

SEC Modification Proposal, SECMP0184, DCC CR5304

**Increase Smart capability of SMETS2 Twin
Element ESME to support Solar and Storage use
cases**

Preliminary Impact Assessment (PIA)

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1 Executive Summary

The Change Board are asked to approve the following:

- Total cost to complete the Full Impact Assessment of **£22,684**.
- The timescales to complete the Full Impact Assessment of 40 working days.
- ROM costs for SECMP0184, up to the end of Pre-Integration Testing (PIT) of £250,000 to 450,000
- Significant Integration testing from the Communication Service Providers

Problem Statement and Solution

Currently, the SMETS2 defines how a twin element ESME captures and records electricity consumption on a per element basis. The twin element ESME measures and records the energy imported and exported on the primary measurement element, whereas the secondary measuring element records imported energy but is not mandated to record export active energy consumption.

To support greater energy efficiency and cost saving the Proposer would like to offer products and services that require export registers on the secondary element. This would enable the Smart Energy industry to support innovative products and services for management of battery storage and solar solutions, independently from the supply via the primary element.

Modification Benefits

The Proposers organisation could install a solar system and battery at the Consumers premises at no cost to the Consumer. The Proposers organisation would then enter into a Power Purchasing Agreement (PPA) with the Consumers to sell them the electricity generated from the solar system behind-the-meter at a discounted rate.

In the case the Consumer defaults on the PPA, they are still able to consume electricity behind the meter. The Proposers organisation would also find it difficult to recover the solar system.

If MP184 was approved, the Proposer would install the solar system on the secondary element, with the customer paying the agreed PPA fee for their electricity. Generation would take place behind the meter, with export being recorded across the Export MPAN which sits across the primary element. Introducing an export register on the secondary element would mean all generation would be used as export and reduce the risk to the Proposer's organisation.

2 Document History

2.1 Revision History

Revision Date	Revision	Summary of Changes
11/03/224	1.0	Issued to SECAS

2.2 Associated Documents

This document is associated with the following documents:

Ref	Title and Originator's Reference	Source	Issue Date
1	MP184 Modification Report v0.3	SECAS	23/05/2023
2.	MP184 Business Requirements Document v0.5	SECAS	02/02/2024

References are shown in this format, [1].

2.3 Document Information

The Proposer for this Modification is Tom Woolley of SMS PLC. The Modification was raised on 20th September 2021.

The Preliminary Impact Assessment (PIA) was requested of DCC on 6th February 2024.

3 Context and Requirements

In this section, the context of the Modification, assumptions, and the requirements are stated.

The requirements have been provided by SECAS, the Proposer and the Working Group.

3.1 Context

Currently, the SMETS2 defines how a twin element ESME captures and records electricity consumption on a per element basis. The twin element ESME measures and records the energy imported and exported on the primary measurement element, whereas the secondary measuring element records imported energy but is not mandated to record export active energy consumption.

To support greater energy efficiency and cost saving the Proposer would like to offer products and services that require export registers on the secondary element. This would enable the Smart Energy industry to support innovative products and services for management of battery storage and solar solutions, independently from the supply via the primary element.

3.2 What is the Issue?

Currently, SMETS2 is fit for purpose when considering traditional requirements for twin element metering. The issue is the current specification is preventing innovations and alternative markets from using SMETS2 as a solution, due to the current limitations. By making these proposed changes, that will not require hardware changes to existing SMETS2 twin element meters in the market, SMETS2 and the DCC Ecosystem can be used more widely. To enable this innovation and use of SMETS2 for such products and services, this Draft Proposal is proposing: -

- Support for Active Export kilowatt-hour (kWh) register on the secondary element.
- Support for four Time of Use's (TOU) to support Active Export kWh on the secondary element.
- Support for an additional load profile channel specifically for the Active Export kWh on the secondary element.
- Support for an Export Meter Point Administration Number (MPAN) on the secondary element.

3.3 Impact of the Issue

The current SMETS2 specification focuses on traditional twin element legacy installations and does not consider added value propositions. The current limitations on SMETS2 twin element restricts the industry in developing innovative ways in utilising the secondary element on twin element meters. These limitations prevent the industry from creating innovative products and offering cost effective tariffs to consumers.

Consumers are currently unable to receive payment for the exported energy from the secondary element if a twin element meter is on site.

3.4 Business Requirements

The business requirements are as follows.

Ref.	Requirement	MoSCoW Rating
1	Active Export kWh register on the secondary element.	M
2	Four Time of Use (TOU) tariffs to support Active Export kWh on the secondary element.	M
3	A Profile Data Log specifically for the Active Export kWh on the secondary element.	M
4	An Export MPAN on the secondary element.	M
5	Export Data to be made available on the Home Area Network (HAN).	C
6	Existing reporting for export on the primary element to include information about export on the secondary element.	M

Requirement 1: Active Export kWh register on the secondary element.

The Proposer would like to alter the existing arrangements to allow measurement of export energy on the secondary element. Introducing this functionality would allow the Proposer to install solar generation equipment with all generation being used as export, lessening the likelihood of their assets being stranded at the customer property if they default on the PPA.

SMETS currently defines that the ESME should be capable of recording Active Energy Imported and Exported. This proposal is requesting to allow 'cumulative Active Energy Exported via the secondary measuring element of its Electricity Meter in the Secondary Active Export Register'.

Requirement 2: Four Time of Use (TOU) tariffs to support Active Export kWh on the secondary element.

The Proposer would like to enable Consumers to have as much choice as possible when choosing who they import and export their energy consumption and generation to. This is especially important as the Proposer wishes to enter into a PPA with the Consumer to sell them the electricity generated from the solar panels behind-the-meter at a discounted rate.

They would like the Consumer to have the ability to engage with other Supplier Parties for the primary element, enabling them to choose the best possible option for their needs (eg, electric vehicle).

The proposal of a new section in SMETS that defines pricing to be applied to the secondary element on a twin element meter as follows:

5.13.1.3 Secondary Export Tariff TOU Price Matrix [INFO]

A 1 x 4 matrix containing Prices for Time-of-use Pricing Tariffs relating to Supply via the secondary measuring element of the Electricity Meter

Requirement 3: A Profile Data Log specifically for the Active Export kWh on the secondary element.

The Proposer needs to identify how much generation has taken place in order to fulfil the PPA they have signed with the Consumer. A sixth section should be added to SMETS Section 5.13.2.7 'Profile Data Log'.

A log capable of storing UTC date and time-stamped half hourly data (the amount of energy Imported or Exported in a half hour period) arranged as a circular buffer such that when full, further writes shall cause the oldest entry to be overwritten.

The log shall be capable of storing a minimum of:

- vi. 3 months of Active Energy Exported via the secondary measuring element of the Electricity Meter.

Requirement 4: An Export MPAN on the secondary element.

This is necessary to ensure for balancing and settlement of Export Data on the secondary element.

The proposal of a new MPAN shall be defined and provide specific support for the export channel on the secondary element.

Requirement 5: Export Data to be made available on the Home Area Network (HAN).

The Proposer believes that having as much information readily available to the Consumer on their IHD or PPMID would be beneficial. The Proposer acknowledges that import and export data from the primary element is available and would like this functionality to be mirrored onto the secondary element.

The proposal is to include additional HAN items as follows: -

- Active Export kWh on the secondary element
- 4 x TOU's that are related to the secondary element
- Load profile channel for Active Export – Secondary

Requirement 6: Existing reporting for export on the primary element to include information about export on the secondary element.

The Proposer would like the export on the secondary element to match what is possible for the export on the primary element. In terms of reporting, this means any existing reporting on export on the primary element should now include information about the export on the secondary element.

3.5 Business Case

Business benefits and the basis of the business case are given in document [2]. The key points associated with the new Service Requests and GBCS Use Cases can be summarised as:

- The Proposer would be able would be able to install solar panels and a battery at Consumers' premises at no cost to the Consumer, on the secondary element of a Twin Element ESME;

- Consumers would be able to enter into direct Power Purchase Agreements to purchase electricity generated by solar panels installed by the Proposer behind the meter at a discounted rate; whilst
- the risk to the Proposer's organisation would be reduced as all generation would be used as export.

3.6 Solution Approach

This Modification seeks to introduce new Service Requests and associated GBCS Use Cases through changes in the DSP. It will also be necessary to implement changes in the Great Britain Companion Specification (GBCS) at a device level. The latter aspect is not covered in this PIA, and would require a separate SECAS-led consultation with meter manufacturers to assess the cost and effort required.

4 Description of Solution

Changes in the DSP to DUIS, the Message Mapping Catalogue (MMC), and GBCS will be required to meet the requirements.

DCC's understanding of the requirements for this CR is as follows:

1. implement new or updated DUIS Service Requests and GBCS Use Cases to support an Active Export Register on the secondary element;
2. implement new or updated DUIS Service Requests and GBCS Use Cases to support four Time of Use (TOU) tariffs for Active Export on the secondary element;
3. implement new or updated DUIS Service Requests and GBCS Use Cases to support a Profile Data Log for the Active Export Register on the secondary element;
4. implement new or updated DUIS Service Requests and GBCS Use Cases to support the setting and reading of an Export MPAN on the ESME device for the secondary element;
5. implement new or updated DUIS Service Requests to support the setting and reading of an Export MPAN within the Smart Metering Inventory for the secondary element;
6. create new DUIS and MMC XML schemas (assumed to be v5.4) for the new and updated SRV definitions;
7. add support for a new GBCS version (assumed to be v4.4) that includes the new and updated GBCS Use Cases;
8. add Secondary Export MPAN to the Smart Metering Inventory details for an ESME device.

Please note that the SECMP0184 Business Requirement 5 will not be delivered by DCC as it relates to HAN Device functionality and therefore can only be implemented by Device manufacturers.

Please also note that the SECMP0184 Business Requirements document includes a statement in the Supplementary Questions that as a result of the four MPANs "there could be up to four Suppliers associated with the Twin Element ESME" but this is not actually possible. There is a GBCS constraint which means that the Primary Import MPAN and Secondary Import MPAN must both be associated with the same Import Supplier, since the ESME only has one Trust Anchor Cell for a Supplier certificate. This constraint is currently enforced by DUIS on the SR8.11 validation when those MPANs are declared at I&C.

We assume that it is not the intention or the agreed scope of this SEC Modification to change the behaviour related to Import MPANs and therefore we are not proposing to make any such changes under SECMP0184.

4.1 DSP Changes

An initial assessment of the new and updated DUIS Service Requests and GBCS Use Cases for each requirement is summarised below.

Note that it is assumed that all GBCS Use Cases will be new.

Active Export Register for secondary element:

SRV	Type	GBCS Use case	Description
4.5.1	New	Similar to ECS17a	Read Instantaneous Export Registers (Secondary Element).

			New SRV and Use Case similar to SRV4.2 for Primary Element.
4.6.3	New	Similar to ECS21c	Retrieve Export Daily Read Log (Secondary Element). New SRV and Use Case similar to SRV4.6.2 for Primary Element.
5.1	Update	N/A	Create Schedule. Updated SRV to allow new SRV4.6.3 to be DSP Scheduled.

Four TOU Tariffs for Active Export on secondary element:

SRV	Type	GBCS Use case	Description
1.1.3	New	Similar to ECS01c	Update Export Tariff (Secondary Element). New SRV and Use Case similar to SRV1.1.2 for Import Tariff but must be a Non-Critical Command.
1.2.3	New	Similar to ECS01d	Update Price (Secondary Element). New SRV and Use Case similar to SRV1.2.2 for Import Tariff but must be a Non-Critical Command.
4.5.2	New	Similar to ECS17d	Read Instantaneous Export TOU Matrices (Secondary Element). New SRV and Use Case similar to SRV4.1.2 for Import TOU Matrices.
4.11.3	New	Similar to ECS01c	Read Export Tariff (Secondary Element). New SRV and Use Case similar to SRV4.11.2 for Import Tariff.

Profile Data Log for the Active Export Register on the secondary element:

SRV	Type	GBCS Use case	Description
4.8.4	New	Similar to ECS22a	Read Export Profile Data (Secondary Element).

			New SRV and Use Case similar to SRV4.8.3 for Primary Element.
5.1	Update	N/A	Create Schedule. Updated SRV to allow new SRV4.8.4 to be DSP Scheduled.

Export MPAN on the ESME device for the secondary element:

SRV	Type	GBCS Use case	Description
6.2.7	Update	Similar to ECS40	6.2.7 Read Device Configuration (MPxN). Updated SRV and new GBCS Use Case. SRV will return Secondary Export MPAN if device is at new GBCS version or later.
6.20.3	New	Similar to ECS21c	Set Device Configuration (Secondary Export MPAN). New SRV and Use Case similar to SRV6.20.2 for Primary Export MPAN.

Export MPAN within the Smart Metering Inventory for the secondary element:

SRV	Type	GBCS Use case	Description
8.2	Update	N/A	Read Inventory Updated SRV to return Secondary Export MPAN
8.4	Update	N/A	Update Inventory Updated SRV to allow creation or update of Secondary Export MPAN
8.11	Update	N/A	Update HAN Device Log (Add) Updated SRV to allow Import Supplier to set Secondary Export MPAN (Only allowed if the Import Supplier is also the Export Supplier for the Secondary Export MPAN; otherwise the Export Supplier must use SR8.4)

As well as the DUIS and GBCS changes described above, the DSP solution will also require the following updates to support the Secondary Export MPAN:

- addition of Secondary Export MPAN to the logical and physical data model for Devices in the Smart Metering Inventory;
- addition of Secondary Export MPAN to Device extracts sent to DCC DS&A;
- addition of Secondary Export MPAN to Self Service Interface Read Inventory screen;
- addition of Secondary Export MPAN to the interface providing device data to the DCC Service Management System;
- amendments to access control to support separate Suppliers for the Primary Export MPAN and Secondary Export MPAN.

4.1.1 Security Impact

This Change allows multiple (4) MPANs to be associated with a SMETS2 device, which will enable multiple suppliers to be associated with a SMETS2 device.

There are no interface changes, and the security posture is not impacted. However, there will be significant design changes to support the multiple MPANs per device that will require security input and assurance.

The implementation will be security assured throughout. This assurance includes reviewing designs, test artefacts and providing consultancy to the implementation and test teams.

A more detailed assessment of Security impact will be carried out as part of the Full Impact Assessment.

4.1.2 Technical Specifications

Changes to DUIS, MMC, and GBCS will be required to meet the requirements.

4.1.3 Service Impact

As part of the implementation, a provision is anticipated for service support in the following areas:

- as part of the setup activities, the Application Management Support (AMS) team will extend the monitoring solution to include the new SRVs. The solution allows DSP to proactively monitor the health of the Production system and take action to address potential service disruption, although none is anticipated;
- a Data Power schema change will be required in all the environments due to the required DUIS change;
- activities required for transition to operations (TTO) at time of implementation will be minimal following completion of testing. However, there will be a small effort required to ensure that all applications continue to function correctly during and post cutover. A small amount of effort will be included in the FIA to cover knowledge transfer sessions;

- a period of Early Life Support (ELS) is included, estimated at two simple calls per month for two months. This estimate is based on the complexity of the changes, in anticipation of challenges with early life stability issues or questions from users due to a lack of familiarity with updates to front end screens and reporting. All calls received are required to be assimilated, investigated and resolved; and
- Environmental Analyst effort has been included to cover Production go-live activities.

A more detailed assessment of service impact will be completed as part of the SECMP0184 Full Impact Assessment.

4.1.4 Infrastructure Impact

There will be no change to the infrastructure design as a result of this Change. The Change does not impact the DSP resilience or DR implementation.

It is anticipated that there will a change to Service Request volumetrics, but these are not expected to be significant enough to warrant additional motorway lanes outside of BAU demand and capacity management.

4.2 Critical Software

Critical Software as the Parse and Correlate provider will make the required changes to support the revised DUIS and MMC schemas and additional GBCS Use Cases.

4.3 Communications Service Providers

This Preliminary Impact Assessment contains no impacts on the SMETS 2 Communications Service Providers (CSP) or the Network Evolution Service Providers (4G Comms Hub). As there are no requirements for the Communications Hub to implement any functionality beyond the passthrough of the new GBCS Commands and associated Responses, no firmware changes are required. In addition, specific exemptions apply to all the CSPs:

- No comms hub changes – this solution does not require firmware updates.
- No modification to any test approaches.
- No changes to network traffic.
- Telefónica assume no changes to the interactions between the CH and HAN devices.
- No changes to performance measures.
- No changes to GBCS which will impact the CSPs.

4.4 Data Science and Analytics Reporting

As per SECMP0184 Business Requirement 6, the introduction new Service Requests will impact the current DCC Data Science and Analytics (DS&A) reporting of SRVs and Alerts which are included in the existing SECMP0122B reporting. Provision for this is included in the cost in section 6.1 to produce a FIA.

5 Implementation Timescales and Approach

This Modification is expected to be implemented in a future SEC Release. Design, Build, and Pre-Integration Testing (PIT) is expected to take approximately five (5) months to complete after the CAN is signed. The Modification would be added to a suitable SEC Release after the FIA is completed, and although this change would be expected to be part of a SEC Release, due to the DUIS schema changes would most likely be implemented in a Release with other DUIS changes.

5.1 Implementation Approach

Implementation of this change is assumed to follow a waterfall methodology. The release lifecycle duration and implementation details will be confirmed as part of the FIA.

5.2 System Integration Testing

System Integration Testing (SIT) will include DUIS and GBCS Compatibility testing, System Regression testing, and SIT management as well as governance activities. More specifically the SIT scope for this Change will consist of:

- testing across all three Comms Hubs for the CSPs;
- testing of the 4G Comms Hubs for the NEWAN;
- the use of Twin ESME SLS emulators (where real devices are currently not available);
- new read SRVs proposed for secondary export consumption, export tariff, and secondary export MPAN configuration;
- testing DUIS changes required for configuring an export tariff for each export register;
- testing changes to existing export read SRVs;
- verifying changes to SRV 8.11, SRV 8.4, and SRV 8.2 support the new secondary export MPAN; and
- verifying amendments to reporting to include the secondary export MPAN;

Testing will aim to cover the newly created and updated SRVs as part of this CR5304 in the context of the following business scenarios:

- Credit and Prepayment Modes;
- Install & Commission;
- Change of Mode;
- Change of Supplier;
- Change of Tenancy; and
- Meter Readings.

It is understood that, as part of this CR5304, new DUIS and GBCS versions will be required to implement the changes to SRVs to allow for alert configuration. Therefore, it is expected that new test scripts and scenarios will need to be created. This will be carried out as part of the SIT preparation activities, including the creation of test artefacts such as the Heatmap. It is expected that minor updates to the Motorway Automation Framework will be required to accommodate these changes.

It is estimated that for this Modification, approximately five hundred and ninety tests will be executed within the proposed SIT-B scope in order to verify the new behaviour. While the cost and duration is not included as part of the PIA, it is clear that this testing and any required regression testing with all the CSPs will require significant effort and associated cost.

5.3 User Integration Testing

The UIT scope for this change will consist of:

- testing across all three Comms Hubs for the CSPs;
- testing of the 4G Comms Hubs for the NEWAN;
- the use of Twin ESME SLS emulators (where real devices are currently not available);
- new read SRVs proposed for secondary export consumption, export tariff, and secondary export MPAN configuration;
- testing DUIS changes required for configuring an export tariff for each export register;
- testing changes to existing export read SRVs;
- verifying changes to SRV 8.11, SRV 8.4, and SRV 8.2 support the new secondary export MPAN.

Testing will aim to cover the newly created and updated SRVs as part of this SECMP0184 in the context of the following customer journeys:

- Credit and Prepayment Modes;
- Install & Commission;
- Change of Mode;
- Change of Supplier;
- Change of Tenancy.

6 Costs and Charges

The scope of supply under this PIA includes design, development (build), system testing, and performance testing within the PIT environments.

The Rough Order of Magnitude cost (ROM) shown below describes indicative costs to implement the functional requirements as shown in section 3.4. The price is not an offer open to acceptance. It should be noted that the change has not been subject to the same level of analysis that would be performed as part of a Full Impact Assessment and as such there may be elements missing from the solution or the solution may be subject to a material change. As a result, the final offer price may result in a variation.

6.1 Design, Build and Testing Cost Impact

The table below details the cost of delivering the changes and Services required to implement this Modification. For a PIA, only the Design, Build, and PIT indicative costs are supplied.

£ ROM	Design, Build and PIT
New Service Requests, Responses and GBCS Use Cases	£250,000 to £450,000

The range of charges includes provision for a DUIS uplift. However if the targeted SEC Release date includes another Modification or Change Request with a DUIS uplift, that cost will be shared equally between the two (or more) changes, and the cost of Design, Build, PIT, and subsequent Integration Testing will come down.

Although not included in this PIA, it is expected that there will be high integration testing costs associated with this Modification. As with the DUIS uplift, if the targeted SEC Release date includes another Modification or Change Request with regression testing, that cost will be shared equally between the two (or more) changes, and the cost of Integration Testing will come down.

Based on the existing requirements, the total fixed price cost for a Full Impact Assessment is **£22,684** and would be expected to be completed in 40 working days.

6.2 Contract and Schedule Impacts

No changes to Schedule 2.2 (Performance Measures and Reporting) are expected as a result of this Change.

Updates to the DSP Design Baseline (Schedule 4.1) and Payment milestones (Schedules 6.1 and 7.1) are anticipated.

Appendix A: Glossary

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

Acronym	Definition
BAU	Business As Usual
CAN	Contract Amendment Note
CR	DCC Change Request
DCC	Data Communications Company
DSP	Data Service Provider
DUIS	DCC User Interface Specification
ESME	Electricity Smart Metering Equipment
FIA	Full Impact Assessment
GBCS	Great Britain Companion Specification
GSME	Gas Smart Metering Equipment
MMC	Message Mapping Catalogue
MRT	Meter Read Transaction
PIA	Preliminary Impact Assessment
PIT	Pre-Integration Testing
ROM	Rough Order of Magnitude (cost)
SAT	Service Audit Trail
SEC	Smart Energy Code
SECAS	Smart Energy Code Administrator and Secretariat
SIT	Systems Integration Testing
SMIP	Smart Metering Implementation Programme
SRV	Service Reference Variants
SSI	Self-Service Interface
UIT	User Integration Testing

Appendix B: RAID and Clarifications

No Risks or Issues have been identified at this time.

Assumptions

Ref	Description	Status/Mitigation
SECMP184-A1	It is not intended to be possible for there to be separate Responsible Suppliers for the Primary and Secondary Import MPANs and there will therefore be no additional ESME Trust Anchor Cells.	Open
SECMP184-A2	It is assumed that this Change will be contributing towards the SEC System Release targeted for June 2025 and therefore the SIT and UIT responses for this PIA cover only activities and deliverables specific to this Modification.	Accepted
SECMP184-A3	Systems Integrator Programme and Release Management activities are not included in this PIA.	Accepted
SECMP184-A4	It is assumed that this Change will only impact SMETS2.	Accepted
SECMP184-A5	SECMP0184 is targeted for June 2025, after the point of CH&N go-live, and therefore it is assumed that SIT and UIT testing will also be executed on 4G Comms Hubs.	Accepted
SECMP184-A6	SIT and UIT testing will involve the use of real devices, including the Twin Element ESMEs, if available. Otherwise, emulators will be used.	Accepted
SECMP184-A7	There will be no changes to the interactions between the CH and HAN devices.	Open

Dependencies

Ref	Description	Status/Mitigation
SECMP0184-D1	In the case that emulators will need to be used during SIT testing, firmware versions must be readily available, and compatible with the uplifted GBCS version to test this change.	Accepted