



QUEST Use Cases Industry Steering Group

7th July 2021

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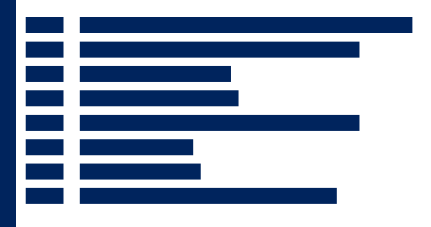
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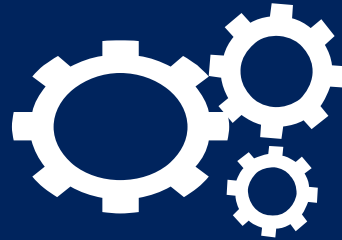
QUEST project
overview and team

QUEST Project Partners

Project Overview



Use Case Development
Approach



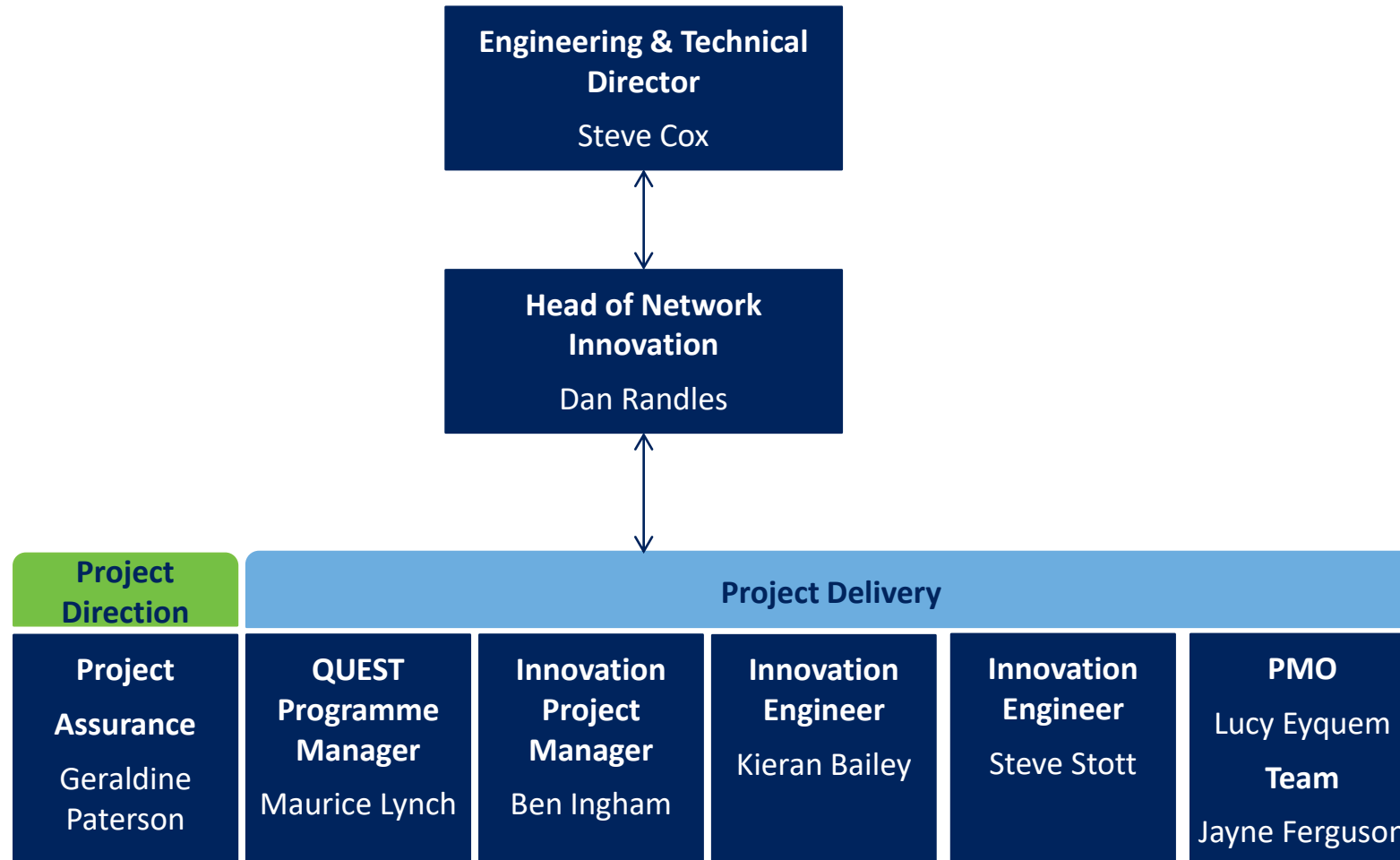
Individual Use Cases &
detailed run through

Purpose of this Meeting



As part of the NIC QUEST project ENWL is looking to consult with other network operators, as part of an Industry Steering Group (ISG) established specifically for the project. The purpose of this group is to ensure the holistic voltage control methodology is replicable and considers all appropriate use cases.







*In November 2020 Ofgem announced their decision to award ENWL's full funding request of **£7.95 million** for the QUEST project.*

QUEST is an overarching system that will be designed to provide a holistic voltage control methodology to coordinate discrete voltage management techniques, to optimise their use and facilitate the increased use of LCT's (Low Carbon Technologies).

Why is QUEST Needed?

To cater for the increased uptake of LCT's and subsequent increase in demand on the network, ENWL has deployed a number of discrete voltage management techniques on the network over the last number of years. These techniques have been successful in helping us manage the network in helping ENWL to manage the network, but have some limitations as they are not currently coordinated.

The problem

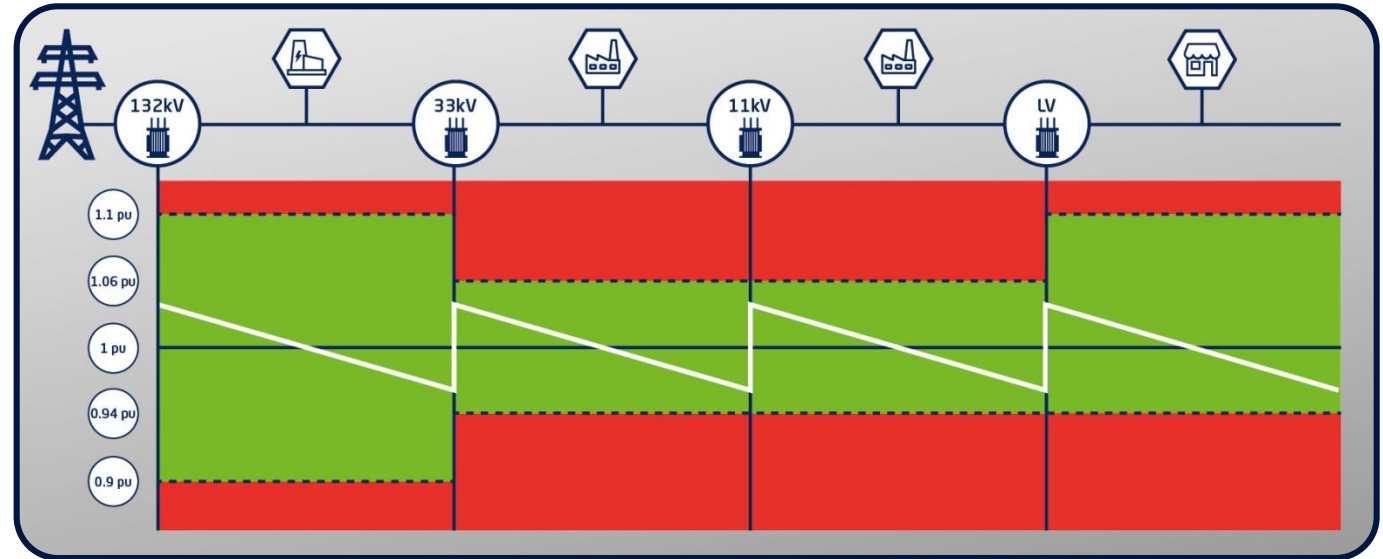


Historical

Passive traditional distribution network operation

Predictable customer demand profiles

Simple, independent voltage control techniques

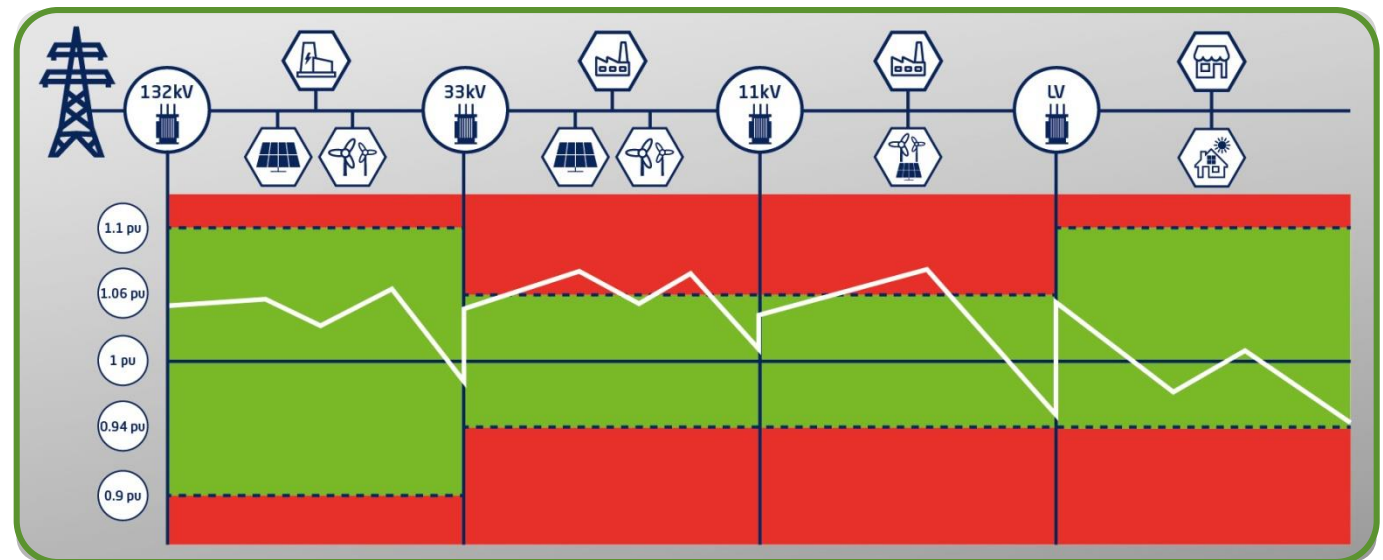


Today

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



CLASS System Overview



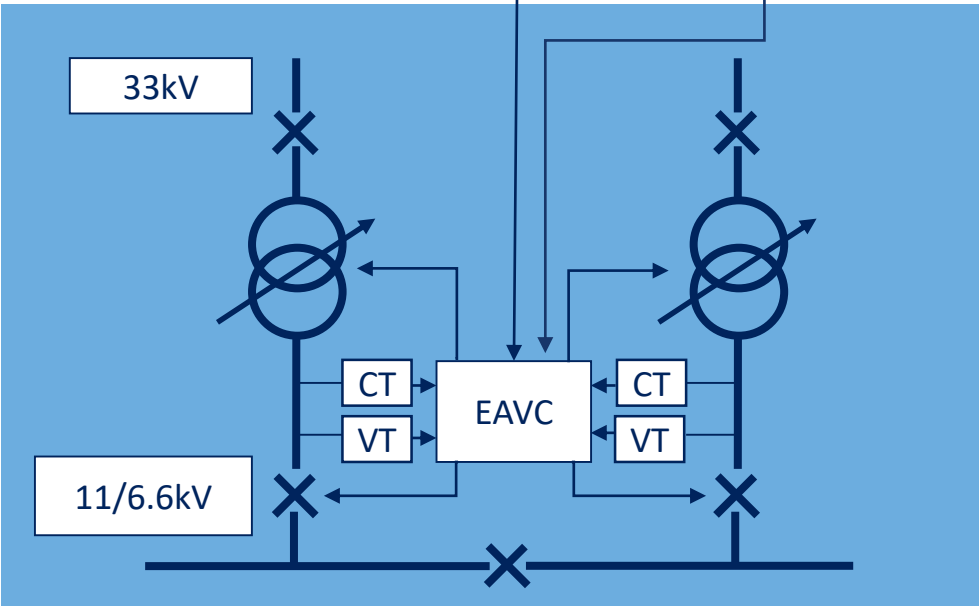
NGET System: Link will provide capability for National Grid to access the CLASS functionality directly for flexible whole system response

NGET System



Central System

CLASS Dashboard NMS Data Processing iHost



Central System (Dashboard)

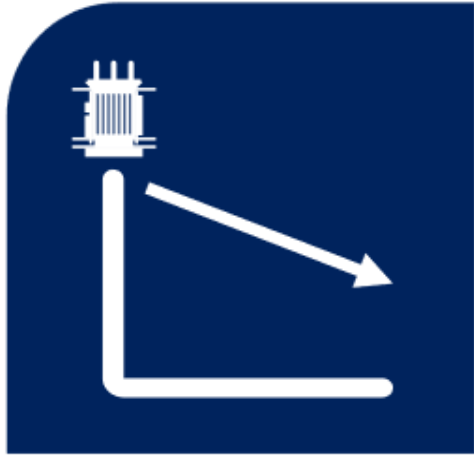
Facility to specify service requirements
 Monitors the status of each CLASS substation and which should be armed or disarmed
 Monitor performance

Enhanced Automatic Voltage Controller

Measure performance. voltage, current, power, frequency etc
 Hold arm/ disarm flags for each of the CLASS services
 Trip or close circuit breakers or operate tap changers to implement CLASS services

Data Processing

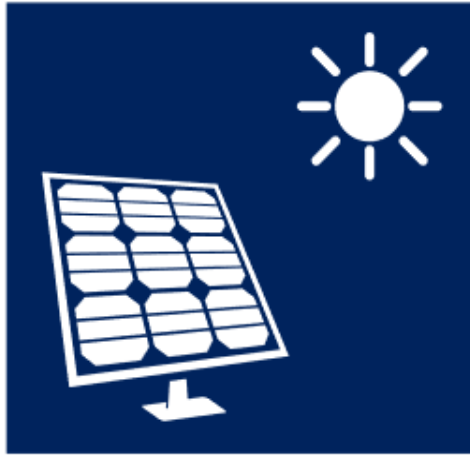
Collect 1s data, analyse performance submit to National Grid



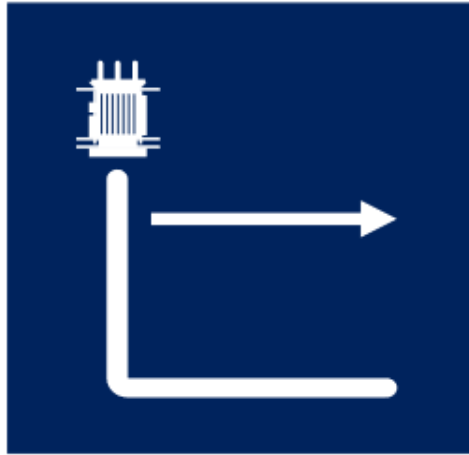
Historic networks have no active voltage regulation



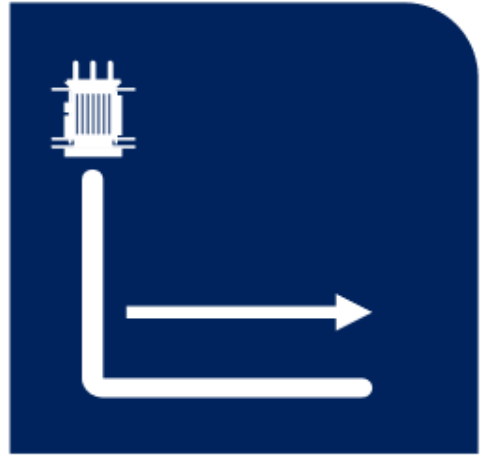
LCTs create network issues
Customer demand could cause voltage to dip below statutory limits



Customer generation could cause voltage to exceed statutory voltage limits



Smart Street stabilises voltage across the load range and optimises power flows

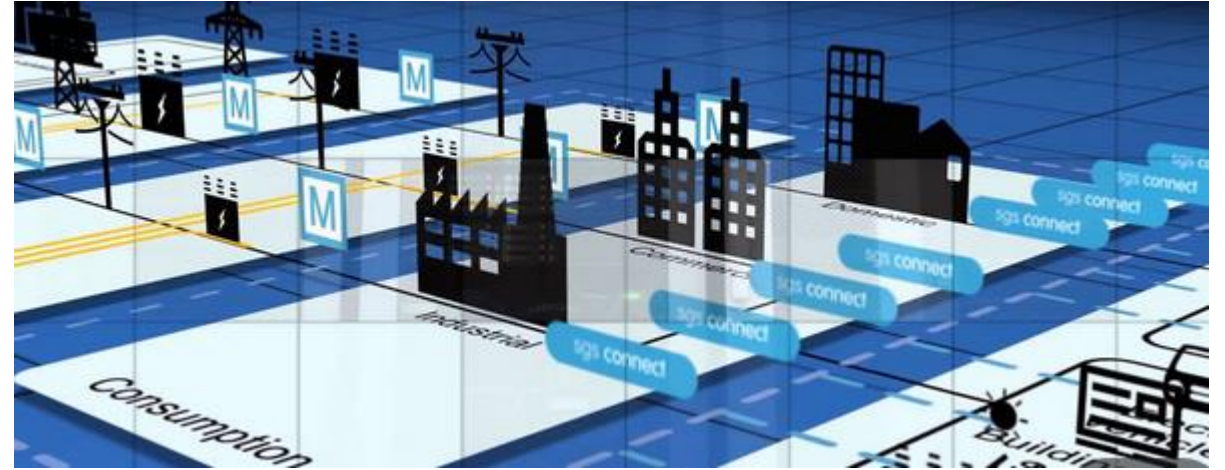


Conservation voltage reduction
Stabilised voltage can be lowered making our network and customers' appliances more efficient



ANM System within ENWL is still being developed.

However, the main purpose of ANM is to connect and manage renewable sources to the existing network faster and with less reinforcement. This will also allow more managed demand to be connected where thermal and voltage constraints currently exist, again with less reinforcement. All this is achieved within the limits of the existing network.



QUEST 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

Partners Within Project



Schneider
Electric

Our current NMS partner

NMS provides end to end real time network visibility required

smarter
grid solutions

Leading ANM provider to GB industry

Enable project to prove transferability

 FUNDAMENTALS

Experts in voltage control and leading AVC provider to GB industry

Facilitates transferability

nationalgrid ESO

Operator of the GB transmission network

Enables project to examine issues at TSO / DSO interface

Impact
Research

Leading consumer research consultancy with proven experience in NIC projects

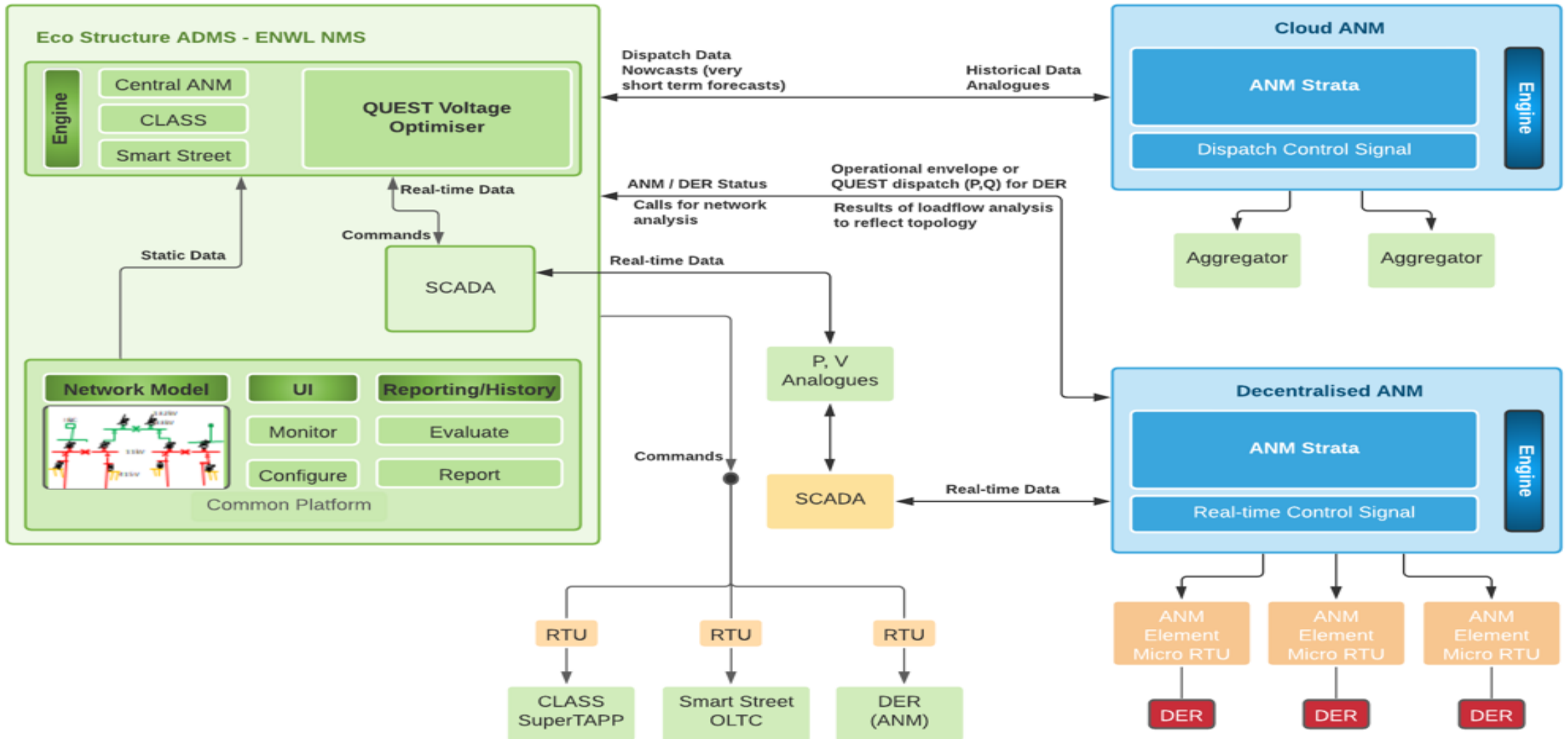
Provides independent customer feedback



The Purpose of the Use cases within this report is to provide a description of how systems will operate and be coordinated within the QUEST overarching control system. It outlines, from a user's point of view, the network's behaviour as it responds to requests. Each Use Case is represented as a sequence of simple steps, beginning with a user's goal/conflict and ending with a proposed solution to achieve the outline goal/conflict.

Use Case Name	[Insert use case name (taken from the ENWL list of use cases)]			
Use Case Number	[e.g. UC1]	Version	[e.g. 1.0]	Status [Insert status: e.g. draft, under review, approved]
Use Case Development Owner	[Insert Quest partner company take the lead and ownership of the use case development]			
Use Case Description	[Insert a summary description of the use case function]			
Primary users	[Insert ENW system primary users]			
Secondary users	[Insert ENW system secondary users]			
Trigger	[What events / systems / users trigger the use case and how]			
Preconditions	[Describe the conditions that can exist prior to the use case trigger event]			
Post Conditions	[Describe the conditions at the end of the use case]			
Main Success Scenario	Steps	Actions		
	1.	[Describe in the simplest terms what should happen next]		
	2.	[Describe in the simplest terms what should happen next]		
	3.	[Describe in the simplest terms what should happen next]		
	4.	[Describe in the simplest terms what should happen next]		
	5.	[Describe in the simplest terms what should happen next]		
	6.	[Describe in the simplest terms what should happen next]		
Extensions	[Describe extensions to the main success scenarios including in the simplest terms what should happen next if there is a failure]			
Notes and Outstanding issues (if any)	[Insert any outstanding questions, issue, holds that require to be addressed to complete the use case development]			

Architecture Diagram





The functional use cases identified to support development of the QUEST overarching Voltage Control System are listed below.

(The Use Cases highlighted green will be discussed in further detail within this presentation)

1. Quest running in network efficiency.
2. Smart Street & CLASS.
3. Smart Street & ANM (Flexible service and connections).
4. CLASS & ANM (Flexible service and connections).
5. Smart Street, CLASS & ANM (Flexible service and connections).

NG ESO responses

6. Smart Street, Class, ANM & LFDD.
7. Smart Street, Class, ANM & OC6.
8. Smart Street, Class, ANM & Deliver Reactive Response.



Notes

- OFDM (Optional Downward Flexibility Management) was also considered when developing the Use Cases for this initial report. However, as per the information report provided on the ESO data portal which states OFDM is a time-limited service that will expire 31 October 2021, it was felt by the project group that creating an individual Use Case for this service was not applicable. Also as this is an flexible service, this would mean that it would fall into ANM remit.
- Dynamic containment which has been highlighted within the ESO Market road map 2025, has also being considered within the Use Cases, this is known as SFR within the CLASS functionally as seen in Use Case No.4. It was felt no individual Use Case is required t as this functionally already exists within CLASS and the other use cases that include CLASS SRF.



1. These Use Cases are a starting point for the development of the different architecture options and design specification.
2. Since this is the first-time multiple system objectives will be run together, it is possible unforeseen conflicts will arise.
3. The Use Cases are intentionally developed at a high level to allow a degree of flexibility as the QUEST system progresses into the design phase. In particular the safe modes for each system to cater for conflict will need to be examined in the design phase.
4. This approach provides a robust and safe solution for QUEST to be implemented and meets the project overall objectives.
5. ENWL will continue to monitor changes within system requirements, that may require additional Use Cases to be considered.
6. This report could be seen as living document as markets progress.



**YOUR FEEDBACK
MATTERS**