 50 years in the methodology. Therefore, the cost of the network is spread over 50 years when calculating the cost per MWkm of network in the Expansion Constant and Expansion Factors. This allows Users to be charged annually for their usage of the network, even if the life of their project is less than 50 years, which is often the case.

If Users were only charged based on the current view of future network investments each year, costs could not be spread over 50 years. Once the investment was made, it could no longer be considered a future investment and its costs could therefore not be reflected in locational charges, meaning its remaining years' costs would be lost. This issue does not arise with deeper charging arrangements, where Users triggering the investment are charged the full cost upfront or annually, with termination top-up payments if their project closes before charges are paid off.

Therefore, the Workgroup member stated that by its nature the current shallow charging methodology seeks to reflect combinations of existing network and future network costs, and identified key aspects of the methodology that followed a consistent approach to this:

Expansion Constant: uses the past 10 years' investment costs in 400kV overhead lines, indexed to reflect price key changes in the inputs to costs, assuming that the asset is used its full MW capacity for a period of 50 years.

Expansion Factors: uses the same approach as the Expansion Constant, to calculate costs of other network types and voltages.

Locational Onshore Security Factor: average amount of security provided across the whole network currently.

Use of High Voltage Direct Current (HVDC) "Onshore" assets: these links are by their nature controllable so can be used to varying levels of capacity. The Transport Model assumes that the Direct Current (DC) link is used in the same proportion as existing Alternating Current (AC) onshore network, even though the actual incremental use could be more or less than this.

The Workgroup member stated the belief that the current methodology seeks to reflect the incremental cost of the network through the calculation of the marginal MWkm, rather than trying to do so in every aspect of the methodology, identifying paragraph of 14.15.4 of the CUSC which states:

"*The DCLF ICRP transport model calculates the marginal costs of investment in the transmission system which would be required as a consequence of an increase in demand or generation at each connection point or node on the transmission system, based on a study of peak demand conditions using both Peak Security and Year-Round generation backgrounds on the transmission system.* ***One measure of the investment costs is in terms of MWkm. This is the concept that ICRP uses to calculate marginal costs of investment."***

The Workgroup member noted, however, that even in this aspect of the methodology, the existing network plays a crucial role in calculating the locational signal. The DCLF model reflects the current network but assumes it is perfectly sized to meet the assumed amount and locational distribution of generation and demand. Additional flows are calculated by introducing additional generation at different locations on the network, with the assumption that the network can be expanded only by the necessary fractions of MW to accommodate these additional flows. Therefore, the model focuses not on actual investments needed to accommodate new generation, but rather on the additional use of the existing network.

The Workgroup member believed the model correctly aims to represent the average level of security required for the system as a whole when calculating the Locational Onshore Security Factor, particularly since the model assumes the network is precisely sized to current requirements, so any additional assets would also need to provide security. In reality, various approaches might be adopted depending on the circumstance: additional circuits may need to be constructed, existing circuits might need reinforcement, or no additional investment may be required. The Workgroup member stated the opinion that this does not imply an ever-increasing level of security on the network to ever higher levels than N-2 and observed that under the current methodology, if the average amount of security in the network were reduced, the Locational Onshore Security Factor would accordingly decrease.

Another key aspect highlighted by the Workgroup member is the need to provide signals for efficiently reusing the existing network, which aligns with the current charging approach described above. The efficient reuse of the system is particularly important now as the country strives to meet Clean Power 2030 Action Plan objectives by altering the generation mix as well as increasing the total amount of generation. Consequently, it is impractical to focus solely on new network construction while neglecting the use of the existing network. Inefficient use of the existing network could lead to unnecessary new infrastructure development or inefficient levels of constraint costs, ultimately harming customers.

The Workgroup member argued that if the Locational Onshore Security Factor calculation were altered to reflect only actual new investments, all aspects of the methodology should be reviewed and, where appropriate, modified to ensure consistency within any new model. This should be conducted under a comprehensive review, as suggested by Ofgem, to ensure transmission charging is appropriate for future low carbon trading arrangements.

A specific example where a similar change might be required is the treatment of HVDC assets. The Workgroup member noted that a major argument for the CMP432 solution is that new investments tend to involve new circuits, such as the Western DC link; therefore, only the effect of these assets on security should be included in the model, excluding existing assets. A similar argument could be made that only the new HVDC assets should be considered when calculating the use of that relevant part of the network in the Transport Model, as this would be the marginal impact on the Transmission System. It would be inconsistent to exclude existing network security from the Security Factor calculation while including the use of existing onshore assets in the MWkms calculation.

In a purely marginal or incremental approach, the usage of HVDC assets should be set at 100 percent, not an average approach agreed upon to ensure fairness in charging, as mentioned above.

The Workgroup member believed that altering the Locational Onshore Security Factor alone, without ensuring consistency with the broader model, would result in a less cost-reflective methodology.

Notwithstanding the above views, in response to arguments that new network investment only provided transfer capability, and not new security, the Workgroup member expressed a perspective that it was not possible to concluded this simply by looking at investments made in single transmission lines or cables. The provision of security and network planning in general is clearly more complex than this and the network investment that is expected in future will consist of multiple new lines and cables, as well as reinforcement of existing circuits. It is this as a whole that provides a combination of transfer capability and security.

The Workgroup member said that looking at the specific example of the Western HVDC link that was used in the Workgroup to demonstrate that only transfer capability had been provided to several network boundaries, showed this sort of complexity. The Workgroup member noted two things:

- That the Electricity Ten Year Statement had indicated that the additional capacity on the B6 boundary was provided by "*the addition of the new Western HVDC circuit and upgrade of cables at Torness*", so not just the HVDC circuit.
- That prior to the above network investments, the initial 3.5GW of boundary capability appeared to be provided by existing assets with a total capacity of around 10GW.

Therefore, it was wrong to assume that new investments were providing just transfer capability and the preexisting network demonstrated the significant amount of additional network needed to provide security on a boundary.

The Workgroup member also considered that strategically planned network still needed to be covered by locational signals. For the wholesale market to work competitively, those using strategically planned network assets should be exposed to locational signals in the same manner as other users, so they can internalise the costs of those assets in their investment and closure decisions. This is important to ensure efficient use of new and existing assets.

The Workgroup member concluded that considering all the above points, it would be inappropriate to remove the Locational Onshore Security Factor from the methodology as proposed in CMP432. This view was supported by a number of other Workgroup members.

Workgroup Consultation Summary

The Workgroup held their Workgroup Consultation between 27 February 2025 – 07 March 2025 and received 21 non-confidential responses and 1 confidential response. The full non-confidential responses and a summary of those responses can be found in **Annex 6 and Annex 6a**.

The key general points from the Workgroup Consultation responses are summarised below:

- The following numbers of respondents indicated that the Proposer's solution better facilitated the Applicable Objectives than the baseline (from the 21 respondents): 12 for (a), 11 for (b), 7 for (c) , 1 for (d) and 10 for (e), with 6 respondents stating the Proposer's solution didn't better facilitate any of Applicable Objectives than the baseline and 3 respondents didn't provide an answer.
- 11 respondents supported the proposed implementation approach while 7 didn't agree and 3 didn't provide an answer.

Key Points:

- There are mixed views from respondents regarding the Original Proposal and its facilitation of the CUSC charging objectives.
- Some respondents believe that removing the Security Factor would enhance competition, improve cost reflectivity, support climate goals, and streamline the charging methodology.
- The proposal is seen by some respondents as addressing the steep gradient of charges between the North and South of GB, promoting fairer competition and better CfD strike prices for consumers.
- Some respondents believe that the proposal will better align with how transmission capacity is planned and added in the near and medium term.

- Several respondents supported setting the Security Factor to 1.0 as a conservative measure until further analysis can be conducted.
- Some respondents found the Trident analysis compelling, which suggests a value closer to 0.77.
- A few respondents believed that a value of 1.0 for the Security Factor is appropriate.
- Several respondents believe that price signals should reflect the incremental cost of providing incremental security rather than using average existing costs.
- Some respondents agree that average costs do not send efficient investment signals, as users can only respond to incremental costs.
- One respondent believes that the Security Factor should be based on incremental cost.
- Several respondents believe there is insufficient information to assess the appropriateness of the SECULF model.

Concerns:

- Some respondents do not support the modification.
- There are concerns about the feasibility within the current urgent timeline and the time needed to assess the SECULF model's role.
- Some respondents provided arguments for increasing the Security Factor above 1.76.
- There are concerns about the complexity and volatility in TNUoS charging, with some believing the proposal will reduce this complexity and uncertainty.
- A suggestion was made to provide a workbook of impacts for all code modification consultations to enable proper assessment.
- Concerns were raised about the significant increase in tariffs for Northern Generators in the 10-year TNUoS projections by NESO, which threatens existing Generators and hinders investment.

- A respondent noted that the current charging methodology disincentivises locational signals and is both inefficient and inappropriate.
- Some respondents raised concerns about maintaining consistency in the charging framework by reflecting both incremental and average costs.
- Some respondents raised concerns about the lack of transparency and clarity in the SECULF model.
- A few respondents believe the SECULF model is outdated and not suitable for calculating the Security Factor.
- A respondent noted they are unable to assess the impact on different technologies.

Post Workgroup Consultation Discussions

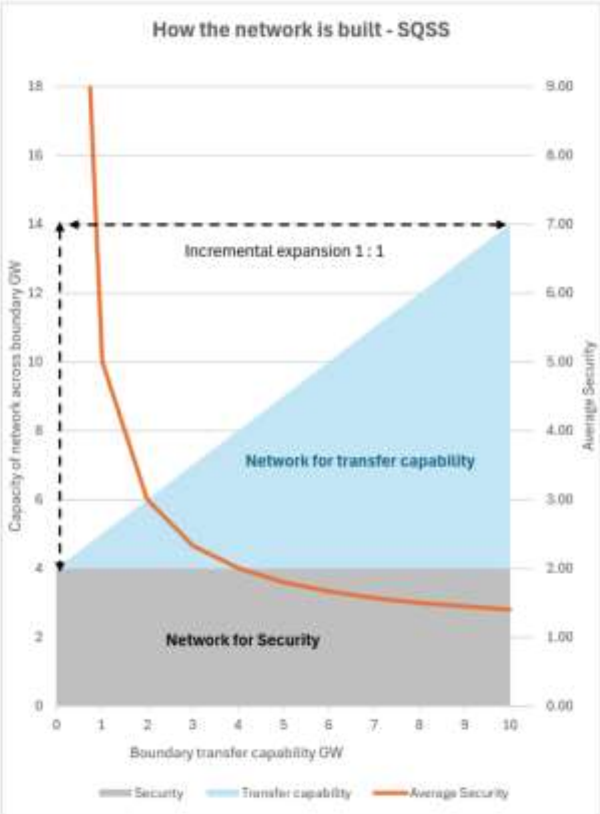
A number of issues were discussed by the workgroup post Workgroup Consultation, for some of these issues a common collective view was held whilst for others a number of views emerged round the same topic.

Proposer's additional analysis

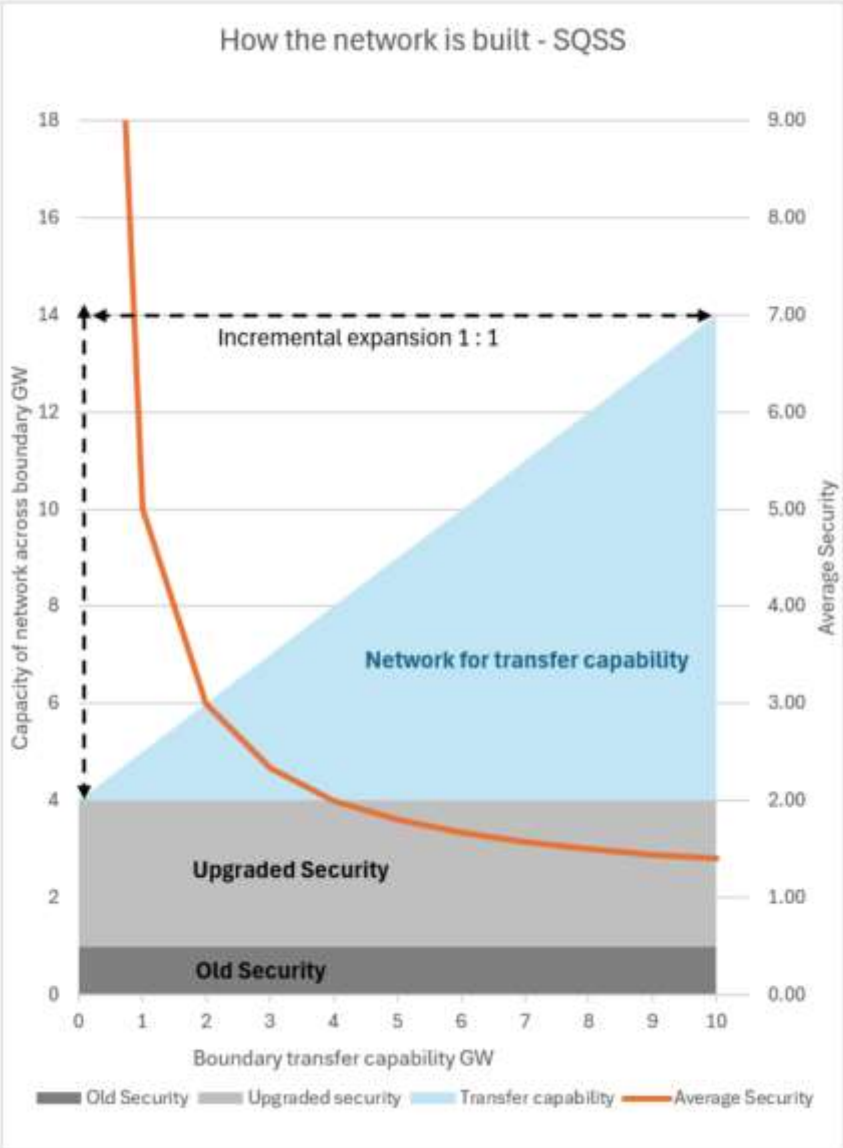
The Proposer presented to the Workgroup for discussion, the additional graphs that were included in SSE's Workgroup Consultation response. The Proposer explained that the graphs provide an illustration in terms of economic theory behind the Original solution. The rationale is that the GB Transmission System is already secure and SQSS system security relates to fault conditions at an absolute level, which means that the GB Transmission System is already secure, so when increasing the network transfer capability, no additional security is required. By contrast SQSS fault conditions do not relate to a factor of the network capacity.

The graph below illustrates how the Original solution separates out the sunk cost of security in the existing network, so that only the incremental cost of security is applied to price signals reflecting the incremental cost of expansion. This results in a more reflective Security Factor of “1.0”.

The Y-axis shows the total thermal capacity of circuits crossing any given boundary. The X-axis shows the boundary transfer capability of the same boundary. The Y-axis on the right-hand side shows the average security which is the Y-axis divided by the X-axis.



The Proposer further explained their view that as part of the GB societal objective to deliver Clean Power 2030 Action Plan and Net Zero, a decision has been made to upgrade the level of security in some parts of the network, such as Northern Scotland, in order to be able to accommodate the growth of renewable generation in that area. In the case, of upgrading of security from an old low level to a new higher level, with an increase in size of the fault condition reflects a one-off step change increase in the security level of the network. This cost of upgrading security is a sunk cost because this cost will not vary with the degree of expansion of the network to accommodate more, or less renewables generation in the future. Therefore, the appropriate incremental Security Factor remains “1.0” for such areas of the network upgrade. This step-change increase in security is illustrated in the graph below.



The Proposer contrasted this with the baseline TNUoS methodology, which, in the Proposers view, incorrectly assumes that the cost of security always increases proportionately with the expansion of network transfer capacity. It does this by incorrectly charging the current average level of security as if it is an incremental cost, which it is not. The Proposer presented the graph below suggesting this illustrates how the baseline charging methodology incorrectly assumes that security is provided in proportion to network expansion.

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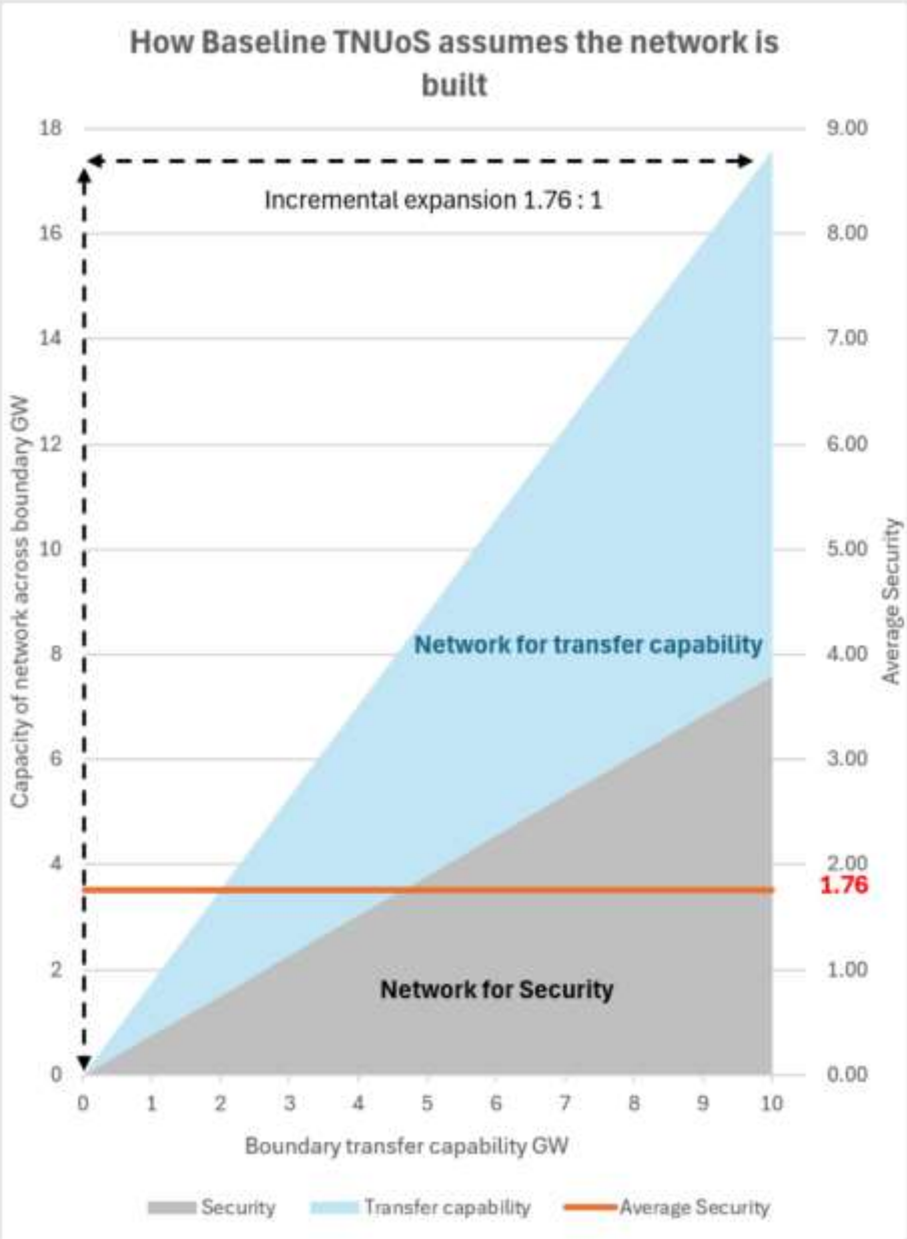

The Proposer concluded that the additional information that NESO provided regarding the SECULF model confirmed their initial view that the SECULF model is irrelevant for assessing the merits of this modification.

In the Proposer's view what the SECULF model attempts to measure is irrelevant. The Proposer concluded through discussions within the Workgroup as well as the Teach-In and NESO confirmed the view that the SECULF model only attempts to measure average security, not incremental security, so is not relevant for calculating an incremental price signal. Several Workgroup members agreed with this view and stated that after all the work developed in the Workgroup meetings and the efforts made by NESO to explain how the SECULF model works, the Workgroup is now comfortable that data from the SECULF model is not needed to conclude this modification. However, some Workgroup members highlighted the fact that if the model had been released earlier, then Alternative Requests may have been raised.

The measured answer does not mean what it claims to mean: The measured ratio of pre-fault to post-fault MWkm is different from redundant network capacity built for security. Instead, SECULF is measuring the shape of the network in terms of relative lengths and circuit types which have primarily been built to serve the geographical distribution of demand. The SECULF model does not measure what it claims to measure and does not even reflect existing average security on the GB network. NESO confirmed that the SECULF model does not take account of the presence, or absence, of spare network capacity. The Proposer therefore concluded that it cannot measure the degree of redundancy on the GB network, which is the key determinant of the degree of security. The proposer interpreted that the SECULF model instead assumes its own answer with regards to how it assumes security is built.

The Proposer suggested this conclusion that the SECULF model assumes its own answer instead of measuring actual network security is further reinforced by the very high R squared value of the SECULF model best fit line of modelled security at each node. In the NESO guidance note, this showed an R squared of 99.46% (as per NESO published "Guidance on TNUoS Locational Onshore Security Factor Calculation"), which the proposer viewed is implausibly high for any methodology that was genuinely measuring real characteristics of the GB network, so the SECULF model cannot be genuinely measuring the existing degree of security in the GB Transmission System.

The methodology is not appropriate: Currently uses the Year-Round background due to largest flow. Implications for network security may be different in the Demand Security versus Economy Investment Criteria, as reflected by Peak Security and Year-Round charges because:

Network outage in Demand Security conditions (reflected by the TNUoS Peak Security background): can be a much more expensive problem where firm generation cannot get power to customers, so risks causing an extended period of loss of load valued at £6,000 per MWh

Network outage in economy conditions (reflected by the TNUoS Year-Round background): is a short-term stability issue which can be addressed in cheaper ways (e.g. intertrips and reserve) compared with building and holding back redundant network. In a network outage, wind can be curtailed and flexible-firm plant brought on at a relatively low cost compared with lost load. NESO confirmed that the SECULF model does not take account of any differences in the implications for network security depending on whether the SQSS Demand Security criteria, or Economy Criteria are the driver for a particular element of network reinforcement.

The Proposer further noted that neither NESO, or any other Workgroup member, attempted to provide any evidence, rational, or justify the way the SECULF model functioned, or the accuracy, or validity of its answer. This made it difficult for the Workgroup to challenge the case for retaining the baseline methodology, since no evidence, or case in favour of retaining the baseline methodology was presented to be challenged.

NESO Teach- In (Calculation of the Global Security Factor)

A representative from NESO's Revenue team delivered a Teach-in session **(Annex 7)**, explaining the background, methodology, and high-level process for calculating the Global Security Factor, complemented by illustrative simple examples to enhance the Workgroup members' conceptual understanding. A Workgroup member highlighted even though the NESO session was good, it was important to make clear that it illustrated the concepts, and these were simple three or four node examples, not a comprehensive training on the excel mode.

NESO also engaged with the Workgroup on an iterative question and answer session to provide further clarifications on the SECULF Teach-In and also associated network impacts. The Proposer felt earlier access to the model may have enhanced this process.

Radial/Mesh Network Examples:

During the Teach-in, the NESO representative from the Revenue team provided an illustration of an example radial network to explain the approach used to calculate marginal costs and the effects of contingencies, along with an example of a mesh network, demonstrating how flows are then calculated, contingencies are represented and the resulting Security Factor.

A Workgroup member raised a query regarding the criteria for determining credible outages. The Workgroup was informed that the query would be forwarded to NESO's network modelling team for further clarification and updates would be provided to the Workgroup in due course.

The Proposer provided clarification on whether all possible N-1 and N-2 scenarios were considered, explaining that the worst-case scenario for each circuit was used.

A Workgroup member asked about the implementation of contingency analysis modules. The Proposer confirmed that the network modelling specialists provided the list of contingencies used in their assessments.

Clarifications on Decision-Making

An Authority representative explained that decisions regarding defects or solutions would be made after a thorough review of the Final Modification Report (FMR) and all relevant evidence. Emphasis was placed on the necessity for the Workgroup and NESO to reach a consensus on the appropriate level of evidence required, considering the restrictive timeline for the modification. The Workgroup's responsibility in determining the required evidence for decision-making was highlighted.

A Workgroup member requested clarification from the Authority representative regarding the Security Factor of 1.76. The Authority representative emphasised that the proposal must adhere to the Terms of Reference and be supported by sufficient evidence to facilitate a well-informed decision.

SECULF Access License Agreement Discussion

The Proposer inquired about the process for signing the license agreement to access the SECULF model. The NESO Representative explained that the plan is to handle it on a bilateral basis, allowing individual Workgroup members to sign the agreement and gain access to a redacted version of the model. Noting that they will discuss the best process with legal to expedite this and ensure timely access for those who need it.

The Proposer suggested that if only some Workgroup members have seen the SECULF model, they may need a subgroup to discuss it within the terms of the license agreement.

A Workgroup member asked if an alternate, more technically inclined person could have access to the model. The NESO Representative agreed to discuss with legal whether the license agreement can be signed by the organisation rather than individuals, and whether an alternate, more technically inclined person can have access to the model.

The Workgroup took onboard the comments of many of the Workgroup Consultation responses where it was suggested that a much deeper understanding of the operation of the SECULF model was needed. NESO provided a detailed presentation on the operation of the model and also responded subsequently to questions **(Annex 9)** relating to various technical issue and a collection of broader questions related to the model and how the model fitted in with the methodology. NESO circulated a license agreement to Workgroup members for them to review and sign in order to gain access to the SECULF model. The Workgroup recognised NESO's efforts, however given that the agreement was only circulated one week before the Workgroup vote, there was a very limited opportunity for members to further their understanding and use the model in their assessment of the modification during the Workgroup process.

A Workgroup member raised a question about the long-term use of the model for forecasting purposes, and the NESO Representative agreed to take question away for further clarification from the legal team, which was subsequently acted upon and included in the Licence Agreement.

Several Workgroup members felt that they had become much better informed on the operation of the model and ultimately took the view that the model in general followed the current methodology as set out in the CUSC and determined the existing Security Factor on that basis. Other Workgroup members thought that due to the very limited time available, they may have more knowledge of how the model works from a theoretical point of view, but that is coming from a very low base as very limited information has been provided in the past since SECULF has been in operation (2001). It was also mentioned that a lack of comments around the SECULF calculation and methodology, was due to the limited time, as opposed to agreement that the model and methodology accurately reflects Security Requirements.

If the proposal had sought to change or improvise the SECULF model the Workgroup would have needed to work further on the model understand but as the proposal simply disapplies the existing methodology, it was felt that the level of understanding gained by the Workgroup was adequate to be able to assess the proposed modification. The NESO presentations, as well as the NESO response to many of the group questions, are contained in the **Annexes 8** and **9**.

At the time of publication of the Workgroup Report, the Workgroup was still in the process of gaining full access to the SECULF model. Expectations are that all the Workgroup members that wish to have access will do, by the publication of the Final Modification Report.

Different basis for expansion constants and allowance for additional security (Security Factor)

The existing methodology calculates the expansion factor (the cost of 400kV line) based on the cost of a sample set of projects that have been built over the last 10 years. This is then effectively multiplied by the Security Factor which represents the overall size of the network relative to a network with no security. Two views become apparent as to the principle behind the different basis for the expansion factor and the security factor.

The First View

- The First view believed that the proposed Security Factor of 1.0 better represented the short run incremental cost of security that was being built into the network, and it was acceptable to have the expansion constant and the Security Factor on a different basis i.e. one on 10-year average cost and one on short incremental cost.

The Second view

- This view believed that the Security factor and the expansion should be on the same basis. If the Security factor was to be based on short run incremental cost, then the expansion factor should also be set based on the same basis. Much of the new network to support connection is being achieved via HVDC connections that are typically 4 x the cost of onshore 400kV circuits as indicated by the Western Boot Strap. The current averaging approach for the expansion factor removes the extreme effect of this and moderates the resulting charges to a 10-year average including all parallel 400Kv onshore circuits in the averaging. To change one without the is effective selecting against the scheme and will result in reduced cost reflectivity and inefficiency in TO build.

Wider impact of the change

If implemented and as shown in the various tables of tariffs the resulting charge produced by implementation of the modification will reduce charges in Northern parts of GB whilst increasing charges in other areas driven by the combined effect of the Security Factor and the residual change.

Two views became apparent that as to the ultimate impact consumers beyond the self-evidence impact on tariffs these were coloured by upcoming commercial auctions and tenders. This is an area that is normally reserved for the Authority to consider given the potential commercial and competition issue. The two view are set out below at a high level.

<u>First View</u>

- This view believes that the effect of lower TNUoS charges will reduce the cleared price of auction as TNUoS cost which is one of the costs developers take account of when construction bids as such bids will be lower. This effect is particularly relevant given that many of the offshore wind projects expected to participate in future CfD auctions are located in Scotland, and it is these projects that would see the greatest reduction in TNUoS charges under the proposed change. Lower auction prices will ultimately feed through to customer bills in the form of lower energy prices. On balance those that advocate this view consider the overall financial cost to consumers will be positive for this change.
- Some Workgroup members commissioned a report to quantify the extent to which lower TNUoS charges might reduce CfD prices. However, they were unable to present the report or incorporate its findings due to concerns raised by other members of the Workgroup that doing so might conflict with competition law. Ofgem was asked to provide clarity on whether these concerns were warranted, but no response has been received to date.

<u>The Second View</u>

- The second view builds on the first but takes account of consequential effect on TO/OFTO builds cost, the impact on auction efficiency and capacity market arrangements. The view in its simplest form suggests that setting the Security Factor to 1.0 will lead to a reduction in the cost reflective element of TNUoS. The view believe that the full cost reflective charge should be faced by parties to ensure the optimum economic outcome. If this is not the case, then the inefficient cost will fall on consumers via reduced efficiency of auctions resulting in higher TNUoS residual charges and potentially higher CfD energy costs overall. A further impact on consumers relates to capacity market bids as conventional Generators seek to recover the lost revenue driven by an increase in relative TNUoS cost. On balance when added together those that advocate this view consider the overall financial cost to consumers will be negative for this change.

Timeline Concerns

The Workgroup expressed concerns about the timeline, suggesting that more time might be needed to accommodate the SECULF model access and review process. The Proposer explained based on a meeting held with the Authority prior to Workgroup 10, the view was extending the timeline should not impact the Authority's ability to make a decision if the Final Modification Report (FMR) is submitted by the agreed date of 15 May 2025. In Workgroup 11, the Workgroup agreed to the new proposed timeline. The agreed timeline was then shared with the Authority and the CUSC Panel.

Legal Text Discussion

The Workgroup considered two solutions presented by the Proposer on how this could be implemented in the CUSC and Transport and Tariff model include:

Solution 1: Remove references to the Locational Onshore Security Factor entirely from the CUSC and all Wider charge calculations.

Solution 2: Amend the value of the Locational Onshore Security Factor for Wider Tariffs to be 1.00 (instead of 1.76 at present). CUSC references to the Locational Onshore Security Factor would be retained.

As both solutions had the same mathematical outcome i.e. both would have the effect of setting the Locational Onshore Security Factor to 1.0, the Proposer was asked on their preference to proceed as their desired solution to rectify the defect. The Proposer opted for **Solution 1** and legal text has been developed to support this and is presented in **Annex 12.**

The NESO Representative noted that they have not received any feedback from the Workgroup members on the legal text shared previously. It was emphasised the importance of receiving input to ensure that the legal text reflects the Workgroup's views and considerations.

The Proposer raised the question of whether the worked examples in the CUSC should be updated to reflect changes in the methodology. Noting that the current examples would be incorrect if the Security Factor is removed or amended.

The Authority Representative suggested that instead of updating the worked examples, they could be removed from the CUSC and placed in a separate guidance note as this would prevent the need for frequent updates to the CUSC whenever the methodology changes.

The Authority Representative recommended that the NESO consider a broader conversation about the value of having worked examples in the CUSC. They emphasised the importance of efficient administration and suggested that a single modification could address the removal of all worked examples from the CUSC.

Legal text

Legal text for this modification can be found in **Annex 12.**

Terms of Reference Discussion

a) Consider EBR implications The Workgroup discussed the EBR implications to better understand the question, and no issues were raised. The Workgroup view was that the modification does not impact EBR Article 18 terms and conditions.
b) Consider the methodology for calculating the Security Factor (Locational Onshore Security Factor Section 14.15.88 – 14.15.90) and the further objectives of the Charging Methodology set out in Section 14. 14.11

The SECULF methodology and the objectives of the Charging Methodology were considered and debated at length by the Workgroup. The Workgroup viewed that in order to properly respond to this term of reference, it was important to understand the NESO's SECULF model as fully as possible. To this end, NESO provided a previously published guidance note explaining the SECULF methodology, answers to Workgroup questions, and provided a Teach-in regarding the SECULF model. The Workgroup requested that NESO provide the Workgroup with access to the SECULF model itself, however, NESO only made a required license agreement available to the Workgroup roughly one week before process was due to be finalised, which left little time for the Workgroup to review the model itself. The NESO Representative believed that the data contained in the SECULF Model was its Intellectual Property (IP) and contained confidential information in relation to National Security that meant, if released, NESO would be in breach of its Licence obligations under CUSC and Section 105 of the Utilities Act and declined to provide the SECULF Model. NESO subsequently undertook a robust analysis of the SECULF Model and verified the legal position to establish what information could be released to the Workgroup. A redacted version of the SECULF Model was made available to the Workgroup, but subject to Workgroup members signing a Licence Agreement. This process took longer than anticipated but ensured NESO was within the parameters of its Licence obligations and protected confidential industry data. The Workgroup drew conclusions from the information provided by NESO that they considered relevant for assessing this modification proposal, which are described in the Report.
c) Consider whether reinforcement with a larger capacity circuit, compared with the previous, increases the fault condition. There were numerous discussions of the implications of changing the fault condition when network reinforcement may be larger than the capacity of existing circuits. The Proposer presented the basis of the fault conditions as described in SQSS Chapter 4, Design of the Main Interconnected Transmission System (MITS) and described how TOs and NESO System Planners assess the need for new network capacity against existing network capacity by applying fault conditions set out in the SQSS, to ensure no network overloads occurred following fault conditions.

The Proposer provided examples see **Annex 16 and 16a** of how new network additions changed the fault condition using the n-2 fault condition, where 2 separate circuits are taken out of service. Conversations around the Terms of Reference C were also discussed in the NESO Teach-In and Q&A session. Please see **Annex 7 and 9.**
d) Consider the impact of whether reinforcement is achieved by upgrading an existing circuit to a larger capacity, therefore increasing the fault condition Following on from ToR c), there were Workgroup discussions on the impact of the fault condition if an existing transmission circuit was upgraded. The Proposer presented material, see **Annex 16**, showing the impact on the fault conditions by different generation technologies and scales. The slides demonstrated how the fault conditions change depending on the size of the upgrade on the existing circuits, noting that the Security Factor remains 1.0 as the fault condition doesn't keep increasing in the long run, thus doesn't align with a long run incremental price signal. The Proposer appointed consultant discussed a paper that was submitted to the Workgroup, see **Annex 16a**. The paper highlighted that network capacity is achieved primarily through the construction of new circuits rather than the upgrade of existing circuits due to design and operational efficiencies. Conversations around Terms of Reference C were also discussed in the NESO Teach-In and Q&A session. Please see **Annex 7 and 9.**
e) Consider whether some types of technology require additional MITS redundancy, e.g. large inflexible conventional such as nuclear The redundancy requirements of certain technology were discussed in various Workgroup meetings An assessment of the Sizewell nuclear generators' network arrangement was presented to the Workgroup, see Annex **16 and 16a**. The material explained how the application of SQSS determined the amount of redundancy required based on the size of Sizewell. It highlighted the special conditions affecting this type of connection, particularly where the generating station capacity exceeds the largest infrequent

loss of infeed (1.8GW) and the single largest circuit capacity technology can provide. In such cases, additional redundancy is needed beyond what would be required for a smaller connection. The Proposer appointed consultant also gave the example of Hinkley Point which has similar network redundancy arrangements. (See **Annex 5**)
f) Consider and evaluate the evidence that the current Security Factor is reflective of how TOs make network reinforcement decisions The Proposer presented material, see **Annex 16 and 16a**, explaining how SQSS is applied by Transmission Owners and System Operator System Planners to plan the Transmission System. The Proposer appointed Consultant presented their paper, see **Annex 5**, describing the difference between the SECULF approach and how the system is planned using SQSS. Further Workgroup discussion of limitations of the SECULF model are described in this report within the post-consultation workgroup discussion section of this Report. Conversations around the Terms of Reference F were also discussed in the NESO Teach-In and Q&A session. Please see **Annex 7 and 9.**
g) Consider the scope of work identified and whether this is achievable within the timeframe outlined in the Ofgem Urgency decision letter. There were numerous discussions around the timeline of the modification across various Workgroups. As a result, the Proposer discussed extending the timeline with Ofgem to allow more time to evaluate the SECULF model. The result was the timeline was extended to allow the Workgroup more time to assess the SECULF model and conclude the remaining work.

What is the impact of this change?

Proposer's assessment against Code Objectives

Note: Following the Authority request, the format of the Applicable Objectives for the Proposer's assessment against the Code Objectives have been aligned with how they are formatted within the Electricity System Operator Licence.

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** Removing Security Factor would be better for effective competition for both Generators and demand through: Firstly, deliver better predictability of Wider locational TNUoS charges, for both Generators and demand, by reducing the sensitivity of charges to changes in elements such as: Expansion Constant, Expansion Factors, or location of generation, demand and new network. Currently, the impact on charges from changes in any of these elements is amplified by multiplying their impact by the 1.76 Security Factor. Secondly, improve international competition for Generators because the Security Factor would no-longer inappropriately amplify the cost of network charges compared with the network charges paid by Generators in other markets.
(e) That compliance with the use of system charging methodology results in charges which reflect, as far as is reasonably practicable, the	**Positive**

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);	Removing the Security Factor would be better for cost reflectivity for both Generator and demand charges. This is because the change would result in Wider locational TNUoS charges that better reflect the cost of incremental network investment.
(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** As the planned growth of the Transmission network increases to meet net zero, it is becoming increasingly apparent that such new network is being built for economic reasons to increase power transport capacity. It is increasingly clear that such new network investment is not being built with accompanying pro-rata additional surplus redundant network capacity for security purposes.
(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 administration of the system charging methodology.	**Positive** Removing the Security Factor calculation and its application to Wider charges would make the administration of the charging methodology more efficient by removing the need for NESO to operate the Secure Load

	Flow model (SECULF) that is currently used to calculate the Security Factor or implement its results into the 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	**Neutral**
Lower bills than would otherwise be the case	**Positive** By improving both cost reflectivity and predictability, this improvement should reduce existing distortions to locational investment decisions, as well as reduced cost of capital and risk premiums for investors in new generation. This should result in a lower total system cost and lower pass-through costs to customers, such as cheaper CfD Strike Prices.
Benefits for society as a whole	**Positive** Better facilitate net zero at best value to customers and the energy system overall by reducing the cost and distortions to investment in generation, and in low carbon generation in particular.

Reduced environmental damage	**Positive** For the reasons given above, it would better facilitate the journey toward statutory net-zero targets.
Improved quality of service	**Positive** As per above, would improve contribution of economic growth and jobs due to better facilitating achieving net zero at best value to customers and the energy system overall.

Workgroup Vote

Note: Following the Authority request, the format of the Applicable Objectives for the Workgroup Vote have been aligned with how they are formatted within the Electricity System Operator Licence.

The Workgroup met on 11 April 2025 to carry out their Workgroup Vote. The full Workgroup Vote can be found in **Annex 13**. The table below provides a summary of the Workgroup Members view on the best option to implement this change.

For reference the Applicable CUSC (charging) Objectives are:

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;*

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);*

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*;*

g) *Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency **; and*
h) *Promoting efficiency in the implementation and 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.*

The Workgroup concluded by majority that the Original better facilitated the Applicable Objectives than the Baseline.

Option	Number of voters that voted this option as better than the Baseline
Original	6

When will this change take place?

Implementation date

01 April 2026

Date decision required by

In parallel, or before CMP444 (TNUoS cap and floor) with sufficient notice for developers to take it into account in their CfD AR7 bid prices. To be implemented in tariffs from April 2026.

Implementation approach

TNUoS Transport and Tariff Model will require amendments

Interactions

On 20 January 2025 the Authority published the decision on the urgent treatment for CMP432 stating that "with respect to potential interactions with the proposed cap and floor mechanism through CMP444 , we agree with the Proposer that CMP432 should be progressed in parallel, or prior to CMP444 “Cap and Floor” modification. We consider that the prospects of modifying the Security Factor post the introduction of the cap and floor could generate uncertainty and interact with levels of the cap and the floor if introduced.”

Acronyms, key terms and reference material

Acronym / key term	Meaning
AC	Alternating Current
ALF	Annual Load Factor
AR7	Allocation Round
BSC	Balancing and Settlement Code
BSUoS	Balancing Services Use of System
CfD	Contracts for Difference
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
DC	Direct Current
DCLF	Direct Current Load Flow
EBR	Electricity Balancing Regulation
ETYS	Electricity Ten Year Statement
HVDC	High Voltage Direct Current
ICRP	Investment Cost Related Pricing
MWkm	Megawatt-kilometres
MITS	Main Interconnected Transmission System
NDA	Non-Disclosure Agreement
SECULF	Secure Load Flow model (used by NESO to calculate the Security Factor)

STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
T&Cs	Terms and Conditions
TEC	Transmission Energy Capacity
TNUoS	Transmission Network Use of System
VBA	Visual Basic for Applications

Reference material

- TCMF slides from Meeting on 29th February 2024 where the Proposal was presented (item 7 on the agenda)
- Taskforce Headline report from the TNUoS Task Force meeting held on 27th February 2024, where the proposal was presented and discussed.
- Guidance on TNUoS Locational Onshore Security Factor Calculation

Annexes

Annex	Information
Annex 1	CMP432 Proposal form
Annex 2	CMP432 Terms of Reference
Annex 3	CMP432 Urgency letters
Annex 4	CMP432 Tariff and Revenue impact of setting the Global Locational Security Factor to 1.0
Annex 5	CMP432 Trident Economics – Setting the locational onshore Security Factor

Annex 6	CMP432 Workgroup Consultation responses
Annex 6a	CMP432 Workgroup Consultation responses summary
Annex 7	CMP432 NESO Teach-In
Annex 8	CMP432 Worked examples from the Teach-In
Annex 9	CMP432 NESO Q&A's
Annex 10	CMP432 NESO 5-year tariffs
Annex 11	CMP432 Uniper Presentation
Annex 12	CMP432 Final Legal Text
Annex 13	CMP432 Workgroup Vote
Annex 14	CMP432 Workgroup Attendance Record
Annex 15	CMP432 Workgroup Action Log
Annex 16	CMP432 Proposer's Slides 1
Annex 16a	CMP432 Proposer's Slides 2