



# QUEST EIS 2024, Liverpool

Technology to increase capacity of existing infrastructure to support growth in renewables and LCTs.

Andy Howard

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What is being developed?

A voltage optimisation algorithm which will co-ordinate the actions of multiple voltage control and optimisation techniques across the whole system to optimise their use and facilitate the increased use of Low Carbon Technologies (LCTs).

What are the benefits?

Several discrete voltage management techniques have been deployed by DNOs which have been successful in helping to manage the network. By coordinating the interactions of these techniques QUEST will increase the benefits they generate.

Additionally, QUEST will demonstrate that optimising voltages across all levels of the network can maximise efficiency and allow for the increased uptake of LCTs and associated increase in demand on the network.

# Project Partners



Our current NMS partner

NMS provides end to end real time network visibility required



Leading ANM provider to GB industry

Enable project to prove transferability



Experts in voltage control and leading AVC provider to GB industry

Facilitates transferability



Operator of the GB transmission network

Enables project to examine issues at TSO / DSO interface



Leading consumer research consultancy with proven experience in NIC projects

Provides independent customer feedback



## New overarching control system software

- Full control at all voltage levels below Grid Supply Point
- Optimise / maximise voltage control at each voltage level
- Interface with other elements of Network Management e.g. ANM, emergency situations
- Interface with external / 3<sup>rd</sup> party ANM systems

Offline studies to inform and corroborate results

**SMART STREET**

**CLASS**

**Active Network Management**

# QUEST management dashboard



QUEST Control & Monitoring

SYSCON Selection: **HORADALE** OC6 VR(5) OC6 DD(4) LFDD(2R3) BLACK START(1)

Search: [ ]

WHITEGATE GSP

QUEST Contention Management Process

Configure: QUEST (default) | Simulate: Not Started | Outcome: Not Available

QUEST Control

Apply Configuration: Active Profile: CLASS highest priority | QUEST Status: Enabled - Standby

Object	BSP TSF (132 MW)	NEM (33 MW)	CLASS (11 MW)	Smart Street (3V)	Centralised APM (DRV, HV)	Decentralised APM (DRV, HV)	Cloud APM (DRV, HV)
CHADDERTON GRID	● Off	● CLASS-DRH-SM	-	-	-	-	-
CHADDERTON (300029)	-	-	● Off	● Normal mode	● Off	● Normal mode	● Normal mode
FALSWORTH (100613)	-	-	● Off	● Normal mode	● Off	● Normal mode	● Normal mode
HOLLINWOOD (307008)	-	-	● Off	● Normal mode	● Off	● Normal mode	● Normal mode
LANGLEY (302855)	-	-	● Off	● Normal mode	● Normal mode	● Off	● Off
MIDDLETON JUNCTION (300015)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
NEW MOSTON (100623)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
NEWTON HEATH (100624)	-	-	● Off	● Off	● Off	● Normal mode	● Normal mode
TOWNLEY ST (300004)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
GREENHILL	● Off	● CLASS-DRH-SM	-	-	-	-	-
BELGRAVE (300832)	-	-	● Off	● Normal mode	● Normal mode	● Off	● Off
GREENHILL PRIMARY (300024)	-	-	● Off	● Off	● Normal mode	● Off	● Off
ST MARYS (302931)	-	-	● Off	● Normal mode	● Off	● Normal mode	● Normal mode
WATERHEAD (302852)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
WERNETH (303309)	-	-	● Off	● Off	● Off	● Normal mode	● Normal mode
RED BANK GRID	● Off	● CLASS-DRH-SM	-	-	-	-	-
ANCOATS NORTH (100601)	-	-	● Off	● Off	● Off	● Normal mode	● Normal mode
BLACKLEY (100605)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
CANNON ST (100607)	-	-	● Off	● Off	● Off	● Normal mode	● Normal mode
HARPURHEY (100614)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
ROYTON	● Off	● CLASS-DRH-SM	-	-	-	-	-
HEYSIDE (302808)	-	-	● Off	● Off	● Off	● Normal mode	● Normal mode
ROYTON PRIMARY (300009)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
SHAW PRY (300006)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode
WILLOWBANK (302292)	-	-	● DRH Enabled	● Off	● Off	● Normal mode	● Normal mode



## Cyber Security Challenges

Led to an IT infrastructure design change including:

- QUEST decoupled from NMS
- Additional ICCP connections
- IT Configurations & Security firewalls

## Infrastructure

On site build went smoothly

- Relay development
- Site Installs

## Customer

- Impact on domestic customers tied to trials
- Sensitive HV customer work complete
- Voltage Generation contract work in progress

Project Extension of 3 months, with reduced trial period agreed in December 2023 / April 2024

# QUEST Project timescales and deliverables (April 24)



Workstream Phase	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024	Q1 2025	Q2 2025	Q3 2025	Q4 2025
Phase 2 Implementation	Bid		Actual							
IT Install	Bid		Actual							
Trials and Analysis		Bid			Revised					
T&A Phase 1		Bid		Revised						
T&A Phase 2				Bid		Revised				
Closedown						Bid		Revised		
Phase 4 Transition to BaU							Bid	Revised		
Customer		Bid						Revised		
Learning & Dissemination		Bid						Revised		
Deliverables	1-4		5				6	7	8	9

Deliverables	
1	QUEST Initial Report - Use Cases
2	QUEST System Design and Architecture Lessons Learned
3	QUEST Trials, Design and Specification Report
4	QUEST Interim Report - System Design and Technology Build Lessons Learned
5	QUEST System Integration Lessons Learned Report
6	QUEST Customer Research Findings Report
7	QUEST Trials and Analysis Report
8	QUEST Final Report
9	Comply with knowledge transfer requirements of the Governance Document.



## ICCP – Testing and Modifications

April 2024 – First operation of real-world relay from the QUEST dashboard

July 2024 – First operation of the Full QUEST system and the interaction with the LIVE network management control room systems

### However.....

This identified additional changes to ICCP points, QUEST software configuration and Relay configuration

Required a full design, implementation, test and approval cycle to implement with additional delay





## Continue trials

Initial trials prove basic functionality of individual elements at each voltage

Increasing complexity in trials mix (Simulated and Real Time)

Sense check of results, and real time monitoring to SGS network model

## Customer Engagement

Domestic customer engagement: revisit during Trial period with changed voltage management

Completion of engagement work assessing possible future voltage management generator contracts

## BaU Transition

QUEST anticipated to be successful for adoption

Software code will need embedding on core NMS and updated to match core product version.

# QUESTIONS & ANSWERS



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