



The future

NIA Progress Report

NIA_ENW 011
Enhanced Voltage Control

22 July 2016



VERSION HISTORY

Version	Date	Author	Status	Comments
v.1.0	20/07/2016	G Bryson Project manager	Final	Final version following internal review and comment

REVIEW

Name	Role	Date
A Howard	Programme Manager	21/07/2016
D Randles	Network Performance and Innovation Manager	21/07/2016
P Turner	Future Networks Delivery Manager	21/07/2016

APPROVAL

Name	Role	Date
Steve Cox	Head of Network Engineering	22/07/2016

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1 PROJECT BASICS

Project Title	Enhanced Voltage Control
Project Reference	NIA_ENWL011
Funding Licensee(s)	Electricity North West Limited
Project Start Date	November 2015
Project Duration	3 Years
Nominated Project Contact(s)	Geraldine Bryson (geraldine.bryson@enwl.co.uk)

2 SCOPE

This project will define the technical requirements to allow a GB rollout of the CLASS learning. The project will also provide new AVC settings for generator connections and investigate a technical solution to enable the offering of voltage managed connections for generators.

3 OBJECTIVES

The project has the following objectives:

- Devise appropriate technical solutions to meet the functional requirements for CLASS
- Trial technical solutions as necessary on the Electricity North West network
- Produce relevant documentation to allow future installations
- Devise new settings for generator connections
- Application of new settings at a number of primary substations on the Electricity North West network
- Develop a functional specification for a technical solution to enable the offering of voltage managed connections.

4 SUCCESS CRITERIA

- Successful trial of the business as usual technical solution for CLASS
- All relevant documents produced to allow purchase, installation and commissioning of the technical solution
- Settings devised for generator connections

- Successful trial of new settings for generator connections on a number of primary substations
- New voltage control policy incorporating the new settings
- New functional specification for a technical solution to enable the offering of voltage managed connections.

5 PERFORMANCE COMPARED TO THE ORIGINAL PROJECT AIMS, OBJECTIVES AND SUCCESS CRITERIA

This project has informed the development of specifications which will be used to purchase and install substation equipment required to deliver the enhanced voltage control functionality. Where appropriate, these specifications will be made available.

We have started to investigate the new generator settings and voltage managed contracts. We have commenced site selection for the trials and will carry out some modelling to aid in devising appropriate settings.

The first site for trial is in Greater Manchester and has particular issues with achieving voltage control owing to the significant generation deployed downstream. The generation installed is 14MW of gas turbines and the transformers at the primary substation are rated at 10/14MVA. This generation runs all year round and either matches or exceeds the site demand for real power. Historically voltage control schemes have struggled with this because the net power flow measured at the transformer is at or about 0MW and the power factor constantly fluctuates due to reactive power flow.

At this site we have installed trial enhanced AVC relays with added functionality manufactured by Fundamentals. To use the added functionality current transformers are to be fitted on the four feeders with generation. The current transformers will feed into the SuperTAPP SG AVC relay and the relay uses the measurements to determine the true transformer load and control the voltage more accurately. The AVC relays are installed but due to outage constraints the feeder current transformers are not yet all installed so feedback on this cannot be provided at this stage.

6 REQUIRED MODIFICATIONS TO THE PLANNED APPROACH DURING THE COURSE OF THE PROJECT

Following the registration of this project Electricity North West was encouraged by Ofgem and National Grid to progress the CLASS component of the enhanced voltage control to wide scale deployment as soon as possible. Rather than waiting on the results of this project a tender has been initiated using existing functionality developed as part of the Second Tier project, CLASS.

7 LESSONS LEARNT FOR FUTURE PROJECTS

To date project activities have been focused on establishing a contract with an appropriate technical consultancy. This includes the development of appropriate settings for generator connections. At the time of writing, this work is still in progress.

The Greater Manchester substation trial is the first installation of the new Fundamentals Supertapp SG relay. As with many new installations there have been some teething problems including issues with analogues, IO cards and outputs which related to communications inside the relay controlled by the software. The manufacturer has analysed

the issues, corrected the software and issued newer versions of the relays which are now installed and working correctly. These problems would not have been apparent from any bench test and are only revealed when the relay is controlling voltages on a live system.

From a voltage control viewpoint the SuperTAPP SG is working as expected. The new functionalities will be trialed once the feeder current transformation installation is completed.

8 THE OUTCOMES OF THE PROJECT

Not applicable.

9 PLANNED IMPLEMENTATION

Not applicable.

10 OTHER COMMENTS

Not applicable.