Workgroup Consultation

CMP456: Cost recovery for legacy plant in relation to GC0168

Overview: Modification GC0168 requires existing plants, upon request to obtain and submit Electromagnetic Transient (EMT) models. This is a significant and costly challenge for older plant with complex systems and with little direct benefit to the Generator. This modification enables appropriate cost recovery.

Modification process & timetable

1. **Proposal Form**
   19 June 2025
2. **Workgroup Consultation**
   29 April 2026 – 20 May 2026
3. **Workgroup Report**
   18 June 2026
4. **Code Administrator Consultation**
   01 July 2026 – 22 July 2026
5. **Draft Final Modification Report**
   26 August 2026
6. **Final Modification Report**
   08 September 2026
7. **Implementation**
   10 Business Days after decision

Have 5 minutes? Read our Executive summary
Have 60 minutes? Read the full Workgroup Consultation
Have 120 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 solutions to the issue raised.

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

Governance route	Standard Governance modification with assessment by a Workgroup	
Who can I talk to about the change?	**Proposer:** Tim Ellingham, RWE Tim.ellingham@rwe.com	**Code Administrator Chair**: Kat Higby, NESO katharine.higby@neso.energy
How do I respond?	Send your response proforma to cusc.team@neso.energy by **5pm** on **06 April 2026.**	

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Executive Summary

CMP456 introduces a cost-recovery mechanism allowing legacy Generators to recover the reasonable and efficient costs of retrospectively producing EMT models required under GC0168, with costs recovered via Balancing Services Use of System charge (BSUoS) (raised under related modification CMP466).

The modification has been raised because GC0168 obliges existing plants, which are often lacking EMT models and therefore facing significant costs to produce them, to comply retrospectively. This creates a risk of unfair commercial impact and delays to system security if EMT models are not obtained promptly.

What is the issue?

Modification GC0168, if implemented, will require existing Generators to retrospectively provide EMT models, which many legacy plants do not have and must create at significant complexity and cost, often where Original Equipment Manufacturer (OEM) support is no longer available. Without an explicit cost-recovery mechanism, these Generators face substantial unrecoverable costs and a commercial disadvantage compared to new plant.

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

Proposer's solution: Introduce a cost-recovery mechanism, similar to CMP398, allowing NESO to refund Generators for the reasonable, efficient and proportionate costs of retrospectively producing EMT models required under GC0168. Costs would be recovered via BSUoS, with an agreed process covering cost approval, claims, verification, dispute resolution and a cut-off date for eligibility.

Implementation date: 10 Business Days after an Authority decision.

Summary of potential alternative solution and implementation date:
Alternative Request 1 (voted in by the Workgroup as Workgroup Alternative CUSC Modification 1) (WACM1) proposes expanding the conditions under which costs may be recovered by the User for developing EMT models for legacy plant, aligning these provisions with the requirements proposed under modification GC0168.
Implementation date: The same as the original proposal.

What is the impact if this change is made?

The modification has a positive impact on system safety, reliability and efficient operation, by ensuring NESO can obtain EMT models needed for accurate system analysis and stable operation. It also supports fair competition by avoiding disproportionate costs on legacy Generators, though it may lead to higher consumer costs through BSUoS to fund cost recovery.

Interactions

Ideally, implementation of this modification will be in line with related modifications GC0168 and CMP466.

Potential impact on Distribution Connection and Use of System Agreement (DCUSA) if EMT models are required for Licence Exemptible Embedded Medium Power Stations (LEEMPS). Such parties are likely not CUSC Users, so therefore would not be able to access the cost-recovery mechanism.

What is the issue?

What is the defect the Proposer believes this modification will address?

GC0168 is a modification proposal that will oblige Generators to provide National Energy System Operator (NESO) with Electromagnetic Transient (EMT) models. The reasons for this are set out in GC0168 proposal form.

The modification will apply retrospectively, requiring existing Generators with older generating units commissioned before 2022, when requested by NESO under GC0168 to undertake the complex task of creating the EMT models, which they typically do not have.

In many cases the Original Equipment Manufacturer (OEM) may no longer exist and consequently the costs of creating an EMT model may run to hundreds of thousands of pounds per Balancing Mechanism Unit (BMU) meaning a Generator with multiple sites could be facing a multi-million impact and an even greater sum as an industry.

New Generators will be required to provide an EMT model as a condition of connection. The costs will be part of construction financing and data will be provided by OEMs as part of their contracts. Without an express cost recovery mechanism older Generators will be placed at a commercial disadvantage due to obligations from GC0168 but with no route to recover costs incurred.

Given the advancement of GC0168, it is recommended that this modification be progressed as quickly as possible to prevent any potential gap in coverage between the approval of GC0168 and the implementation of CMP456 and the resulting charging modification CMP466.

Why change?

The GC0168 modification requires NESO to obtain detailed models, specifically EMT models, to accurately simulate the power system during challenging

scenarios. These EMT models are essential for the effective management of the National Electricity Transmission System (NETS) and to ensure that newly connecting generation plant meet compliance standards. However, the main challenge arises with existing generation plant, which were not originally designed with EMT models in mind. The control systems in such installations are often unique or outdated, making the process of developing retrospective models both complex and costly. As these efforts offer no direct benefit to the Generator, it is appropriate that the financial burden should not rest with them. Therefore, a suitable cost recovery mechanism is necessary to address this issue.

The Original Proposal form can be found in **Annex 01**.

What is the solution?

Proposer's Original solution

Following a process similar to that established in CMP398 for Generators forced to provide EMT models retrospectively. NESO should refund the reasonable, efficient and proportionate costs of providing the EMT models. The costs to be recovered via the Balancing Services Use of System (BSUoS) charges.

Costs to be recovered

It is proposed that recoverable costs encapsulate:

1. EMT model production:
    a. Procurement of a suitable contractor
    b. Physical interrogation of existing control system
    c. Production of equivalent model in the specified software and version as referred to via PC.A.9.9.1. of the Grid Code
    d. Model User guide and report creation
    e. Liaison with NESO for verification, see below

2. Model verification physical test runs (when the plant is to be run out-of-merit):

    a. Out of the money market equalisation (possibly by a pre-arranged Bid Offer Acceptance (BOA/7a trade)

    b. Contractor on-site fees

The following outline process is to be developed along with legal text via a Workgroup.

1. NESO request the EMT model and agree the parameters of the model.
2. Generators assess the cost of providing the EMT model. Generators seek ex ante pre-expenditure approval requests for costs in excess of £200k.
3. Generators develop the EMT model and make ex post claim for costs.
4. NESO panel assess costs and can request further information if needed.
5. Dispute resolution process to be discussed by Workgroup.
6. Payment of agreed costs by NESO to Generator either in single sum or instalments, in a time frame to be discussed by the Workgroup.

There will need to be a cut-off date such that Generators connected after a certain date will not be eligible to apply for refund of EMT model costs. This should be determined by the Workgroup.

Workgroup considerations

The Workgroup convened 3 times to discuss the issue as identified by the Proposer within the scope of the defect, develop potential solutions, and evaluate the proposal in relation to the Applicable Code Objectives.

Workgroup Discussion ahead of the Workgroup Consultation

Purpose and Structure of CMP456 and CMP466

Workgroup members discussed the respective purpose of CMP456 and CMP466 and their relationship. There was a shared understanding that while the two modifications are closely linked, they address different CUSC objectives.

- CMP456 was viewed as addressing the substantive question of whether and how costs incurred due to GC0168-driven retrospective EMT modelling should be recoverable.
- CMP466 was understood to provide the associated charging mechanism, enabling NESO to recover validated payments through existing arrangements.

Workgroup members acknowledged that progressing two modifications in parallel would require separate consultations and reports, despite covering related subject matter.

The Workgroup agreed that CMP456 and CMP466 should continue as separate but coordinated modifications, in line with governance requirements.

Interaction with GC0168

The Proposer explained that CMP456 and CMP466 were raised to support the implementation of GC0168, which introduces requirements for retrospective EMT models.

The Proposer expressed the view that the production of these models is primarily driven by NESO's system stability requirements and that, as such, it is appropriate to consider a cost-recovery mechanism for Generators being required to undertake this work retrospectively.

The Proposer emphasised the need for clarity on how cost claims would operate at the point the modifications go live, including the treatment of "pre-claims" and ensuring a requirement to provide models will not apply without an available cost recovery route.

Workgroup members broadly agreed that alignment between GC0168 obligations and cost recovery arrangements would be essential. Some members stressed that uncertainty around claims windows, cut-off dates, and the relationship between GC0168 compliance and CMP466 could create material financial risk for Users if not clearly defined in the legal text.

Frequency and Scope of Retrospective EMT Model Submissions

The Workgroup discussed whether retrospective EMT models under GC0168 would be a one-off requirement or part of a recurring obligation. Several members noted that the answer to this question would significantly affect the design of the

cost-recovery mechanism, particularly the setting of claim cut-off dates and the treatment of ongoing costs.

The NESO Subject Matter Expert (SME) confirmed that retrospective EMT models would be required only once, with subsequent updates only triggered where a Generator makes changes to its plant that already require updates under the Grid Code.

Workgroup members highlighted that it is important for this confirmation to be clearly reflected in the CMP456 and CMP466 Workgroup Reports to provide clarity for Users.

Applicability to Generator Types, Including Embedded and Licence-Exempt Plant

The Workgroup had extensive discussions regarding which Generators would be impacted by GC0168 and therefore eligible for cost recovery. Workgroup members queried the applicability across large, medium, and embedded Generators, and raised concerns about Users connected at distribution level who may not be CUSC signatories.

Several Workgroup members noted that historically, distribution-connected parties only fall under Grid Code obligations where specific contractual arrangements (such as Bilateral Embedded Generation Agreement (BEGA) or Bilateral Exemptible Large License-exempt Agreement (BELLA) agreements) exist.

The Workgroup discussed whether GC0168 would capture such parties and, if so, whether alternative cost-recovery routes outside the CUSC may be required.

The NESO SME referred to developing Grid Code legal text (PC.A.9.2.2), which includes clarification of plant types required to submit EMT models, and offered to share further detail. Some Workgroup members expressed concern about the additional complexity and extended timelines that could arise for Distribution Network Operator (DNO)-connected plant, particularly due to the additional communication chain between NESO, DNOs, and customers. There was broad agreement that these issues would need careful treatment in the modification drafting to avoid unintended exclusion from cost recovery.

EMT Model Specifications, Governance, and Use Cases

The Workgroup discussed the status of the EMT modelling specifications referenced under GC0168. Workgroup members asked whether these specifications had been subject to appropriate Workgroup review, noting that clarity on this point was important in determining whether CMP466 is sufficiently well defined to support a claims process.

The NESO SME confirmed that EMT modelling guidance is already publicly available and that GC0168 will move these requirements into the Grid Code, ensuring that future changes are subject to industry governance rather than unilateral updates.

The NESO SME also emphasised that EMT models have wider application beyond system stability analysis, including High Voltage Direct Current (HVDC) studies, detailed performance studies, and event investigations. Several members acknowledged that the absence of validated EMT models can delay or prevent essential studies and agreed that this context is important when assessing both costs and benefits.

Ongoing Model Maintenance and Boundaries of Cost Recovery

Workgroup members discussed the ongoing maintenance obligations associated with EMT models and whether such costs should be recoverable. Some Workgroup members highlighted that Grid Code requirements already mandate ongoing model maintenance and that changes in software versions or evolving standards can impose additional burdens on Generators.

The Proposer suggested that NESO should, where possible, be able to update models internally if the underlying plant remains unchanged, particularly in respect of software version updates.

The NESO SME clarified that it does not intend to require updated submissions solely due to software version changes and that further submissions would only be required where a Generator modifies its plant in a way that triggers an existing Grid Code obligation.

Workgroup members generally welcomed this clarification, although some noted the importance of ensuring that such principles are transparently reflected in both GC0168 and CMP466 to avoid future disputes.

Cost-Benefit Considerations and System-Wide Benefits

The Workgroup considered the benefits associated with retrospective EMT models. The NESO SME described how the absence of adequate EMT studies can lead to extended disconnections of new connections or require costly defensive operational actions, such as increasing short-circuit levels. An illustrative example was provided showing that disconnection of 1,000 Mega Watt (MW) of generation for a week at £100/Mega Watt Hour (MWh) could result in costs of approximately £16 million.

The NESO SME also highlighted benefits that are difficult to quantify, including reduced risk of equipment damage and improved overall system security.

Workgroup members recognised that while some benefits cannot be directly monetised, there was broad agreement that improved system stability provides a compelling justification for obtaining retrospective EMT models, provided that costs are fairly and transparently recovered.

Scope of Recoverable Costs and Practical Considerations

The Workgroup discussed whether the original CMP456 proposal adequately captured all relevant cost components. Members highlighted additional costs such as data acquisition, physical testing, and model verification, particularly where plant availability constraints apply. The Proposer asked whether NESO would take account of plant outage conditions when requesting models and whether costs associated with physical test runs should be recoverable when plants are not scheduled to operate during the compliance window.

The NESO SME responded that GC0168 includes flexibility to agree suitable timelines based on plant availability and that validation data from existing sources could be used where available. However, NESO acknowledged that physical testing may be unavoidable in certain circumstances and indicated openness to case-by-case discussion. Members noted that these practical realities reinforce the need for a flexible and well-defined cost-recovery framework.

Alternative Request 1 (voted in by the Workgroup as WACM1)

The Workgroup considered Alternative Request 1, which sought to extend and formalise the scope of recoverable costs to include additional scenarios, particularly for non-synchronous plant and smaller Generators that may face disproportionately high costs. The Alternative Proposer emphasised that the

proposal aims to capture realistic cost drivers, including data collection and validation activities, and to future-proof the mechanism by recognising that GC0168 is a learning process. The use of wording such as "including but not limited to" was highlighted as a means of accommodating unforeseen scenarios.

Some members expressed support for this approach, arguing that the original cost assumptions understated real-world experience, particularly for inverter-based resources. Following discussion, the Workgroup voted by majority to take Alternative Request 1 forward as WACM1, noting that this would better reflect the diversity of plant types and cost profiles across the industry.

Timeline, Consultation, and Next Steps

The Workgroup reviewed the timeline and agreed that, given the additional work arising from the discussions—particularly around charging, embedded Users, and the Alternative Request—the timetable of the Workgroup phase should be extended.

The Chair agreed to issue a revised timeline. Workgroup members also agreed that the forthcoming Workgroup Consultation should explicitly test views on eligibility, scope of recoverable costs, treatment of embedded plant, and the proposed charging mechanism, to ensure robust stakeholder input before final recommendations are made.

Alternative Requests

One Alternative Request was submitted by a Workgroup member (**Annex 03**).

This Request sets out the case as to why the Workgroup member who submitted it wished to amend parts of the Original Proposal.

The Workgroup reviewed the Request, and the table below provides an overview of the Request (and who raised it) along with its status.

Solution and Outcome of Alternative Vote	Party	Characteristic	Mechanism of Workgroup Vote
Alternative Request 1 **(WACM1)**	ScottishPower Renewables	Expands the conditions under which costs may be recovered by the User for developing EMT models for legacy plant.	Voted in by Workgroup

WACM1 – Expands the conditions under which costs may be recovered by the User

Overview: The WACM1 solution proposes more detail on conditions where costs must be recovered in developing EMT models for legacy plant.

Costs to be recovered

It is proposed that recoverable costs include but are not limited to:

1. EMT model production:
    a. Procurement of a suitable contractor
    b. Physical interrogation of existing control system
    c. Loss of revenue due to stopping Generators to obtain control system data or inverter/converter data.
    d. In case of Inverter Base Resources (IBR) Generators, any converter/inverter firmware update required to build a model, if allowed by NESO, and it is not considered a substantial modification. This includes but it is not limited to Energy Storage Systems (ESS), Static Synchronous Compensators (STATCOMs), Static Var Compensations (SVCs), Hybrid STATCOMs, Wind Turbine Generators (WTGs) used in offshore and onshore windfarms.
    e. For offshore wind Generators, if interrogation of control system or WTG converter settings parameters is not possible to do it remotely, reimbursement of any cost associated with hiring vessels and

manpower required to reach WTGs offshore and retrieve data required for developing EMT models

f. Production of detailed or equivalent model in the specified software and version as referred to via PC.A.9.9.1. of the Grid Code

g. Model validation as per PCA.9 requirements: including but not limited to validation of EMT models where no Factory Acceptance Tests (FAT), Real Time Data Simulator (RTDS) or Hardware in the Loop (HiL) data is available for the existing site. (No physical test run) under agreement between the User and NESO

h. Model User Manual and report creation

i. Model maintenance fees. Due to some legacy plant being obsolete this cost can be significant.

j. Liaison with NESO for verification

Workgroup discussion: The Workgroup considered WACM1, which sought to extend and formalise the scope of recoverable costs to include additional scenarios, particularly for non-synchronous plant and smaller Generators that may face disproportionately high costs.

The WACM1 Proposer emphasised that the proposal aims to capture realistic cost drivers, including data collection and validation activities, and to future-proof the mechanism by recognising that GC0168 is a learning process. The use of wording such as "including but not limited to" was highlighted as a means of accommodating unforeseen scenarios.

Some Workgroup members expressed support for this approach, noting that the original cost assumptions understated real-world experience, particularly for inverter-based resources. Following discussion, the Workgroup voted by majority to take Alternative Request 1 forward as WACM1, noting that this would better reflect the diversity of plant types and cost profiles across the industry.

Draft legal text

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

What is the impact of this change?

This change primarily impacts existing Generators, particularly owners of legacy Plant, and consumers, as it enables Generators to recover the efficient and proportionate costs of retrospectively producing EMT models required under GC0168, with recovery via BSUoS charges once implemented (expected from 10 business days after an Authority decision).

The positive impact is improved system safety and operability for NESO through better-quality modelling and reduced risk of delayed compliance, while negative impacts include an increase in costs socialised to consumers and administrative burden associated with cost assessment and recovery processes.

Original and Workgroup Alternative Proposer's assessment against Code Objectives

Original Proposer's assessment against CUSC (Non-Charging) Code Objectives	
Relevant Applicable Objective	**Identified impact**
(i) The efficient discharge by the Licensee of the obligations imposed on it by the Act and by this licence*;	**Positive** Will aid the path for the NESO to operate a reliable system. Provides assurance that the licensee's obligations are satisfied and discharged in a non-discriminatory way.
(ii) Facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in	**Positive** Will enable new plant to connect faster if EMT models are available ahead of connections. Will assist in levelling the cost from model

the sale, distribution and purchase of electricity;	complexity on older plant versus new plant, enabling a more level field for Generators.
(iii) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency **; and	**Neutral**
(iv) Promoting efficiency in the implementation and administration of the CUSC arrangements.	**Positive** By having a simple and efficient procedure for any bona fide costs to be recoverable this will promote efficiency in the administration of the CUSC arrangements.
(i) The efficient discharge by the Licensee of the obligations imposed on it by the Act and by this licence*;	**Positive** Will aid the path for the NESO to operate a reliable system. Provides assurance that the licensee's obligations are satisfied and discharged in a non-discriminatory way.

Relevant Applicable Objective	**WACM1 Proposer's assessment**
(i) The efficient discharge by the Licensee of the obligations imposed on it by the Act and by this licence*;	**Positive** Will help NESO to operate a reliable and stable transmission system. Provides assurance that the licensee's obligations are satisfied and discharged ensuring all Generators, regardless of age or technology, are treated consistently, in a harmonised and efficient way

(ii) Facilitating effective competition in the generation and supply of electricity, and (so far as consistent therewith) facilitating such competition in the sale, distribution and purchase of electricity;	**Positive** Will enable new plant to connect faster if EMT models are available for legacy plant ahead. Will allow fair competition between Generators as cost for EMT models in legacy plant were never envisaged in the project's financial models, unlike new connections where these costs are added in the Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) enabling a more level field for Generators.
(iii) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency **; and	**Neutral**
(iv) Promoting efficiency in the implementation and administration of the CUSC arrangements.	**Positive** By establishing a simple, transparent and efficient procedure for the recovery of any bona fide costs, the proposal will promote efficiency in the administration of the CUSC arrangements. A streamlined reimbursement process reduces unnecessary administrative burden, minimises disputes, and ensures that all parties understand the steps, evidence requirements and timelines involved.

When will this change take place?

Implementation date

10 Business Days after an Authority decision. Ideally this will be in line with the modification GC0168 implementation and CMP466.

Date decision required by

The modification should go to the Authority alongside GC0168 and CMP466 so that it has full access to the package of changes proposed.

Implementation approach

No process or system changes envisaged.

Interactions

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

Potential impact on Distribution Connection and Use of System Agreement (DCUSA) if EMT models are required for Licence Exemptible Embedded Medium Power Stations, such parties are likely not party to the CUSC, so therefore cannot access the recovery mechanism.

How to respond

Standard Workgroup Consultation questions

1. Do you believe that the Original Proposal and/or WACM1 better facilitate the Applicable Objectives versus the current baseline?
2. Do you support the proposed implementation approach?
3. Do you have any other comments?
4. Do you wish to raise a Workgroup Consultation Alternative request for the Workgroup to consider?

5. Do you agree with the Workgroup's assessment that the modification does/does not impact the European Electricity Balancing Regulation (EBR) Article 18 terms and conditions held within the Code?

Specific Workgroup Consultation questions

6. Do you have a view on the additional cost components related to the development and ongoing maintenance of EMT models—beyond those covered in the original solution and the alternative request—that the Workgroup should consider?
7. Do you agree with the proposed duration of the claims window (5 years as per the Compliance Repeat Plan)?

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

Please send your response to cusc.team@neso.energy using the response pro-forma which can be found on the CMP456 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
BEGA	Bilateral Embedded Generation Agreement
BELLA	Bilateral Exemptible Large License-exempt Agreement
BOA	Bid Offer Acceptance
BMU	Balancing Mechanism Unit
BSC	Balancing and Settlement Code
BSUoS	Balancing Services Use of System
CAPEX	Capital Expenditure
CMP	CUSC Modification Proposal
CUSC	Connection and Use of System Code
DCUSA	Distribution Connection and Use of System
DNO	Distribution Network Operator
EBR	Electricity Balancing Guideline
ESS	Energy Storage Systems
EMT	Electromagnetic Transient
FAT	Factory Acceptance Tests
HiL	Hardware in the Loop
HVDC	High Voltage Direct Current
IBR	Inverter Base Resources
MW	Mega Watt

MWH	Mega Watt Hour
LEEMPS	Licence Exemptible Embedded Medium Power Stations
NESO	National Energy System Operator
NETS	National Electricity Transmission System
OEM	Original Equipment Manufacturer
OPEX	Operational Expenditure
RTDS	Real Time Data Simulator
SME	Subject Matter Expert
SQSS	Security and Quality of Supply Standards
STATCOM	Static Synchronous Compensators
STC	System Operator Transmission Owner Code
SVC	Static Var Compensations
T&Cs	Terms and Conditions
WACM	Workgroup Alternative CUSC Modification
WTG	Wind Turbine Generators

Annexes

Annex	Information
Annex 01	CMP456 Proposal form
Annex 02	CMP456 Terms of reference
Annex 03	CMP456 WACM1 Proposal Form