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SECMP0046 Initial Modification Report

About this document

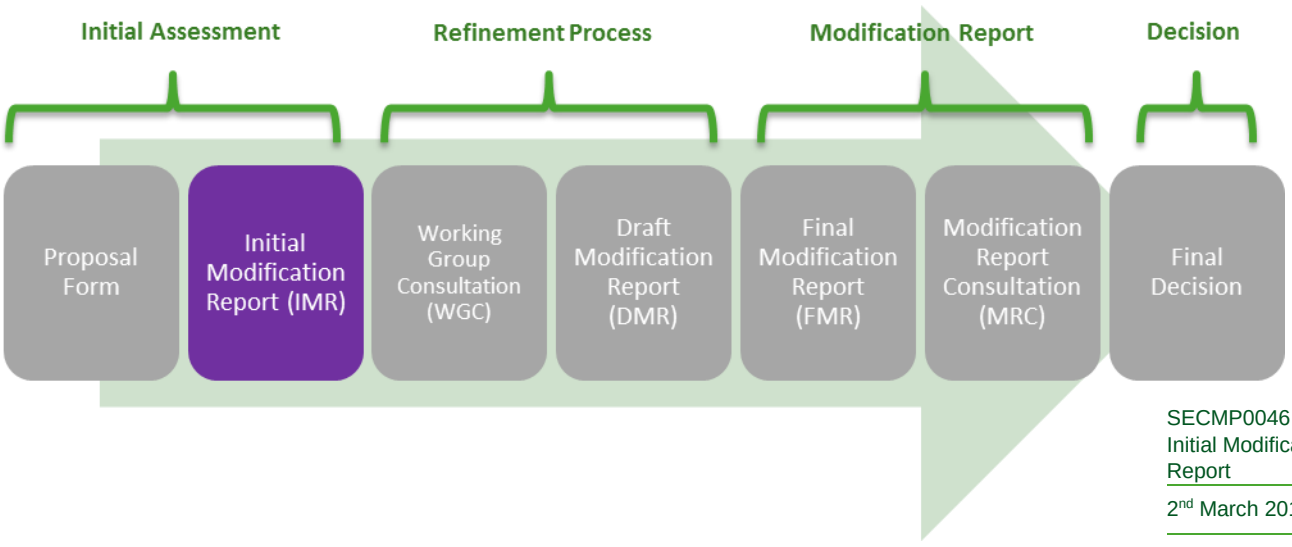
This Initial Modification Report (IMR) contains our initial assessment of SECMP0046. It also provides information on the issue, the Proposer's solution, potential impacts, costs and proposed progression.

This document was submitted to the Smart Energy Code (SEC) Panel for consideration to determine whether this Modification Proposal should be progressed through the Modification Process.

As part of this document the Panel:

- **AGREED** that this modification should be submitted into the Refinement Process to be assessed by a Working Group;
- **AGREED** the Working Group Terms of Reference;
- **AGREED** the progression timetable set out in Section 6; and
- **AGREED** that SECMP0046 should be progressed as a Path 2 Modification Proposal.

Where are we in the process?



Smart Energy Code

SEC
Smart Energy Code

Stage 01: Initial Modification Report

SECMP0046:

Allow DNOs to control Electric Vehicle chargers connected to Smart Meter infrastructure

What stage is this document in the process?

- 01 Initial Assessment
- 02 Refinement Process
- 03 Modification Report
- ► 04 Decision

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Summary

This modification proposes changes to the SEC to enable electricity Distribution Network Operators (DNOs) to use Smart Meter infrastructure to modify Electric Vehicle charging load within a household. This is to avoid the risk of overloading low voltage circuits between secondary substations and properties, and therefore avoid power outages.

Proposed Progression

The Panel agreed that the Modification Proposal should be progressed:

P2

- as a Path 2: Authority Determined Modification Proposal; and
- through the Refinement Process for 19 months.

Potential Impacts

!

- All Party Categories except Gas Network Parties.
- DCC Central Systems and Party interfacing systems.

Gemserv

Content

About this Document

This is an Initial Modification Report. This document contains details of the issue, solution, potential impacts and costs as well as the proposed progression for SECMP0046.

This document has one attachment:

- Attachment A contains the SECMP0046 Modification Proposal Form.

The Panel considered this IMR at its meeting on 9th March 2018 and determined how this modification should be progressed through the Modification Process.

1. Summary

What is the issue?

The number of people owning Electric Vehicles (EV) is increasing across Great Britain. This increase will lead to a larger quantity of domestic EV chargers being installed at domestic premises and are connecting to electricity networks. The electrical rating of EV chargers is also increasing in order to achieve more rapid charging.

The increase in electricity demand on low voltage networks has the potential to lead to power outages due to fuses blowing or cables supplying homes overheating.

What is the Proposed Solution?

The Modification Proposal has identified two possible solutions to address this issue, both of which involve electricity DNOs utilising DCC Systems to regulate load:

- **Option 1** proposes the use of Home Area Network (HAN) Connected Auxiliary Load Control Switches (HCALCS) to temporarily disconnect EV chargers from supply, or use of HCALCS to provide a binary "signal" to inform a smart charger to reduce the charging; and
- **Option 2** requires the DCC Systems to be used to pass signals to a HAN-Connected Smart Charger which can vary the rate of charging in response to a parameter passed to it. This is the option preferred by the Proposer.

Potential impacts

Party

Large Supplier Parties	X	Small Supplier Parties	X
Electricity Network Parties	X	Gas Network Parties	
Other SEC Parties	X		

System

DCC Systems	X	Party interfacing systems	X
Smart Metering Systems	X	Communication Hubs	
Other systems	X		

Potential implementation costs

We believe that the cost to implement SECMP0046 will be made up of SECAS and DCC time and effort. The total estimated cost to deliver this modification will be determined as part of the Working Group's assessment.

Proposed progression

The Panel agreed that this Modification Proposal should be progressed:

- as a Path 2: Authority Determined Modification Proposal; and
- through the Refinement Process for 19 months.

2. What is the issue?

Background

Electric Vehicle (EV) ownership has increased significantly over the last five years, with new registrations of plug-in cars increased from 3,500 in 2013 to more than 135,000 by the end of January 2018[1].

With this growth, it is likely that clusters of domestic EVs will begin to appear in the next few years, increasing the demand on low voltage networks (also known as feeders) that connect individual properties to secondary substations. This additional demand will also contribute to peak demand, as EV owners are likely to have similar patterns of car charging. This has the potential to lead to fuses blowing and/or the overheating of cables supplying these areas, leading to power outages for all households connected to those feeders.

Additionally, the Automated and Electric Vehicles Bill currently going through Parliament mandates that EV charge points shall have the capability to respond to external signals i.e. be 'smart'.

What is the issue?

Typically, a single feeder could serve up to 100 properties. A power outage caused by overloaded cables may result in supply restoration activities being required, potentially taking from around an hour to attend site and replace the fuse, to extensive work being required to provide a long-term capacity increase which could take several weeks.

The conventional method of dealing with the problem of increased electricity demand is to reinforce the DNO networks by installing new fuses, entire transformers and/or replacing the underground cables supplying entire streets; all with associated costs and high-levels of disruption.

The Proposer states that previous work has indicated that the potential estimated savings from having smarter solutions to this problem is £2.2 billion. They references studies that have shown that managing the charging of EVs at times of network stress can defer or negate this cost, including the My Electric Avenue project, which reported extensively on the potential benefits of smart charging. Since then, many studies have highlighted the benefits, and even necessity, of smart charging as the UK decarbonises transport (e.g. Electric Nation interim results, Aurora Energy Research, National Grid Future Energy Scenarios).

[1] Society of Motor Manufacturers and Traders, February 2018 https://www.smmt.co.uk/vehicle-data/evs-and-afvs-registrations/

The Proposer considers that the most efficient way to undertake this load control is for the DNO to respond to alerts when the network is experiencing stress. They have confidence in this approach to load control, rather than having other parties such as Suppliers or aggregators initiating the load control, due to the localised nature of the problem at a street level, and the DNO's ability to respond quickly to alert on their network. This would also minimise the complexity of the process, as individual properties are likely to supplied by multiple Import Suppliers.

3. Solution

Proposed solution

Two potential solutions have been identified, and the Proposer is looking to use the Refinement Process, as well as a parallel industry consultation process, to identify the optimal solution:

- **Option 1** proposes the use of HCALCS to temporarily disconnect EV chargers from supply, or use of HCALCS to provide a binary "signal" to inform a smart charger to reduce the charging; and
- **Option 2** requires the DCC Systems to be used to pass signals to a HAN-Connected Smart Charger which can vary the rate of charging in response to a parameter passed to it. **This is the option preferred by the Proposer**.

The project work the Proposer is currently undertaking to support this modification proposes options for the definition of the smart functionality that EV charge points will be required to have under the Automated and Electric Vehicles Bill.

This modification seeks to permit DNOs, through the DCC, to issue a command to an EV charger via the HAN. The solution may ultimately be incorporated as an ENA Engineering Recommendation or secondary legislation.

The Proposer suggests that the DNOs would monitor the load flowing through the low voltage feeders at substations previously identified as "high risk", and a signal would be raised when this load approaches an ''at risk level''.

This signal would be translated into an instruction to curtail EV charging on the chargers connected to the feeder. This instruction would be transmitted through the DCC Systems to the SMETS2 communication hubs on the feeders. The signal would change the status of the HCALCS or the HAN-Connected Smart Charger to reduce the charge rate – thereby protecting the feeder and ensuring all customers on the feeder have their electricity supplies maintained.

The Proposer has conducted an impact assessment to establish the likely frequency and timescale of any curtailment applied to domestic EV chargers, which concluded that the impact on customers is expected to be negligible. A typical example is extending the charging duration by ten minutes on four occasions annually, which led to a 20% increase of EVs that could safely charge from the local network. Due to the expected rarity of these events, the Proposer considers the best approach is for DNOs to take real-time control of HCALCS/HAN-Connected Smart Charger when necessary rather than using, for example, scheduled commands.

Views against the General SEC Objectives

The Proposer believes that this Modification Proposal better facilitates General SEC **Objective (e)**[2] for the following reasons:

- Giving DNO's control of EV chargers when low voltage cables are under stress is a positive innovation for the use of smart technology for Electricity Networks, as it should enable more efficient operation of existing infrastructure. Additionally, it will best facilitate the sustainable and secure Supply of Energy due to reduced risk of power outages, and decreased or deferred costs to reinforce the DNO networks.

For the avoidance of doubt, the Proposer believes that this modification is neutral against the remaining Objectives.

[2] To facilitate such innovation in the design and operation of Energy Networks (as defined in the DCC Licence) as will best contribute to the delivery of a secure and sustainable Supply of Energy

4. Potential Impacts

The following section sets out the initial assessment of likely impacts should SECMP0046 be approved and implemented. Additional impacts may be identified by the Working Group as part of the Refinement Process.

SEC Party impacts

Large Supplier Parties	X	Small Supplier Parties	X
Electricity Network Parties	X	Gas Network Parties	
Other SEC Parties	X		

Electricity Network Parties will be positively impacted, as they will gain the ability to issue commands to control load associated with EV charging. This has the potential to achieve significant cost benefits. It also increases their ability to respond to stress in electricity networks in real time to avoid the customer impacts associated with power outages. Their User Systems will also be impacted by having access to a new/amended Service Request(s).

Large and Small Supplier Parties will be impacted, as the DNOs will be able to impact the supply of electricity to their customers. The SEC currently only allows Import Suppliers to issue commands that enable or disable the Supply of Energy. There are currently no Service Requests that can impact the rate of electricity supplied.

Supplier Parties may also face some commercial and/or regulatory impacts relating to their energy purchasing, balancing and settling if DNOs are shifting the load supplied to their customers.

Other SEC Parties that are likely to be impacted include device manufacturers that may need to introduce new or changed functionality into their devices.

Central System impacts

DCC Systems	X	Party interfacing systems	X
Smart Metering Systems	X	Communication Hubs	
Other systems	X		

The Refinement Process will determine the degree of impact on systems.

It is anticipated that there will be new or amended Service Requests that will impact DCC Systems, Party Interfacing systems, and either Smart Metering Systems or Other Systems as well as EV chargers.

Testing

Testing will be required for any new or changed Service Requests. This will require DCC and User testing.

SEC and Subsidiary Document impacts

The impacts on the SEC will depend on the solution(s) identified and developed during the Refinement Process. It is anticipated that the minimum changes required are:

- Schedule 8: Great Britain Companion Specification – New Use Case would need to be added for DNOs' access to HCALCS and to control output value or send commands to the EV charger;
- Schedule 9: Smart Metering Equipment Technical Specifications – New command required to configure or reduce HCALCS output;
- Appendix E: DCC User Interface Services Schedule – Update to include New Service Request
- Appendix R: Common Test Scenarios – Update to include new Service Request in testing documentation
- Appendix AD: DCC User Interface Specification – New Service Request Variant required to configure the electric vehicle charger output value and DNOs' access control;
- Appendix AF: Message Mapping Catalogue – New response notifications will need to be created;

Impacts on other industry codes

Preliminary discussions have identified potential impacts on the Balancing and Settlement Code (BSC) and the Distribution Connection and Use of System Agreement (DCUSA).

If DNOs limit the supply of energy to customers, this may impact a Supplier's Balancing and Settling activities under the BSC. Additionally, the Unmetered Supplies User Group (UMSUG) under the BSC is currently having discussions regarding EV charging being eligible to become an Unmetered Supply (UMS) registered in the Supply Meter Registration System (SMRS). These discussions are likely to consider charging capacity in decisions regarding eligibility, with rapid charge potentially being excluded for UMS. The outcome may influence the rating that DNOs would seek to limit EV chargers to.

DCUSA Section 2A covers Distributor to Supplier/Generator Relationships. These arrangements may change if the DNO is able to impact the supply of electricity to a Supplier's customers.

Greenhouse Gas Emission impacts

The Proposer does not believe there will be any notable impacts on Greenhouse Gas Emissions, as the proposal would result in deferring the use of electricity rather than reduce it.

5. Potential Costs

Potential implementation costs

The cost to implement SECMP0046 is expected to include the following:

- SEC Administration time and effort for:
    - making the necessary amendments to the SEC;
    - releasing a new version of the SEC to SEC Parties; and
    - publishing this on the SEC website.
- DCC time and effort for:
    - developing the necessary changes to the DCC Total System;
    - pre-integration, system integration and user testing; and
    - implementation to live.

The estimated costs and effort will be determined as part of the Working Group's assessment and development of the modification.

6. Proposed Progression

Modification Path

We and the Proposer recommend that SECMP0046 be progressed as a Path 2: Authority Determined Modification Proposal.

This is due to impacts on Energy Customers, as well as potential impacts on Commercial Activities connected with the Supply of Energy.

Proposed progression

We recommend the following progression timetable for Panel consideration.

Activity	Date
Modification Proposal raised	21 Feb 18
IMR presented to Panel	09 Mar 18
Panel reviews Interim Report	Jun 19
Panel reviews Modification Report	Dec 19
Modification Report Consultation	Dec 19
Change Board vote	Jan 20
Modification Decision by the Authority *(Path 2 only)*	Feb 20

Refinement length

We recommend that this modification is submitted for a 19-month Refinement and assessment by a Working Group. This 19-month timetable will allow for:

- a full Working Group assessment to take place (approx. five to seven Working Group meetings). SECAS anticipates the first Working Group meeting to occur in May 2018;
- Two to three 15 WD industry consultation(s) to be issued and reviewed; and
- a full DCC assessment to be undertaken (approx. three months for a Preliminary Assessment and three months for an Impact Assessment);

For a more detailed progression plan please see Appendix 1.

Working Group

Membership

We recommend that the SECMP0046 Working Group be made up of individuals with expertise in:

- SEC Technical Specifications
- HAN Connected Devices
- Auxiliary Load Control

as well as any other interested parties.

We are also seeking other Code Administrators to attend the Working Group meetings to ensure all cross-code impacts are identified. Further, We will continue to provide updates on the progression of this modification at scheduled Code Administrator Code of Practice (CACoP) meetings.

Terms of Reference

In order to assess the Modification Proposal fully, we are recommending that the Working Group consider the following specific questions in addition to the standard Working Group Terms of Reference questions.

Q1: What impacts will this Proposal have on the interests of Energy Consumers?

This Modification Proposal seeks to introduce the ability for DNOs have certain controls over provision of electricity to a premise. It is important to fully develop the scope of impacts this may have on Energy Consumers including from the perspectives of security of supply, costs, and the relationships between Consumers, Suppliers and DNOs. There may be other broader consumer policy considerations to take into account. Therefore, determining the impacts on Energy Consumers early in the process is important.

Q2: What are the impacts on other industry Codes?

This Modification Proposal seeks to introduce new arrangements for how DNOs can exercise load control on their networks. Therefore, determining the impacts on other industry codes and arrangements early in the process is important.

Q3: Will enabling DNOs to impact the Supply of Energy to a premise introduce additional risk to the End-to-End Technical Architecture under the SEC?

As Import Suppliers are the only Party Category currently permitted to send Service Requests that enable or disable electricity supply, any change to this should assess whether there are technical and/or security risks to permitting DNOs to impact supply.

Q4: What are the associated cost and benefits of exploring different approaches of developing and implementing the solution.

The Panel questioned whether this Modification Proposal will result in benefits to all Parties by including the proposed solution as an addition to the services provided in accordance to the SEC and related documents, rather than an Elective Communication Service, which would be therefore be paid for directly by the Parties intending to use it.

Q5: Is the solution resilient to technological advances and change?

The Panel discussed the potential for the emergence of other ways to address this issue during the refinement process, and noted that the national charging infrastructure is in a period of development. Therefore, it is important that any solution developed is resilient to potential advances and is future proof.

The standard Terms of Reference for SEC Working Groups can be found on the About Modifications page of our website.

7. Implementation

Recommended implementation date

The Proposer has recommended that the implementation of this modification should coincide with the mass roll out of the SMETS2 infrastructure to minimise the impact of the new functionality on Smart Metering Systems that have already been rolled out.

They also note that if an enduring solution to the increase in demand attributable to EV charging is not found in two to three years, this will result in other solutions with higher customer impacts needing to be implemented, such as the use of diesel generators, directly engaging with customers to ask them not to charge their vehicles, and higher expenditure on reinforcing network infrastructure.

Given the complexity of the change being developed, we have recommended a longer than usual progression timetable. However, this timetable will still enable a system based solution being implemented in June 2021. It should be noted that this estimate does not take into account any potential timetable extensions and assumes an implementation lead time of no more than 12 months.

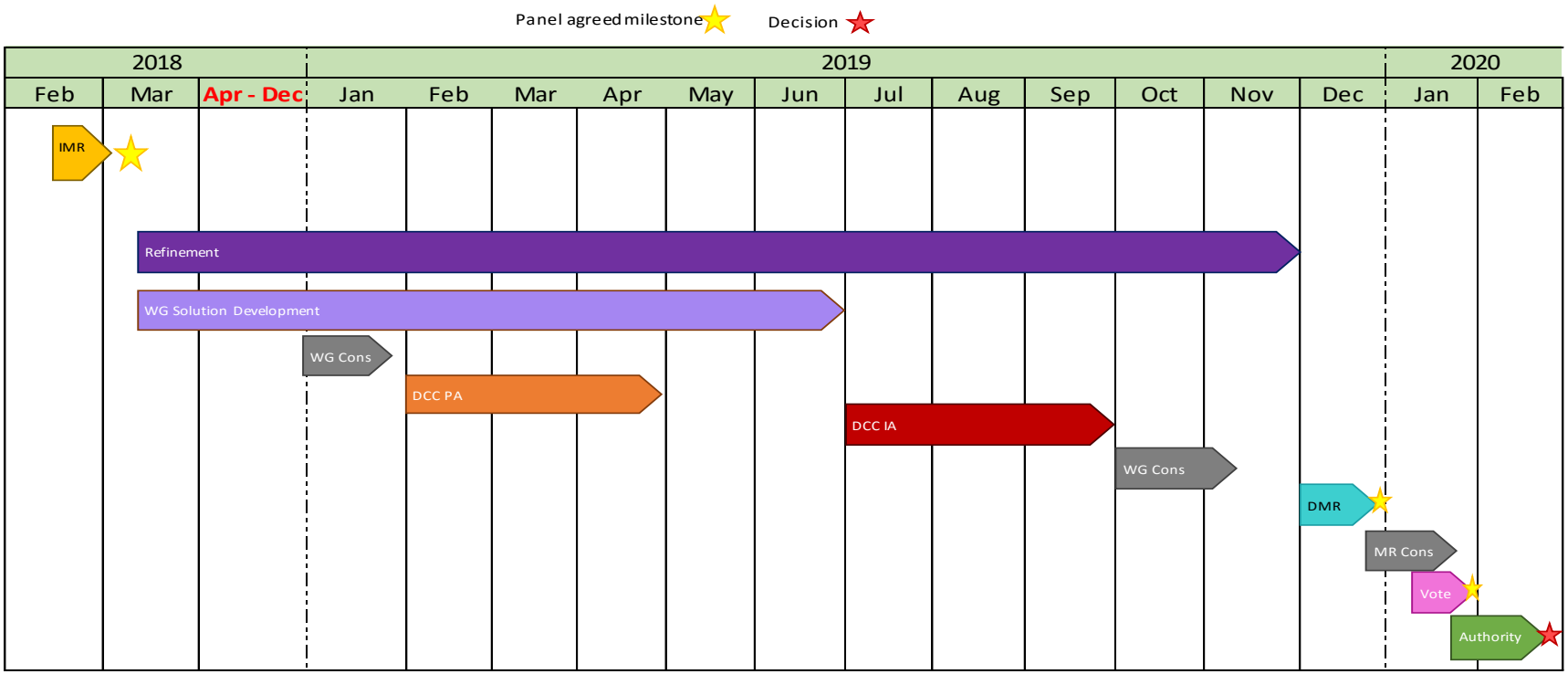
8. Recommendations

The Panel:

- **AGREED** that this modification should be submitted into the Refinement Process to be assessed by a Working Group;
- **AGREED** the Working Group Terms of Reference;
- **AGREED** the progression timetable set out in Section 6; and
- **AGREED** that SECMP0046 should be progressed as a Path 2 Modification Proposal.

Appendix 1: Detailed Progression Plan

Please note that the progression plan shown below is subject to change.



Appendix 2: Glossary

The table below provides definitions of the terms used in this document.

Acronym	Defined Term
BSC	Balancing and Settlement Code
DCUSA	Distribution Connection and Use of System Agreement
DNO	Distribution Network Operators
EV	Electric Vehicle
HAN	Home Area Network
HCALCS	HAN Connected Auxiliary Load Control Switch
SEC	Smart Energy Code
SECAS	SEC Administrator and Secretariat
SMETS2	Smart Metering Equipment Technical Specifications Version 2
UMS	Unmetered Supply