



QUEST Project Overview & Progress Update

Energy Networks Innovation Conference 2021

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In November 2020, ENWL was awarded **£7.95 million** funding by Ofgem's Network Innovation Competition (NIC) for QUEST. The project runs from April 2021 to April 2025.

QUEST is a whole-system voltage optimisation system, comprising software held centrally within a network management system, alongside intelligent devices fitted in substations. QUEST will co-ordinate the actions of multiple voltage control and optimisation techniques, including CLASS, Smart Street and Active Network Management (ANM), holistically across the whole system to optimise their use and facilitate the increased use of Low Carbon Technologies (LCTs).

Why is QUEST Needed?

QUEST will allow DNOs to cater for the increased uptake of LCTs and the subsequent increase in demand on the network. Over the years, DNOs have deployed a number of discrete voltage management techniques which have been successful in helping to manage the network. QUEST will address their inherent limitations by fully coordinating their use.

The problem

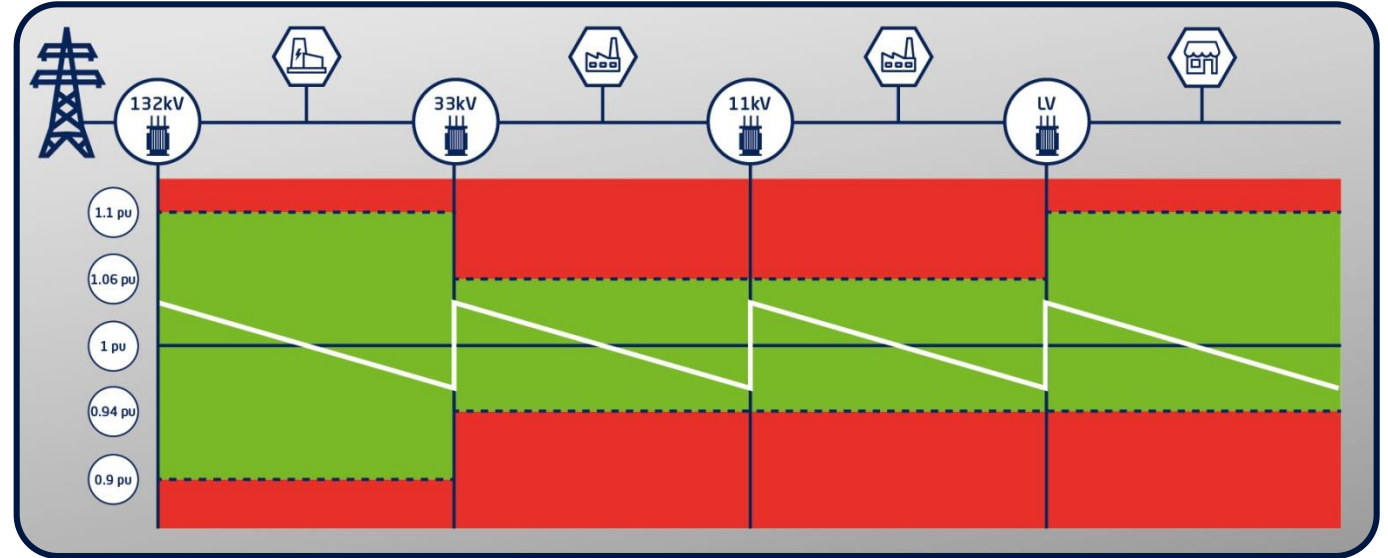


Historical

Passive traditional distribution network operation

Predictable customer demand profiles

Simple, independent voltage control techniques

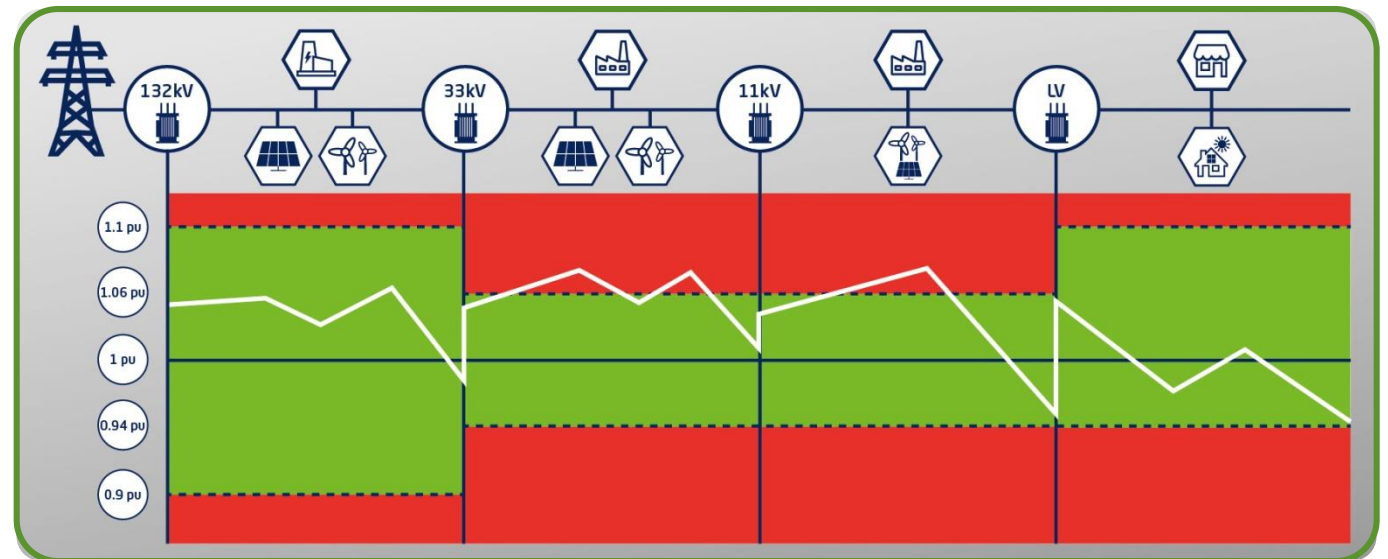


Today

Decarbonisation drives uptake of low carbon technologies

Increase in demand and generation leads to highly variable voltage profile

Voltage management techniques not co-ordinated which could reduce effectiveness



The solution



QUEST will deliver a business-ready solution to holistically integrate multiple, concurrent voltage management techniques across the whole distribution system
This will unlock capacity for customers and facilitate the adoption of low carbon technologies

OVERARCHING CONTROL SYSTEM QUEST



Benefits



Carbon savings of 8,373tCO₂e across ENWL by 2050,
and 51,498tCO₂e across GB by 2050

Across GB (ENWL), net benefit of £266.7m (£32.6m) and up to 2,236.7MVA (211.2MVA) capacity by 2050

Savings of £3,385.5m for LV customers and over £932.8m for HV customers across GB up to 2050

Reduction in system losses providing a financial benefit of £65.4m across GB by 2050



Releases network capacity to facilitate the low-cost connection of LCTs

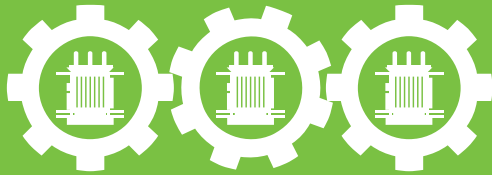
Enables whole distribution system voltage optimisation by integrating discrete, innovative techniques

Maximises the use of existing low carbon generation and allows DNOs to provide faster, cheaper connections

Why is it innovative?



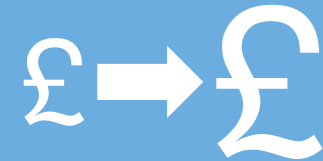
QUEST contains three highly innovative, and as yet untested, aspects



For the first time ever, network operators will have the ability to resolve voltage constraints at one voltage level through the action of voltage controllers at another



Ability to look holistically at total network, determine and deploy voltage profiles that deliver optimised outcomes for network operation and connected customers



By fully co-ordinating the operation of previously discrete systems, QUEST will boost their effectiveness to provide a fully optimised system

By integrating discrete voltage management techniques into one overarching voltage control and optimisation system, QUEST will give network operators the ability to manage system voltages more efficiently by using the full range of voltage control available in a holistic manner

Project Plan and Deliverables



Workstream	Tasks	2020	2021	2022	2023	2024	2025
Project Mobilisation	Project Readiness		■				
	Mobilisation		■				
	Financial & Contractual		■				
Technology	Phase 1: System Design		■				
	Phase 2: Implementation			■			
	<i>Deliverables</i>		★ ★				
Trials & Analysis	Trials				■		
	Refinement & Simulation				■		
	Trials Report					■	
	<i>Deliverables</i>			★	★ ★	★	
Transition to BaU	Closedown					■	
	BaU Transition					■	
	<i>Deliverables</i>						
Customer	Customer Engagement		■		■		
	Report of Findings					■	
	<i>Deliverables</i>					★	
Learning & Dissemination	Dissemination activities		■	■	■	■	
	<i>Deliverables</i>						★

Deliverables

- 1 Initial report: use cases
- 2 System design and architecture lessons learned
- 3 Trials, design and specification report
- 4 Interim report: system design & technology build lessons learned
- 5 System integration lessons learned report
- 6 Customer research findings report
- 7 Trials & analysis report
- 8 Final report
- 9 Knowledge transfer requirements of governance document

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



Since April 2021, the primary focus has been on the Use Case Initial report, which we submitted to Ofgem at the end of July 2021.

The Use Case report detailed different scenarios and opportunities of optimisation with the coordination of all discrete voltage systems and possible solutions for further research and analysis.

At present, we are working on architecture options and the modelling regime using the outputs of the Use Case report. This our next key deliverable and is due for submission end of December 2021.

QUEST
An overarching control system

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OVERARCHING CONTROL SYSTEM

QUEST

QUEST Initial Report – Use Cases
Issue: 1
Submission Date: 30th July 2021

Project Partners

nationalgridESO FUNDAMENTALS Schneider Electric
smarter grid solutions IMPACT

Summary



- Novel application of proven technology and innovative software
- An overarching control system operates a holistic voltage control methodology



Technology

Network benefits



- Coordinates existing and future voltage control techniques
- Establishes highly efficient network operation

- Carbon savings of 8,373tCO₂e across ENWL by 2050, and 51,498tCO₂e across GB by 2050
- Promotes low-cost connection and use of low carbon technologies



Carbon Footprint

Project Progress



- First project deliverable (Use Case Initial Report) was submitted end of July 2021.
- QUEST project team currently working on QUEST architecture options and modelling regime.