ESO

Workgroup Consultation

CMP424:
Amendments to Scaling Factors used for Year Round TNUoS Charges

Overview: This modification seeks to introduce a mechanism which sets a lower limit on the variable generation scaling factors used for the purpose of Year-Round Background tariff calculation. This is to address a defect in current methodology which, without any change, we expect to calculate negative scaling factors within the next few years.

Modification process & timetable

1. **Proposal Form**
   12 October 2023
2. **Workgroup Consultation**
   07 March 2024 - 27 March 2024
3. **Workgroup Report**
   18 April 2024
4. **Code Administrator Consultation**
   30 April 2024 - 21 May 2024
5. **Draft Final Modification Report**
   20 June 2024
6. **Final Modification Report**
   09 July 2024
7. **Implementation**
   01 April 2025

Have 2 minutes? Read our Executive summary

Have 25 minutes? Read the full Workgroup Consultation

Have 40 minutes? Read the full Workgroup Consultation and Annexes.

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

This modification is expected to have a: Low impact
Generators, Transmission System Operators, Interconnectors

Governance route	Standard Governance modification with assessment by a Workgroup	
Who can I talk to about the change?	**Proposer:** Martin Cahill Martin.cahill1@nationalgrideso.com 07840 722302	**Code Administrator Chair**: Claire Goult Claire.Goult@nationalgrideso.com 07938 737807
How do I respond?	Send your response proforma to cusc.team@nationalgrideso.com **by 5pm on 27 March 2024**	

ESO

Contents

ESO

Executive summary

This modification seeks to introduce a mechanism which sets a lower limit on the variable generation scaling factors used for the purpose of Year Round Background tariff calculation. This is to address a defect in current methodology which, without any change, we expect to calculate negative scaling factors within the next few years.

What is the issue?

As connected wind generation (which has a fixed scaling factor of 70%) increases it results in a smaller variable scaling factor over time. Using the TEC register and applying best view, the ESO (Electricity System Operator) expect that this will eventually result in negative variable scaling factors within the next few years.

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

Proposer's solution:

- Introduce a 10% minimum value for variable scaled factors in the Year Round Background
- 'Fixed' scaling factors can be adjusted for Year Round Background calculations if required to ensure variable factor remains above 10%
- When the variable scaling factor is increased to meet the 10% floor, all 'fixed' scaling factors are adjusted by a uniform amount so that the total of all scaled generation capacity is equal to ACS Peak Demand
- No changes to be made for Peak Security

Implementation date: 1 April 2025. We believe this will be a relatively simple solution to implement, and 2025 delivery is achievable.

What is the impact if this change is made?

ESO's tariff model does not work if any scaling factors are negative. As there is the real possibility that variable scaling factors could turn negative this modification is crucial to allow future TNUoS charges to be set, whilst having minimal impact on tariffs. This modification will not replace or stop other ongoing Industry work around what are the appropriate Scaling Factors to input into the model. This proposal will ensure that the impact of additional flexible generation is included in the Transport Model, whilst again noting that any impact to tariffs is minimal. The proposal addresses an issue expected in the near future, whilst allowing time for more fundamental questions and answers to be concluded around the most appropriate Scaling Factors to use.

Interactions

The choice to follow the SQSS (Security and Quality of Supply Standard) for scaling factors was made under CMP213 (Project TransmiT). While this proposal does not directly interact with SQSS, it means that the tariff process will deviate from SQSS in certain circumstances. Any deviation is minimal, as the proposal purely introduces a minimum level for the variable scaling factor, with all other factors adjusting uniformly so that scaled generation is still equal to ACS peak demand. Any impact on tariffs is also minimal.

Processes such as Network Options Assessment (NOA), Holistic Network Design (HND) and Electricity Ten Year Statement (ETYS) have been introduced separately to SQSS for network planning processes. These use different methodologies which do not require the use of scaling factors as per SQSS.

This modification will only change the approach used in CUSC. Scaling factors in SQSS will remain the same but may be changed separately during the next SQSS review.

What is the issue?

Scaling factors are used in the calculation of TNUoS tariffs (Year-Round Background and Peak Security). There are fixed (directly scaled) and variable scaling factors which are detailed in SQSS (Appendix E) gives the different parameters (for directly scaled plant) and calculation (for variable scaled plant) to be used.

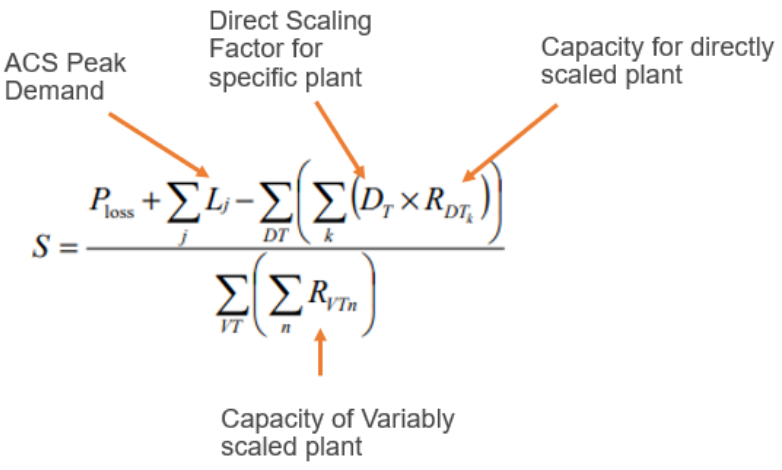
CUSC section 14.15.7 aligns to the scaling factors used in SQSS for Tariff setting.

Generation Plant Type	Peak Security Background	Year Round Background
Intermittent	Fixed (0%)	Fixed (70%)
Nuclear & CCS	Variable	Fixed (85%)
Interconnectors	Fixed (0%)	Fixed (100%)
Hydro	Variable	Variable
Pumped Storage	Variable	Fixed (50%)
Peaking	Variable	Fixed (0%)
Other (Conventional)	Variable	Variable

Scaling factors are designed to scale capacity of generation to equal the ACS Peak Demand (estimated unrestricted winter peak demand on the national electricity system for the average cold spell), with variable factors adjusting to ensure total scaled capacity and ACS Peak Demand are equal.

The fixed and variable scaling factors then feed into the Transport model to scale Nodal generation and calculate the Peak Security or Year Round costs for each circuit. CUSC 14.21 gives examples to show how these are applied.

The following formula is used to calculate the variable scaling factors used in the model:



For Year Round Background:
As connected wind generation (which has a fixed scaling factor of 70%) increases, the top line of the formula above decreases, resulting in a smaller variable scaling factor. Using the TEC register and applying best view, the ESO expect that this will eventually result in negative variable scaling factors within the next few years.

Why change?

ESO's tariff model does not work if any scaling factors are negative. It would also not be cost reflective to use negative scaling, as this would in effect model a reduction in generation when adding any flexible generation.

As forecast TEC (Transmission Entry Capacity) regularly changes, it is not known exactly when negative scaling factors could be seen, but the ESO expect it to be in the near future (variable factors are currently being calculated at around 8%), and so it is important to introduce a change which addresses this issue at an early opportunity.

TNUoS Taskforce is separately carrying out a wider review of backgrounds, including appropriate scaling factors for each generation type. This is expected to be raised as a future modification alongside other Taskforce workstreams, while a review of chapter 4 of the SQSS is also planned. However, it is not known how long these projects could take, and not implementing any action now risks negative scaling factors becoming a reality before a fix is in place. As this modification introduces a backstop to the minimum variable level only, it is envisaged that any future change can still work alongside it.

What is the solution?

Proposer's solution

- Introduce a 10% minimum value for variable scaled factors in the Year Round Background
- 'Fixed' scaling factors can be adjusted for Year Round Background calculations if required to ensure variable factor remains above 10%
- When the variable scaling factor is increased to meet the 10% floor, all 'fixed' scaling factors are adjusted by a uniform amount so that the total of all scaled generation capacity is equal to ACS Peak Demand
- No changes to be made for Peak Security

The intention of this solution is to align predominantly to existing methodology whilst introducing the above controls as a backstop to ensure that the tariff model still operates as intended, and impact of flexible generation is still considered. 10% has been chosen as it is very close to the 8% figure which has been calculated as a variable scaling factor recently as part of the tariff setting process.

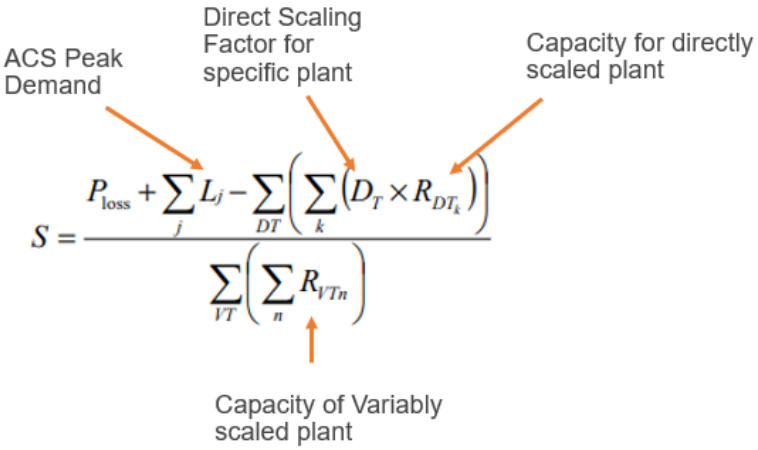
This change is expected to be low impact, as the minimum allowed scaling factor is in a similar range to recent tariffs. This means that there will be no significant shifts in calculated tariffs, and the proposal does not provide an advantage or disadvantage to any generation type.

If the scaling factors in SQSS are changed in due course, a further CUSC modification could be expected.

The process would work as follows:

1. The starting point for the calculation of variable scaling factors remains unchanged:

Generation Plant Type	Peak Security Background	Year Round Background
Intermittent	Fixed (0%)	Fixed (70%)
Nuclear & CCS	Variable	Fixed (85%)
Interconnectors	Fixed (0%)	Fixed (100%)
Hydro	Variable	Variable
Pumped Storage	Variable	Fixed (50%)
Peaking	Variable	Fixed (0%)
Other (Conventional)	Variable	Variable



2. If this initial calculation results in a variable scaling factor below 10%, an adjustment must be calculated:

$$Adjustment = \frac{ACS_{Peak} - \sum(Capacity \times 10\%)_{Variable\ Plant}}{\sum(Capacity \times Scaling\ Factor)_{Direct\ Plant}}$$

$$Adjusted\ Fixed\ Scaling\ Factor = Adjustment \times Scaling\ Factor$$

3. The adjustment is then multiplied by each of the fixed scaling factors to give an adjusted value.
4. Adjusted fixed scaling factors and floored variable scaling factors are then used as per existing methodology for setting tariffs.

Annex 3 shows a worked example for this methodology.

Workgroup considerations

The Workgroup convened 3 times to discuss the perceived issue, detail the scope of the proposed defect, devise potential solutions, and assess the proposal in terms of the Applicable Code Objectives.

Consideration of the proposer's solution

The Proposer shared a presentation (**Annex 3**) detailing the solution and what considerations had been given to alternative options along with a worked example for Scaling Factors (**Annex 4**).

One Workgroup member highlighted that there may be several ways to deal with the defect such as treating interconnectors differently in terms of Scaling Factor values. The member also acknowledged some of these alternatives had already been mentioned by the Proposer in the presentation.

A question was raised if any supporting information or analysis had been done to support the proposed 10% value. The Proposer responded to say only basic analysis had been completed and made a request for Workgroup members to consider what analysis might be required to further develop the solution. One member suggested it might be useful to understand, from a system operator view, the minimum amount of Combined Cycle Gas Turbine (CCGT) is required to be running in terms of inertia and frequency response. The member noted that even if the model works it does not reflect what the system operator would allow in reality. Although agreeing with this point, another member contemplated the minimum amount of CCGT might change through the years as different technologies come on to substitute for inertia and felt it may be difficult to determine.

A Workgroup member stated it would be useful to obtain information demonstrating the impact different Scaling Factor values would have on parties. Another member asked if the Scaling Factor would be generic across GB or locational such as a North and South boundary.

Referring to SQSS Appendix E, a member asked if there was any supporting information behind where the values originally came from. The member felt it would be useful to establish how it was devised and to understand the 70% starting position to help develop the proposal. Another member referenced a previous SQSS modification with an aligned Scaling Factor subgroup which might prove useful in respect to understanding the origin.

Cross Code Impacts

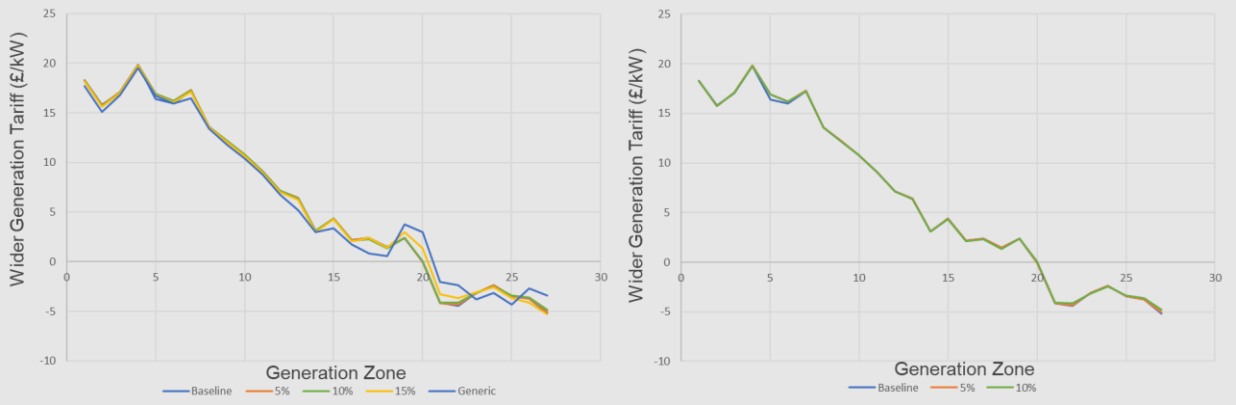
One Workgroup member shared the link to SQSS where the Scaling Factors originate. The Proposer agreed the cross over should be acknowledged but confirmed CMP424 could diverge as it does not directly impact SQSS. One Workgroup member also questioned if the Scaling Factor defect had impacts in any other places. The Proposer agreed to investigate further.

Tariff Impact Examples

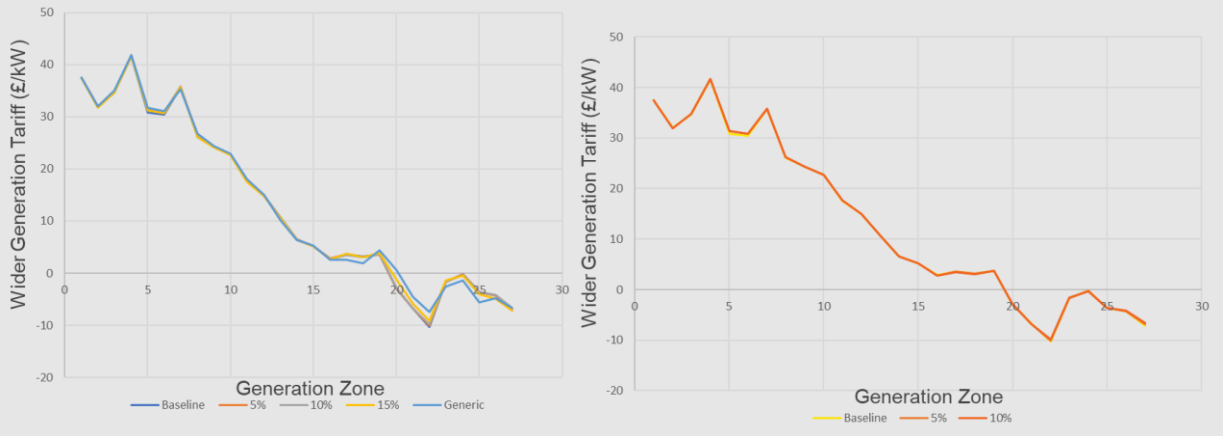
The Proposer presented slides to demonstrate impacts on tariffs of scaling generation to different levels.

The Proposer explained to members how the example model used a baseline of 2% variable scaling factor, which was then scaled up to 5, 10 and 15% in accordance with the methodology for the proposal, and a further example which used a generic scaling factor (each generation type scaled by the same amount).

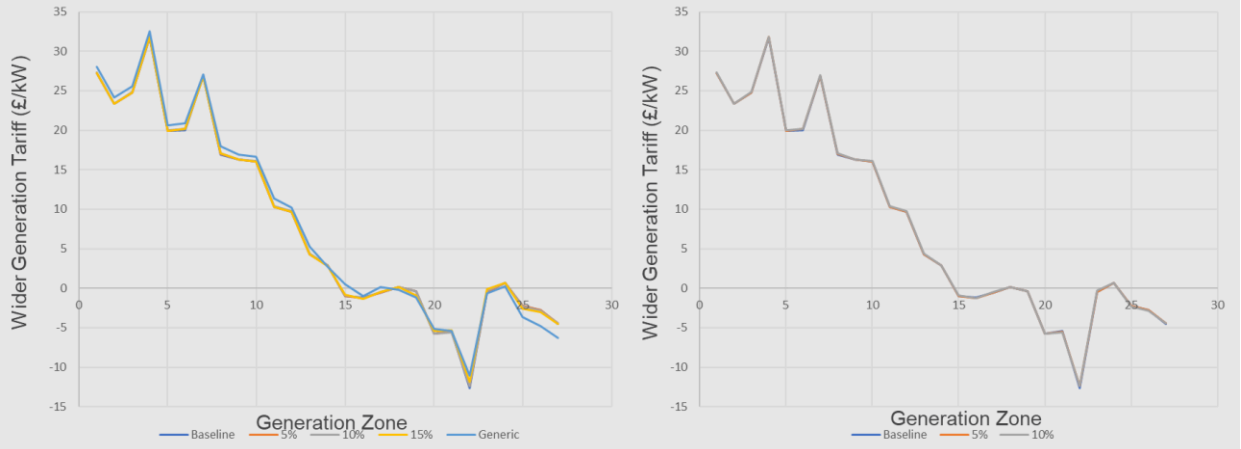
Conventional Carbon



Conventional Low Carbon



Intermittent



A Workgroup member suggested it would be useful to explain and detail why there is so little movement in the presented charts on Tariff impact examples in the Workgroup Consultation. Also, to add the context of the data used not being from a particular Tariff

year for clarity. The Proposer agreed and explained the benefit of using data not from a particular Tariff year meant that, if required, all the data could be shared.

A Workgroup member had requested that the Proposer investigate impact of battery growth on scaling factors and to Confirm where batteries sit within the Scaling Factors.

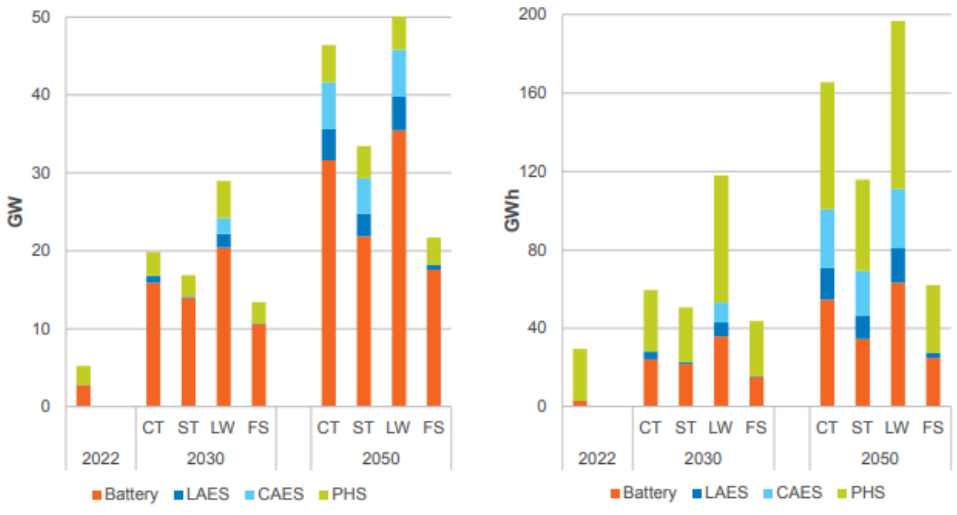
The Proposer shared the following information with the Workgroup:

- Batteries have fixed scaling factor of 50%
- Included in storage generation plant type
- Increasing battery storage will have a similar effect to increasing wind (though not as high due to lower scaling factor)

Table 1.5 Generation scaling factors for the purpose of tariff calculation

Generation Plant Type	Peak Security Background	Year-Round Background
Intermittent	Fixed (0%)	Fixed (70%)
Nuclear & CCS	Variable	Fixed (85%)
Interconnectors	Fixed (0%)	Fixed (100%)
Hydro	Variable	Variable
Electricity Storage (including Pumped Storage)	Variable	Fixed (50%)
Peaking	Variable	Fixed (0%)
Other (Conventional)	Variable	Variable

Figure FL.11: Electricity storage installed capacity and volume (excluding Vehicle-to-Grid)



Another Workgroup member asked if the increase in Batteries not being as much as Wind had been justified.

A Workgroup member commented the 50% Scaling Factor for batteries does not feel right but aware of planned SQSS review. The Proposer explained that the solution is not going to be the enduring solution and ongoing work by the TNUoS Taskforce on

Backgrounds and the planned SQSS review are where the long-term solution will be developed.

A Workgroup member made a request to produce Generation level data showing the adjusted scaling factor for each technology type in the tariff analysis. The Proposer shared the following information to enable members to see the comparison of varying Scaling Factors.
The Proposer explained that the scaling factors used in the above examples were adjusted as follows:
Total Generation = 103,917.82
Peak Demand = 51,520.822

Baseline Scaling Factors:

Generator Type	Fuel Class	TEC	Scaling Factor	Type
Biomass	Other (Conventional)	2,295.1	2%	Variable
CCGT	Other (Conventional)	28,222.8	2%	Variable
CHP	Other (Conventional)	1,450.4	2%	Variable
Coal	Other (Conventional)	3,401.6	2%	Variable
Hydro	Hydro	534.7	2%	Variable
Interconnectors	Interconnectors	16,623.2	100%	Fixed
Nuclear	Nuclear & CCS	7,940.8	85%	Fixed
OCGT	Peaking	1,868.8	0%	Fixed
Pump Storage	Pumped Storage	8,791.5	50%	Fixed
Tidal	Intermittent	56.8	70%	Fixed
Wave	Intermittent	-	70%	Fixed
Wind Offshore	Intermittent	20,591.9	70%	Fixed
Wind Onshore	Intermittent	12,140.2	70%	Fixed

Biomass, CCGT, CHP, Coal and Hydro all have a variable scaling factor, others use the fixed values. Under current baseline, variable factor is calculated in the following way:
Fixed scaled generation = (Interconnectors total TEC*Scaling Factor) + (Nuclear total TEC * Scaling Factor) + etc.…
Fixed scaled generation = 50,720.86
The ‘leftover’ is 51,520.822 – 50,720.86 = 799.962

Variable Scaling Factor = 799.962 / total variable TEC = 799.962 / 35,904.6 = 0.02

The Proposer explained, for the other scenarios, the variable scaling factor is set first, and fixed factors are adjusted by a uniform amount such that total scaled generation is equal to 51,520.822 (RCS Peak).

Baseline 2%

Generator Type	TEC	Year Round Transport Model Scaling
Biomass	2,295.1	2%
CCGT	28,222.8	2%
CHP	1,450.4	2%
Coal	3,401.6	2%
Hydro	534.7	2%
Interconnectors	16,623.2	100%
Nuclear	7,940.8	85%
OCGT	1,868.8	0%
Pump Storage	8,791.5	50%
Tidal	56.8	70%
Wave	-	70%
Wind Offshore	20,591.9	70%
Wind Onshore	12,140.2	70%

5%

Generator Type	TEC	Year Round Transport Model Scaling
Biomass	2,295.1	5%
CCGT	28,222.8	5%
CHP	1,450.4	5%
Coal	3,401.6	5%
Hydro	534.7	5%
Interconnectors	16,623.2	98%
Nuclear	7,940.8	83%
OCGT	1,868.8	0%
Pump Storage	8,791.5	49%
Tidal	56.8	69%
Wave	-	69%
Wind Offshore	20,591.9	69%
Wind Onshore	12,140.2	69%

10%

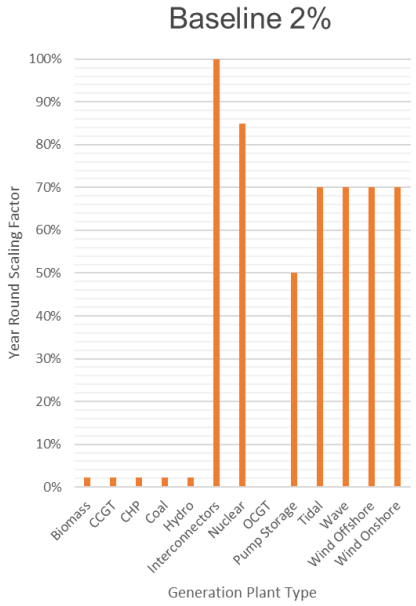
Generator Type	TEC	Year Round Transport Model Scaling
Biomass	2,295.1	10%
CCGT	28,222.8	10%
CHP	1,450.4	10%
Coal	3,401.6	10%
Hydro	534.7	10%
Interconnectors	16,623.2	94%
Nuclear	7,940.8	80%
OCGT	1,868.8	0%
Pump Storage	8,791.5	47%
Tidal	56.8	66%
Wave	-	66%
Wind Offshore	20,591.9	66%
Wind Onshore	12,140.2	66%

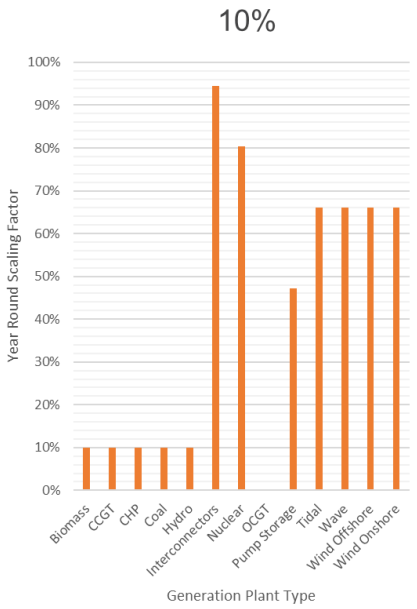
15%

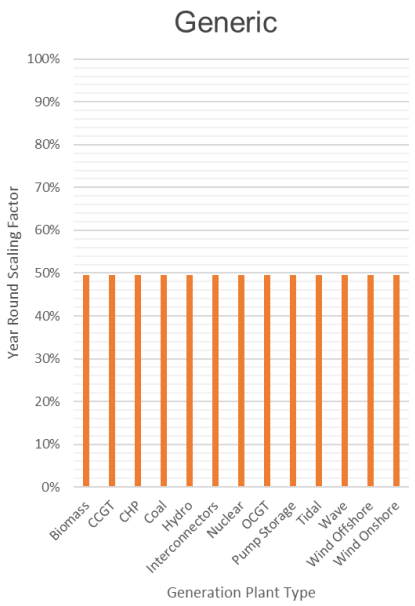
	TEC	Year Round Transport Model Scaling
Biomass	2,295.1	15%
CCGT	28,222.8	15%
CHP	1,450.4	15%
Coal	3,401.6	15%
Hydro	534.7	15%
Interconnectors	16,623.2	91%
Nuclear	7,940.8	77%
OCGT	1,868.8	0%
Pump Storage	8,791.5	45%
Tidal	56.8	64%
Wave	-	64%
Wind Offshore	20,591.9	64%
Wind Onshore	12,140.2	64%

Generic

Generator Type	TEC	Year Round Transport Model Scaling
Biomass	2,295.1	50%
CCGT	28,222.8	50%
CHP	1,450.4	50%
Coal	3,401.6	50%
Hydro	534.7	50%
Interconnectors	16,623.2	50%
Nuclear	7,940.8	50%
OCGT	1,868.8	50%
Pump Storage	8,791.5	50%
Tidal	56.8	50%
Wave	-	50%
Wind Offshore	20,591.9	50%
Wind Onshore	12,140.2	50%







Information on the process used for the last SQSS scaling factors review was shared and is available in **Annex 5**

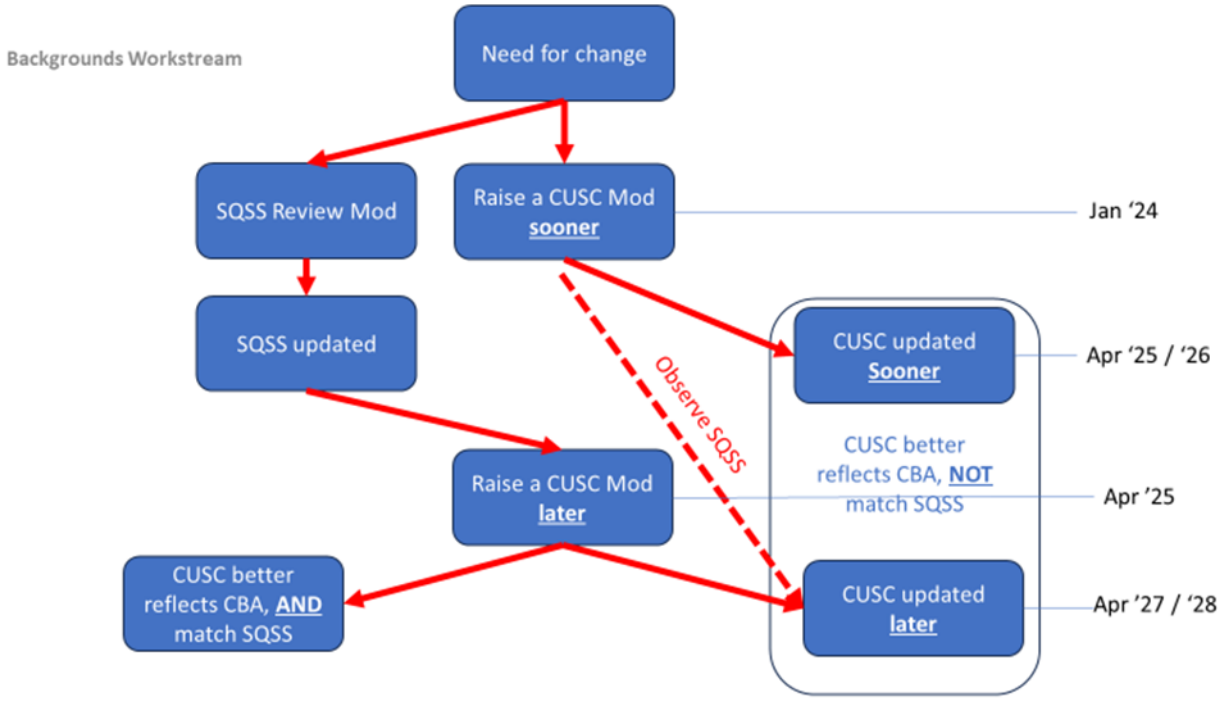
A Workgroup member highlighted that the data provided had demonstrated that the implementation of this modification would have a small impact on what parties would be paying. Another member agreed that the modification is proposing a procedural change only and there would be marginal effect on tariffs.

Consideration of other options

The Workgroup considered a more in-depth review of the appropriate scaling factor for each generation type. However, it was considered that other workstreams were already in place to carry out a longer-term review, and that the need for a more immediate solution meant that this wasn't required for this modification.

The Taskforce Backgrounds workstream is expected to raise a modification to address changes to scaling factors, though it is possible that this won't be implemented until 2027/2028.

Taskforce approach:



Workgroup Member commented that the Scaling Factor for Interconnectors needs to be looked at. The Proposer explained that this would be discussed when the enduring solution is raised and that this point has been raised and discussed in the TNUoS Task Force work on Backgrounds.

Several Workgroup members mentioned the possibility of the solution for CMP424 only be actioned when negative scaling factors occur and therefore added a specific Workgroup Consultation question to gain Industry feedback on this point.

The ESO subject matter expert shared that the defect is already impacting when modelling forecasted TNUoS Tariffs in the Five Year View but made clear not on actual or year ahead tariffs currently.

Cross-over with other processes

The Proposer explained to the Workgroup members that scaling factors were originally introduced by SQSS and the CUSC was aligned to the factors used in the SQSS for the tariff model. The model requires Generation to equal Demand for modelling the impact of increasing generation at different nodes on the network.

Economy Planned Transfer Conditions	The condition arising from scaling the *registered capacity* of each *power station* according to the type of generation such that the total of the scaled capacities is equal to the *ACS peak demand*. This scaling shall follow the techniques described in Appendix E.

The Proposer described how processes such as Network Options Assessment (NOA), Electricity Ten Year Statement (ETYS), and Holistic Network Design (HND) have been introduced separately to SQSS for network planning processes. These use different methodologies which do not require the use of scaling factors as per SQSS. The Proposer confirmed CMP424 will only change the approach used in the CUSC. Scaling factors in SQSS will remain the same but may be changed during the net SQSS review.

Draft legal text

Legal text will be drafted after the Workgroup Consultation has been completed.

What is the impact of this change?

Proposer's assessment against Code Objectives

Proposer's assessment against CUSC Charging Objectives	
Relevant Objective	**Identified impact**
(a) 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 More cost reflective charging (as per b) will help facilitate a level playing field for competition in future years.
(b) 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 C26 requirements of a connect and manage connection);	Positive This proposal will ensure that the impact of additional variable generation is included in the Transport Model.
(c) 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;	Neutral
(d) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency *; and	Neutral
(e) Promoting efficiency in the implementation and administration of the system charging methodology.	Positive Without this modification or an alternative, the TNUoS tariff model will not work in future years

**The Electricity Regulation referred to in objective (d) 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.

Standard Workgroup consultation question: Do you believe that CMP424 Original proposal better facilitates the Applicable Objectives?

When will this change take place?

Implementation date
1 April 2025. We believe this will be a relatively simple solution to implement, and 2025 delivery is achievable.

Date decision required by
30 September 2024

Implementation approach
Change will be required to tariff setting process

Standard Workgroup consultation question: Do you support the implementation approach?

Interactions

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

The choice to follow the SQSS for scaling factors was made under CMP213 (Project Transmit). While this proposal does not directly interact with SQSS, it means that the tariff process will deviate from SQSS in certain circumstances.

How to respond

Standard Workgroup consultation questions

1. Do you believe that the Original Proposal and/or any potential alternatives better facilitate the Applicable Objectives?
2. Do you support the proposed implementation approach?
3. Do you have any other comments?
4. Do you wish to raise a Workgroup Consultation Alternative request for the Workgroup to consider?

Specific Workgroup consultation questions

5. Do you agree with the proposed floor of 10% for the variable scaling factor?
6. Do you agree with the principles of a short-term fix? If not, why, and what other solution would you suggest?

[1] If the modification has an impact on Article 18 T&Cs, it will need to follow the process set out in Article 18 of the Electricity Balancing Regulation (EBR – EU Regulation 2017/2195) – the main aspect of this is that the modification will need to be consulted on for 1 month in the Code Administrator Consultation phase. N.B. This will also satisfy the requirements of the NCER process.

7. Would you prefer the 10% minimum is introduced and persists from the point at which the tariff calculation stops working i.e., the variable scaling factor turns negative noting this issue is already having an impact on the Five Year View of TNUoS tariffs?

The Workgroup is seeking the views of CUSC Users and other interested parties in relation to the issues noted in this document and specifically in response to the questions above.
Please send your response to cusc.team@nationalgrideso.com using the response pro-forma which can be found on the CMP424 modification page.
In accordance with Governance Rules if you wish to raise a Workgroup Consultation Alternative Request, please fill in the form which you can find at the above link.

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

Acronyms, key terms and reference material

Acronym / key term	Meaning
ACS	Average Cold Spell
ACS Peak Demand	The estimated unrestricted winter peak demand (MW and MVAr) on the national electricity transmission system for the average cold spell (ACS) condition. This represents the demand to be met by large power stations (directly connected or embedded), medium power stations and small power stations which are directly connected to the national electricity transmission system and by electricity imported into the onshore transmission system from external systems across external interconnections (and which is not adjusted to take into account demand management or other techniques that could modify demand).
BSC	Balancing and Settlement Code
CCS	Carbon Capture Storage
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
EBR	Electricity Balancing Regulation
ESO	Electricity System Operator
ETYS	Electricity Ten Year Statement
HND	Holistic Network Design
MVAr	Mega Volt Amp Reactive
MW	Mega Watt
NOA	Network Options Assessment
STC	System Operator Transmission Owner Code
SQSS	Security and Quality of Supply Standards
TEC	Transmission Entry Capacity
TEC Register	A record of generation projects that hold contracts for Transmission Entry Capacity (TEC) with National Grid ESO
TNUoS	Transmission Network Use of System
T&Cs	Terms and Conditions

ESO

Annexes

Annex	Information
Annex 1	Proposal Form
Annex 2	Terms of reference
Annex 3	Scaling Factors Presentation
Annex 4	Worked Example Scaling Factors
Annex 5	GSR009 SQSS Consultation