CUSC Modification Proposal Form (for Charging Methodology Proposals) CMP268

nationalgrid

Connection and Use of System Code (CUSC)

Title of the CUSC Modification Proposal
Recognition of sharing by Conventional Carbon plant of Not-Shared Year-Round circuits
Submission Date
26th July 2016
Description of the Issue or Defect that the CUSC Modification Proposal seeks to address

Description of the defect

The current charging methodology fails to reflect the fact that different types of "Conventional" generation, e.g. CCGTs compared to Nuclear, cause different transmission network investment costs to be incurred due to their different network sharing characteristics.

The defect identified by this modification proposal relates to a type of generating plant which the existing charging methodology defines as being both "Conventional" and "Carbon". For the purpose of simplicity, this modification proposal refers to this group of generators as "Conventional Carbon". To aid understanding of the modification proposal, an explanation is provided in the section below and this ""Conventional Carbon" generator type is highlighted in red in the accompanying table.

The defect is that there is a specific circumstance where the charging methodology is not cost reflective because it fails to recognise that Conventional Carbon plant does in fact continue to fully share all Year Round circuit costs even in circumstances when the proportion of plant which is Low Carbon exceeds 50%. The defect in the current methodology delivers the result that "Conventional Carbon" plant in zones with a significant Not-Shared Year-Round tariff are charged TNUoS tariffs which are higher than the cost they cause and therefore the charging methodology is not cost-reflective for those plant.

Within the current methodology, when the penetration of Low Carbon generators increases beyond 50%, the degree of sharing of Year Round circuits is assumed to linearly reduce for all classes of generation. The current methodology therefore applies the TNUoS tariff elements to all "Conventional" generators in the same way irrespective of whether they are classed as "Carbon" (low constraint cost impact due to low BM bid cost), or "Low Carbon" (High constraint cost impact due to high BM bid cost). This represents a defect because the ability of Conventional Carbon to share with Low Carbon plant actually increases as Low Carbon plant becomes more dominant. The existing charging methodology assumes exactly the opposite relationship and therefore provides incorrect and perverse locational incentives for Conventional Carbon generators within zones with a relatively high concentration of Low

Carbon generators.

Explaining the background to the defect

To understand this modification proposal, it is important to be clear regarding the following terms which have a specific technical definition within the existing charging methodology:

1. Technology type by dispatchability: Classed as either "conventional" or "intermittent" depending on whether they can be dispatched as firm, or non-firm respectively.

2. Technology type by bid price: Classed as either "carbon" or "low carbon" depending on whether they tend to exhibit low cost, or high cost balancing mechanism bid prices respectively due to their short-run marginal cost of generation.

These four classification types were created by CMP213 to enable TNUoS charges to better reflect the different costs to transmission network investment caused by different types of generator. The first classification type of "Conventional" versus "Intermittent" is used by the charging methodology to identify whether a generator can be dispatched on a firm basis, so identify whether or not it pays the Peak Security tariff element. The second classification type of "Carbon" versus "Low Carbon" is used by the charging methodology to adjust the degree of sharing by taking account of the level of diversity as defined by the concentration of "Low Carbon" generation. The table below describes the four potential plant classification combinations and also includes a list of which generation technology types are currently included within each category by the existing charging methodology:

		Technology type by bid price	
		"Carbon" (Assumed low cost BM bid price)	**"Low carbon"** (Assumed high cost BM bid price)
Technology type by dispatchability	**"Conventional"** (Firm dispatch, so pays Peak Security tariff)	**"Conventional Carbon":** CCGT, OCGT, Coal, pumped storage, CHP, biomass	**"Conventional Low Carbon":** Nuclear, hydro
	"Intermittent" (Not firm dispatch, so does not pay Peak Security tariff)	**"Intermittent Carbon"**: No technologies identified	**"Intermittent Low Carbon"**: Wind, PV, tidal, wave

Further detail regarding these four existing classification types is described below

<u>Characterisation by dispatchability</u>

- **"Conventional"** – Stations which are capable of dispatching on a firm basis to meet peak demand. These stations contribute to network flows within the ICRP Transport model Peak Security background, so these stations pay the Peak Security tariff element.

- **"Intermittent"** - Stations which are not capable of dispatching on a firm basis to meet peak demand because they are reliant on a weather dependent source of input energy. These stations do not contribute to network flows within the ICRP Transport model Peak Security background, so these stations do not pay the Peak Security tariff element.

Characterisation by bid price

- **"Carbon"** – This is the name used (for the purpose of CMP213) to identify a class of generating stations that comprises generation plant that is flexible in nature, can reduce/increase output driven by market price and transmission system needs and importantly has a material positive short run marginal cost. This plant type will tend to bid to the System Operator in the Balancing Mechanism to reduce production at a relatively low cost (positive bid price), so offering a relatively low cost solution to managing constraints.

- **"Low carbon"** - This is the name used (for the purpose of CMP213) to identify a class of generating stations with the purpose of including stations which tend to operate on a "must run" basis, so almost always generate when input energy is available or, for technical reasons are inflexible, irrespective of transmission system need; e.g. demand level. This plant type will tend to bid to the System Operator in the Balancing Mechanism to reduce production at a relatively high cost (low or negative bid price), so offering a relatively high cost solution to managing constraints.

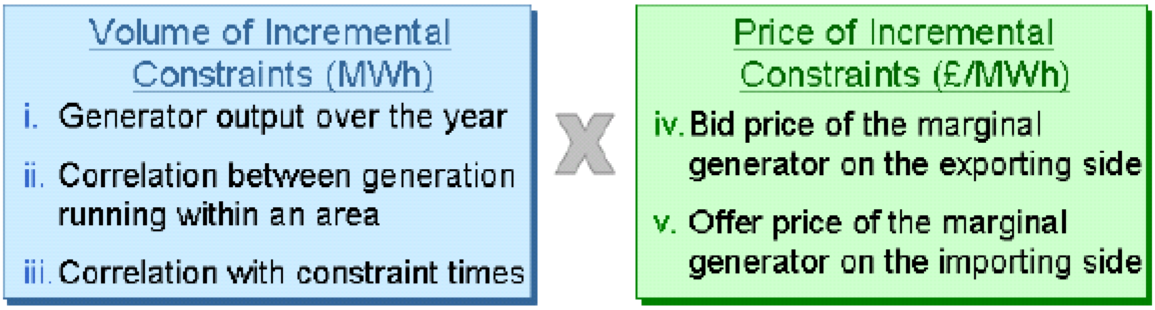
Detailed economic rationale behind the current methodology and this modification proposal

The economic justification for the current methodology was explained in the CMP213 Final CUSC Modification Report found at the following link : http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/CMP213/

The Workgroup report explains that following detailed analysis, the cost/benefit of sharing can be reflected by a generator's Annual Load Factor (ALF), and this approach was implemented in Ofgem's decision to apply a generator's ALF to their Year Round Shared tariff element. This relationship is described below:

> *4.14 From this ELSI based analysis the Proposer believed that a simple proxy for each generator's incremental impact on transmission network costs existed in the form of its ALF, and that this proxy could be incorporated into the existing ICRP approach in order to improve the cost reflectivity of this approach.*

The following illustration is from figure 5 of the CMP213 Workgroup report and explains the different components which drive transmission constraint costs. The "Volume of incremental constraints" is reflected by the station's ALF, while the "Price of incremental constraints" is reflected by the consideration of diversity using the classification of generators between "Carbon" and "Low Carbon" to split the Year-Round tariff between Shared and Not-Shared elements.



The CMP213 Workgroup report goes on to explain the circumstances and causes regarding why network sharing may reduce so that it becomes no longer appropriate to apply the ALF discount. This was described as occurring in zones with a relatively high proportion of Low Carbon generation for the following reason:

> *"4.21 …low carbon plant is more expensive to bid off* ***than carbon plant, which generally has a lower bid price (close to marginal bid price), and is cheaper to constrain off."*** [emphasis added]
>
> *"4.22 The linear relationship between load factor and incremental constraint costs breaks down* ***when bids cannot be taken from plant at close to wholesale marginal price****, and are taken from low-carbon plant instead."* [emphasis added]

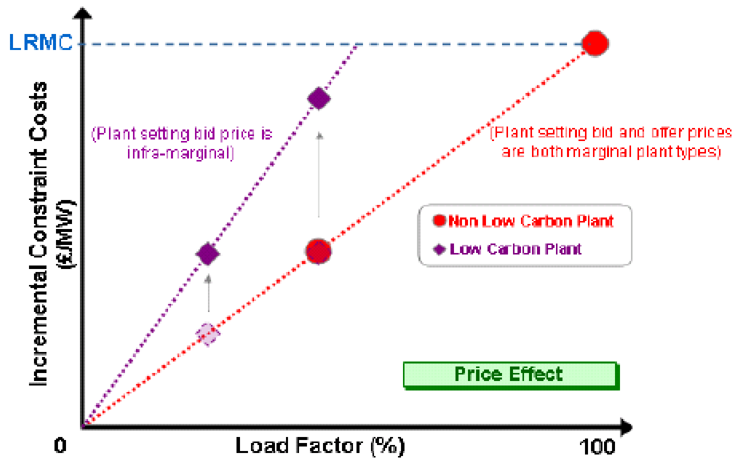


Figure 7 – Divergence in the linear relationship between low carbon and non low carbon plant

It is clear that the CMP213 Workgroup report acknowledged that the reduction in sharing and associated breakdown of the linear relationship with the ALF only occurs when bids can no longer be taken from Carbon Plant. Therefore, <u>it is the absence of Carbon plant which causes the higher constraint costs, not the presence of it</u>. The CMP213 Workgroup carried out analysis to illustrate the following describing the graph below:

> *"4.38 …The red dotted line shows the ideal linear relationship. Mapped against this are the impact of low carbon and carbon generation on this relationship as the percentage of low carbon generation in a zone increases. As the percentage of low carbon plant increases above 50% the cost of bids significantly increases. It follows in these circumstances that incremental low carbon plant increases constraint costs whilst* ***incremental carbon plant reduces incremental constraint costs. This latter effect is because the volume of low carbon***

plant that runs provides cheaper bids than previously available in that transmission charging zone; i.e. the slope in that zone was previously steeper.” [emphasis added]

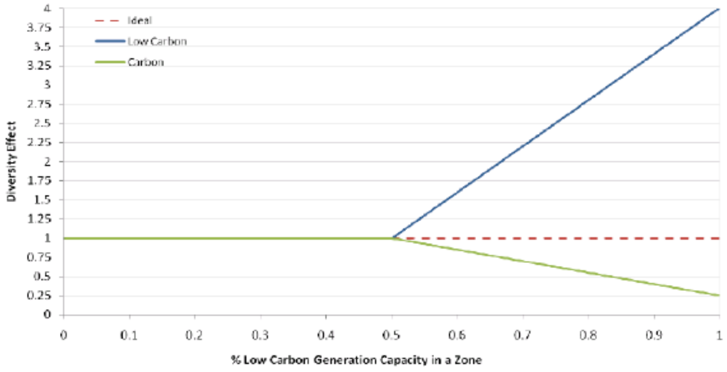


Figure 12 – Normalised effect of Load Factor with changing percentage generation mix in a zone

It follows that for a Conventional Carbon plant, the impact on constraint cost remains a function of their ALF irrespective of the proportion of low carbon plant it is sharing with because: 1) If in an half hour, the conventional carbon plant is generating, then it is available to be bid off, so a network constraint can be managed at a relatively low cost, so the Conventional Carbon generator is not causing a high constraint cost. 2) If in a half hour the Conventional Carbon generator is not generating, then it is also not causing a high constraint cost.

Clearly, Conventional Carbon plant do not cause the assumed reduction in sharing and they do not cause the assumed higher constraint costs (even in zones with a higher penetration of Low Carbon plant), so it is a defect to charge them as if they do.

Types of harm caused by the defect

If this defect is not corrected, then it will result in at least three key types of harm:

1. Firstly, competition is distorted by a non cost reflective economic disadvantage for Conventional Carbon generators which are located in zones with a high proportion of low Carbon generation.

2. Secondly, the defect will cause higher cost to customers than would otherwise be the case. This is because generators will face the incentive to make investment, or closure decisions which do not reflect the economic impact on the investment cost of the transmission network which they cause. This would result in an outcome which is less economically efficient at a higher cost to society and ultimately a higher cost to customers.

3. Thirdly, there is a locational security of supply risk. The current defect provides the perverse economic price signal that as more intermittent low carbon plant is built in a zone, then low load factor peaking plant experience higher TNUoS charges. This is a self reinforcing “death spiral” for low load factor peaking plant because as the charges

increase and low load factor peaking plant are encouraged to close, then this would further reduce the assumed degree of sharing, which would feed back to further increase the price signal for remaining low load factor peaking plant to close. If left uncorrected, then for that zone, the "death spiral" would result in a shortage of low load factor peaking plant and an increasing reliance on imported power to meet peak demand, which would result in an increasing risk to security of supply for customers in that zone.

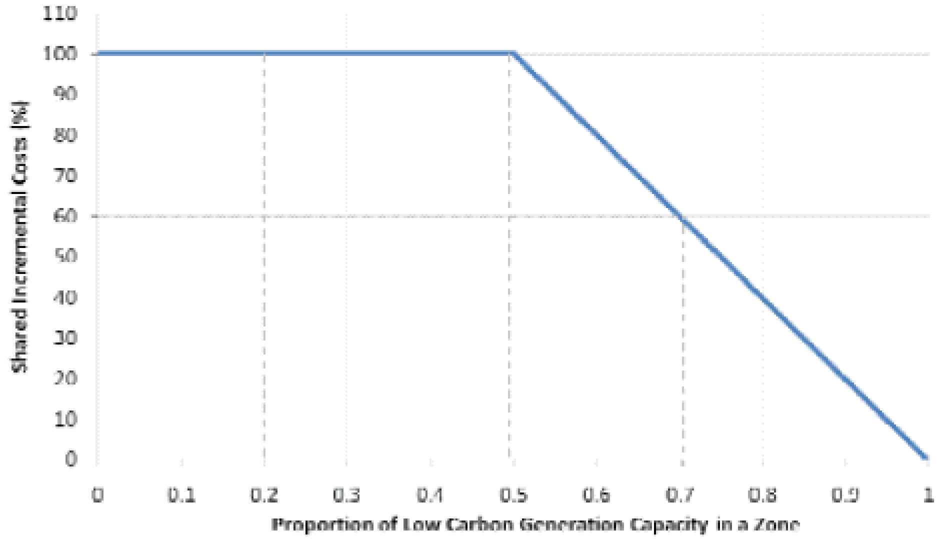
Description of the CUSC Modification Proposal

The proposal is that the charging methodology should be changed to more appropriately recognise that the different types of "Conventional" generation do cause different transmission network investment costs, which should be reflected in the TNUoS charges that the different types of "Conventional" generation pays. The change to the charging methodology would take the form that for generators which are classed as Conventional Carbon, the generator's ALF should be applied to both its Not-Shared Year-Round as well as its Shared Year-Round tariff elements. This does not change the way the Year Round tariff is calculated and it does not change existing generator classifications, but it does change the formula by which the Year Round tariff is applied to different types of Conventional generator. This is described in more detail below.

The element of the current tariff formula to be changed

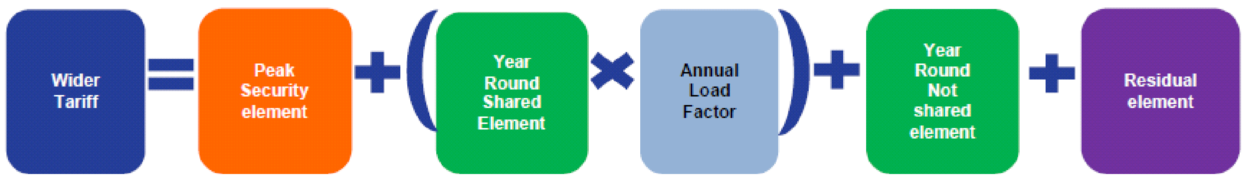
In ICRP Transport model, the cost of Year Round circuits is allocated between Shared and Not Shared according to the relative share of "Low Carbon" compared with "Carbon" plant. The methodology assumes 100% sharing of circuits where the proportion of load flow of "Carbon" is between 100% and 50%. Beyond this point methodology assumes a straight line reduction in the degree of sharing from 50% until the proportion of load flow on the circuit accounted for "Carbon" plant declines to 0%. This is illustrated in the graph below.

Figure 18 from the CMP213 Workgroup report.



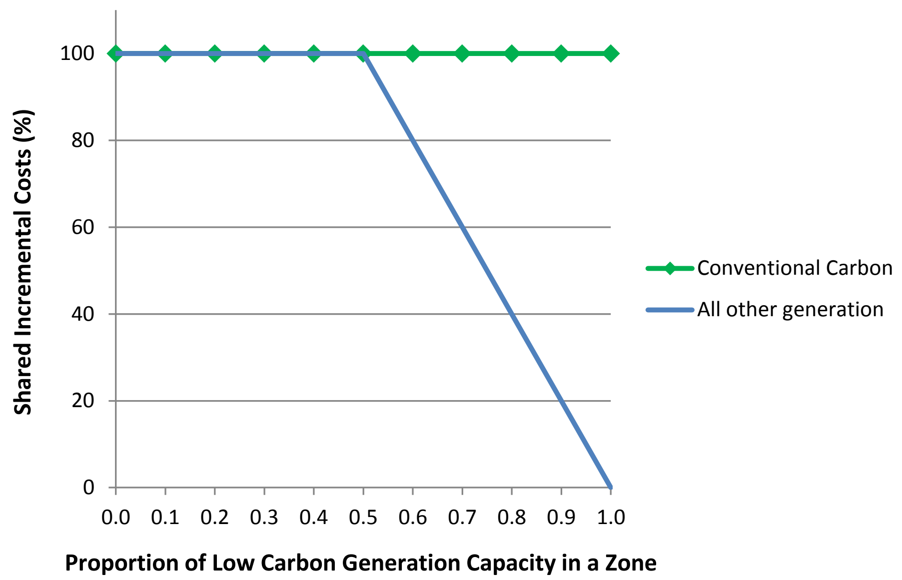
This principle is enacted through the current formula within the charging methodology where all generators (including Conventional Carbon generators) have their ALF applied to their Shared Year Round tariff element, but their ALF is not applied to their Not Shared Year Round tariff element. This is illustrated for Conventional Generators by the formula below taken from National Grid published Final TNUoS tariffs for 2016/17.

Conventional Generator



Proposed change to TNUoS tariff formula

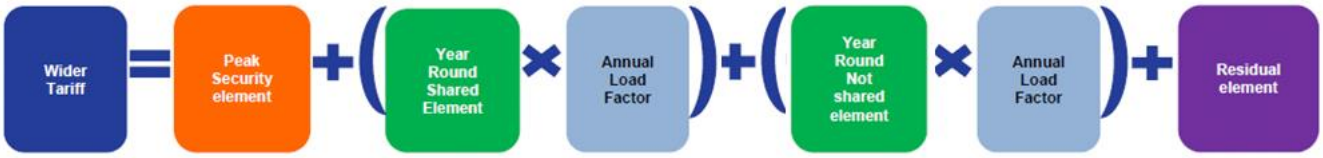
This modification proposes a change to the tariff formula relating to the way sharing is applied to Conventional Carbon generators so they continue to obtain 100% sharing of incremental costs irrespective of the proportion of low carbon generation capacity in a zone. This is illustrated by the graph below, which is a modified version of “figure 18” above.



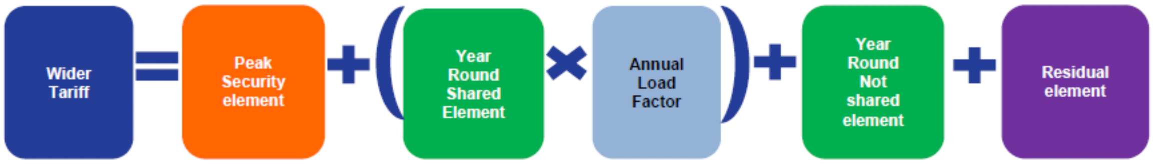
This modification proposal will recognise that even when the proportion of “Low Carbon” plant influencing a boundary is close to 100%, then any conventional carbon plant should have its ALF applied to the whole Year Round tariff (both Shared and Not-Shared elements of Year-Round).

This will require the existing tariff formula relating to “Conventional Generator” to be changed by splitting it into two parts: firstly “Conventional Generator – Carbon” and secondly “Conventional Generator - Low Carbon”. For the avoidance of doubt, the existing tariff formula relating to “Intermittent Generator” is unchanged by this modification proposal. The proposed new tariff calculation formulas are illustrated below:

1) Adjusted tariff formula: "Conventional Generator – Carbon"
This represents a change from the existing "Conventional Generator" tariff formula since it applies the Generator's ALF to both its Not Shared Year Round as well as its Shared Year Round tariff elements.



2) Unchanged tariff formula: "Conventional Generator – Low carbon"
The tariff calculation remains the same as the current "Conventional Generator" tariff. It would be appropriate to give this unchanged tariff formula a new name to ensure it is clear which types of generation this applies to.



It is proposed that this new tariff calculation methodology would apply from the TNUoS charging year starting April 2017.

Impact on the CUSC

CUSC Section 14 – Part 2 – The Statement of the Use of System Charging Methodology, Section 1 – The Statement of the Transmission Use of System Charging Methodology

Do you believe the CUSC Modification Proposal will have a material impact on Greenhouse Gas Emissions? Yes / No

No

Impact on Core Industry Documentation. Please tick the relevant boxes and provide any supporting information

BSC ☐

Grid Code ☐

STC ☐

Other ☐

(please specify)

This is an optional section. You should select any Codes or state Industry Documents which may be affected by this Proposal and, where possible, how they will be affected.

Urgency Recommended: Yes / No
Yes.
Justification for Urgency Recommendation
This proposal should be treated as urgent as it is linked to an imminent date related issue; namely that bids to the capacity mechanism auction for 2017/18 and for 2020/21 could be significantly impacted. If the defect is not urgently addressed there may be a significant commercial impact on generator parties.
Self-Governance Recommended: Yes / No
No
Justification for Self-Governance Recommendation
Should this CUSC Modification Proposal be considered exempt from any ongoing Significant Code Reviews?
Yes
Impact on Computer Systems and Processes used by CUSC Parties:
Details of any Related Modification to Other Industry Codes
Justification for CUSC Modification Proposal with Reference to Applicable CUSC Objectives for Charging:
Please tick the relevant boxes and provide justification for each of the Charging Methodologies affected.

Use of System Charging Methodology

☒ (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;

☒ (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 in accordance with the STC) incurred by transmission licensees in their transmission businesses and which are compatible with standard condition C26 (Requirements of a connect and manage connection);

☐ (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.

☐ (d) Compliance with the Electricity Regulation and any relevant legally binding decision of the European Commission and/or the Agency.
These are defined within the National Grid Electricity Transmission plc Licence under Standard Condition C10, paragraph 1.

Objective (c) refers specifically to European Regulation 2009/714/EC. Reference to the Agency is to the Agency for the Cooperation of Energy Regulators (ACER).

Full justification:

In respect of (a) this modification will better facilitate effective competition in the supply of electricity because it will result in a more level playing field by correcting an existing TNUoS tariff defect which provides a non cost reflective economic disadvantage for a particular group of generators i.e. Conventional Carbon generators in a zone with a high share of low carbon generation.

In respect of (b) this modification will improve the cost reflectivity of Generation TNUoS charges.

Additional details

Details of Proposer: (Organisation Name)	SSE plc

Capacity in which the CUSC Modification Proposal is being proposed: (i.e. CUSC Party, BSC Party or "National Consumer Council")	CUSC Party
Details of Proposer's Representative: Name: Organisation: Telephone Number: Email Address:	John Tindal SSE plc 01738 457308 John.tindal@sse.com
Details of Representative's Alternate: Name: Organisation: Telephone Number: Email Address:	Garth Graham SSE plc 01738 456000 garth.graham@sse.com
Attachments (Yes/No): **If Yes, Title and No. of pages of each Attachment:**	

Contact Us

If you have any questions or need any advice on how to fill in this form please contact the Panel Secretary:

E-mail cusc.team@nationalgrid.com

Phone: 01926 653606

For examples of recent CUSC Modifications Proposals that have been raised please visit the National Grid Website at http://www2.nationalgrid.com/UK/Industry-information/Electricity-codes/CUSC/Modifications/Current/

Submitting the Proposal

Once you have completed this form, please return to the Panel Secretary, either by email to jade.clarke@nationalgrid.com copied to cusc.team@nationalgrid.com, or by post to:

Jade Clarke
CUSC Modifications Panel Secretary, TNS
National Grid Electricity Transmission plc
National Grid House
Warwick Technology Park
Gallows Hill
Warwick
CV34 6DA

If no more information is required, we will contact you with a Modification Proposal number and the date the Proposal will be considered by the Panel. If, in the opinion of the Panel Secretary, the form fails to provide the information required in the CUSC, the Proposal can be rejected. You will be informed of the rejection and the Panel will discuss the issue at the next meeting. The Panel can reverse the Panel Secretary's decision and if this happens the Panel Secretary will inform you.