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DP165

‘ESME Voltage Accuracy’

Modification Report

Version 0.2

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About this document

This document is a draft Modification Report. It currently sets out the background, issue, and progression timetable for this modification, along with any relevant discussions, views and conclusions. This document will be updated as this modification progresses.

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1. Summary

This proposal has been raised by Alan Creighton from Northern Power Grid.

Electricity Network Parties have a statutory obligation to ensure that the voltage supplied to consumers' premises supplied from low voltage electricity networks is always between defined limits. They currently do this by making planning assumptions when low voltage networks are designed.

During the development of the smart meter technical specifications, Electricity Network Parties requested that the average Root Mean Square (RMS) voltage readings from Electricity Smart Metering Equipment (ESME) would be recorded with a mandated level of accuracy. Such a requirement is not currently codified in the Smart Metering Equipment Technical Specifications (SMETS) or the Great Britain Companion Specification (GBCS).

The uncertainty associated with the lack of a mandated level of accuracy means that Electricity Network Parties must take conservative planning assumptions when designing and analysing performance of low voltage networks of, thereby preventing them from realising the full benefits from the smart meter rollout.

2. Issue

What are the current arrangements?

What is average RMS voltage and what is it used for?

The RMS voltage value of an Alternating Current (AC) circuit represents an equivalent voltage of a Direct Current (DC) circuit. Under the Electricity Safety, Quality and Continuity Regulations (ESQCR) each property supplied from a low voltage electricity network must receive a voltage within the range 230V +10% (253V) and 230V -6% (216.2V).

Currently Electricity Network Parties use planning assumptions when designing low voltage electricity networks to ensure that the voltage supplied to customers is always within these statutory limits. One of the benefits associated with smart metering is that Electricity Network Parties should be able to use smart meter average RMS voltage data from smart meters to enable them to design low voltage networks more efficiently, monitor the performance of low voltage networks, identify any problems, and help develop more efficient solutions.

Management of network voltage will be an increasingly important activity as a means of supporting the transition to meet the GB 2050 Net Zero target. This will see an increase in the uptake of Low Carbon Technologies, particularly electric vehicles, heat pumps and distributed generation connected to low voltage networks. The connection of such devices is expected to cause an increase in the number of power flow and voltage issues on low voltage networks. Accurate voltage and consumption data from smart meters will help manage these issues efficiently.

How accurate are the RMS voltage readings from ESMEs?

Currently there is no mandated level of accuracy for voltage measurements from ESMEs. The British Electrotechnical and Allied Manufacturers' Association (BEAMA) has confirmed an 'indicative voltage

accuracy' that an Electricity Network Party could assume is ±1%. However, this assumption is for all ESMEs, and would not consider any differences between meters manufactured by different manufacturers and different models of meter made by the same manufacturer. The voltage measurements from some meter models will be better than this, some may be worse.

Currently there is not a requirement for a meter manufacturer to share the results of any voltage measurement accuracy testing that they may carry out for each of their products.

How is the voltage accuracy of ESMEs tested?

There is currently no codified method for determining the accuracy of ESME voltage measurements. It is understood that the indicative voltage accuracy supplied by BEAMA is not based on an agreed testing methodology and each meter manufacturer may have provided its view on their products on a different basis.

What is the issue?

There is an increase in the connection of low carbon technologies (including electric vehicles, heat pumps, distributed generation and storage) to low voltage networks. This is only likely to grow as GB transitions to meet the 2050 Net Zero target.

The design and management of low voltage networks is becoming an increasingly important Electricity Network Party activity. Having increased visibility of network voltages, with a known level of accuracy from ESMEs, is a crucial element to low voltage network design and management. It is therefore important that an Electricity Network Party can access accurate voltage measurements, with a known degree of accuracy, so that they can be used effectively and efficiently to minimise the amount of network reinforcement required to help GB meet its Net Zero targets.

Ofgem's upcoming review for electricity network price control RIIO 2 (Revenue = Incentives + Innovation + Outputs) will be used to set price controls for the electricity network companies. This performance-based framework seeks to put consumers at the heart of network companies' plans and to encourage longer-term thinking, greater innovation and more efficient delivery. Without voltage measurements, to a known level of accuracy, Electricity Network Parties will need to make conservative assumptions about network voltages which may lead to less efficient solutions being implemented.

There is currently no reference to voltage measurement accuracy, nor a common test methodology, so there will need to be amendments to the SMETS (SEC Schedule 9) to include these. There may also be a requirement for the test results of each meter type to be shared with Electricity Network Parties.

What is the impact this is having?

Although the indicative voltage accuracy confirmation from BEAMA is helpful, whilst there remains no mandated voltage accuracy requirement some ESMEs may have voltage accuracy better than ±1% whilst others may have voltage accuracy worse than ±1%. Network reinforcement is triggered when the voltage on the low voltage network approaches the statutory limits set out in the ESQCR, which are 230V +10% (253V) and -6% (216.2V). For example, if the network voltage is 252.5V reinforcement is not required, whereas if the network voltage is 253.5V reinforcement is required. This illustrates the need for accurate voltage measurements; a difference in network voltage of 1V could

trigger the need for reinforcement. The nominal voltage at a customer's premise is 230V; 1%, the indicative voltage accuracy from BEAMA, corresponds to 2.3V

Impact on consumers

Great Britain's electricity network is ultimately funded by consumers, and the cost savings that had been anticipated from the smart meter rollout may not be realised if Electricity Network Parties do not have access to sufficiently accurate data to enable them to manage their networks as efficiently as possible.

Appendix 1: Progression Timetable

This proposal was raised on 27 May 2021. SECAS will present this Draft Proposal to the Change Sub-Committee (CSC) for initial comment on 29 June 2021 before presenting it to the relevant Sub-Committees.

Timetable	
Event/Action	**Date**
Draft Proposal raised	27 May 2021
Presented to CSC for initial comment	29 June 2021
Modification discussed with TABASC	1 July 2021
Modification discussed with Operations Group	6 July 2021
Presented to CSC for final comment and decision	27 July 2021

Appendix 2: Glossary

This table lists all the acronyms used in this document and the full term they are an abbreviation for.

Glossary	
Acronym	**Full term**
BEAMA	British Electrotechnical and Allied Manufacturers' Association
CSC	Change Sub-Committee
ESME	Electricity Smart Meter Equipment
ESQCR	Electricity Safety, Quality and Continuity Regulations
GBCS	Great Britain Companion Specification
RMS	Root Mean Square
SECAS	Smart Energy Code Administrator and Secretariat
SMETS	Smart Metering Equipment Technical Specifications
TABASC	Technical Architecture and Business Architecture Sub-Committee