electricity north west

Bringing energy to your door

SMART STREET

The Road to IRM

Wednesday 30 October 2019

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From project to where?

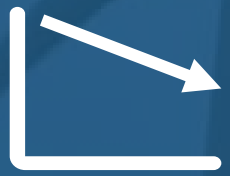
C_2C

CLASS
Customer Load Active System Services

Learning formed the basis of our flexible connection contracts

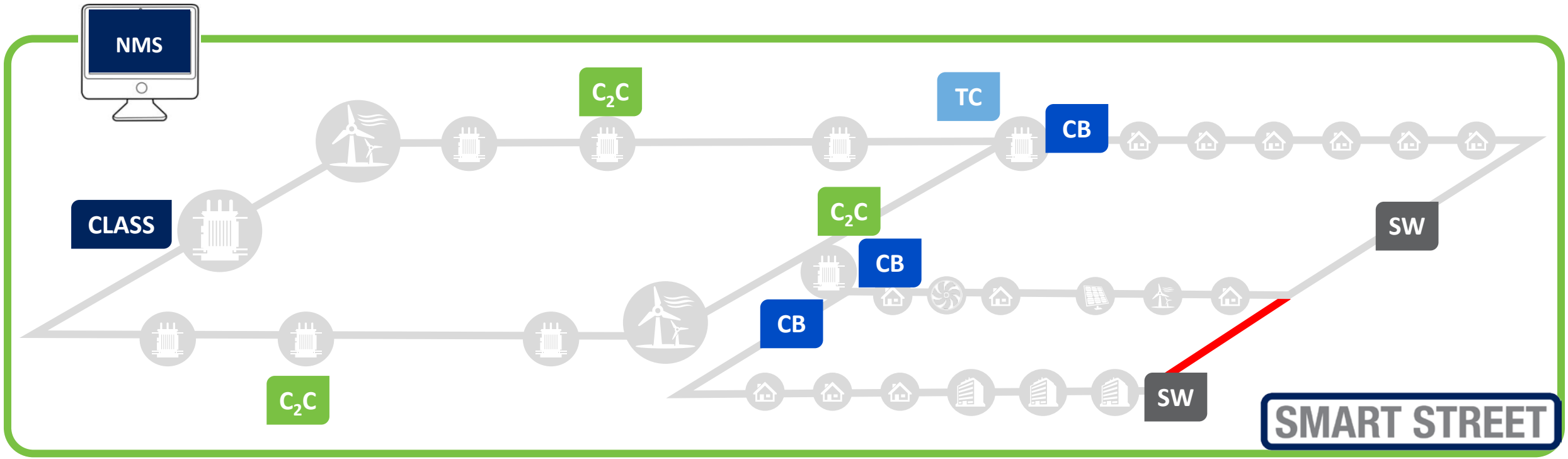
Savings of £24m forecast across RIIO ED1

Installed on 220 sites across the Electricity North West network



Provides a demand response of over 50MW

Network overview



C_2C Capacity to Customers

CB LV CB

SW LV Switch

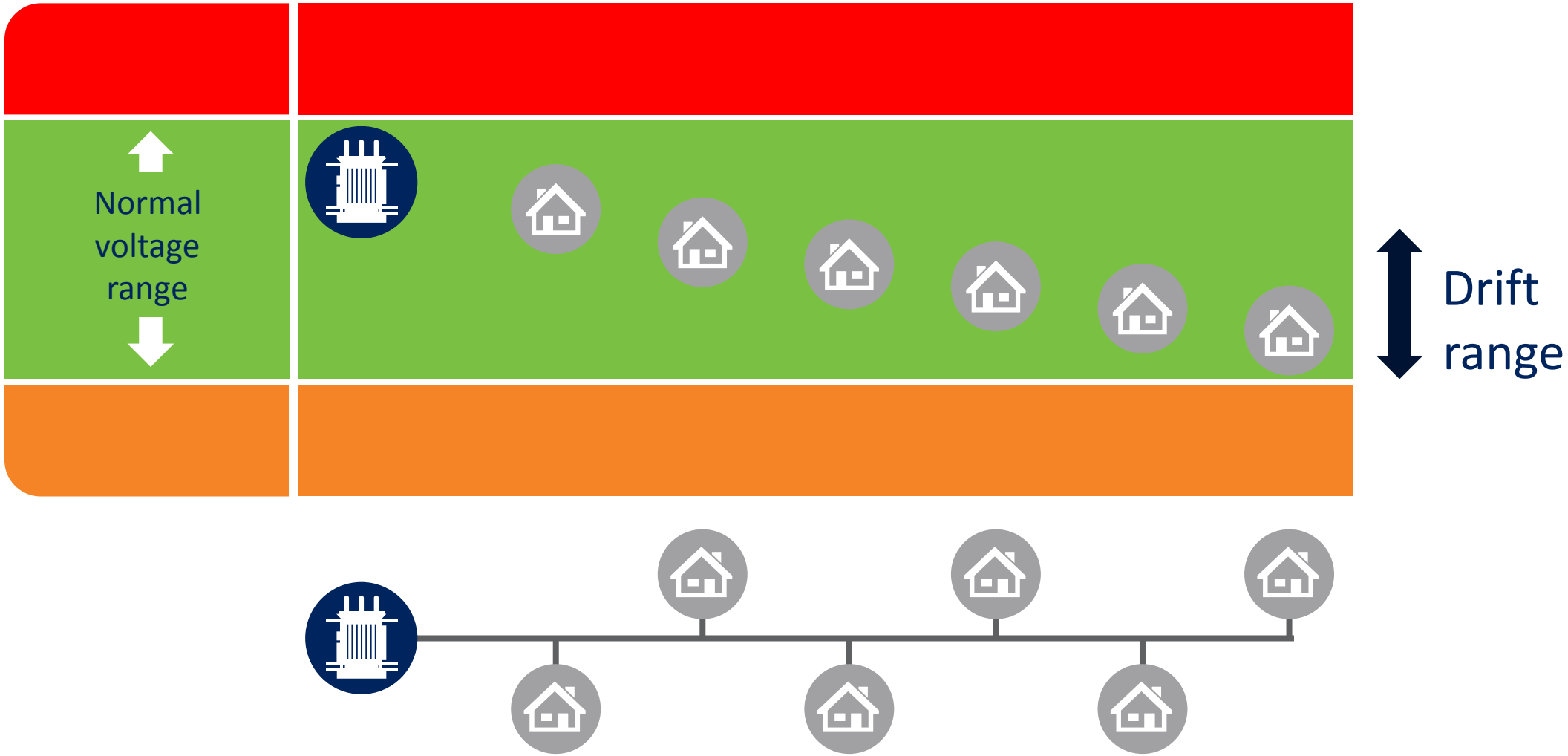
TC On-load tap changer

Builds on C_2C and CLASS ● Storage compatible ● Transferable solutions

Smart Street LCNF tier 2 project overview

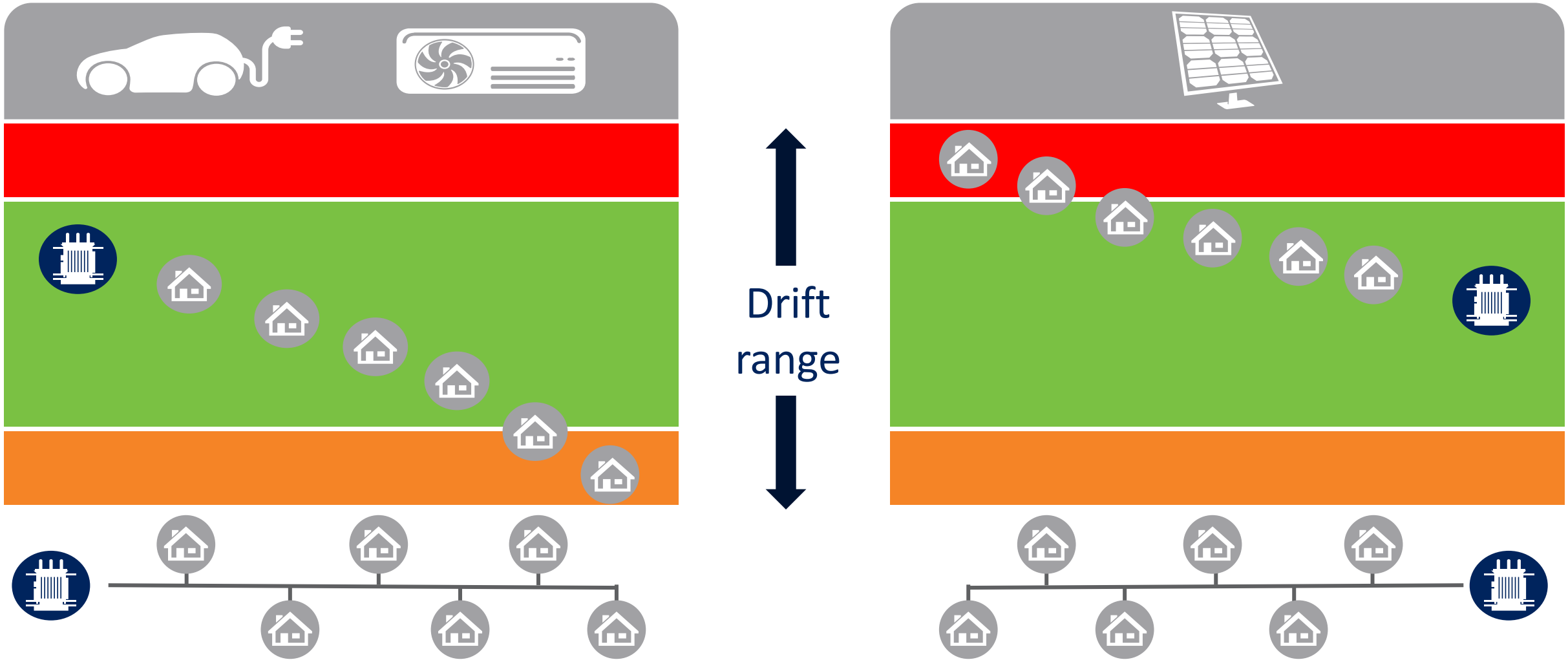
£11.5m, four-year innovation project	Started in Jan 2014 and finished in Apr 2018	Quicker connection of LCTs Lower energy bills Improved supply reliability	Trials period Jan 2016 – Dec 2017	Extensive customer engagement programme throughout project

The problem



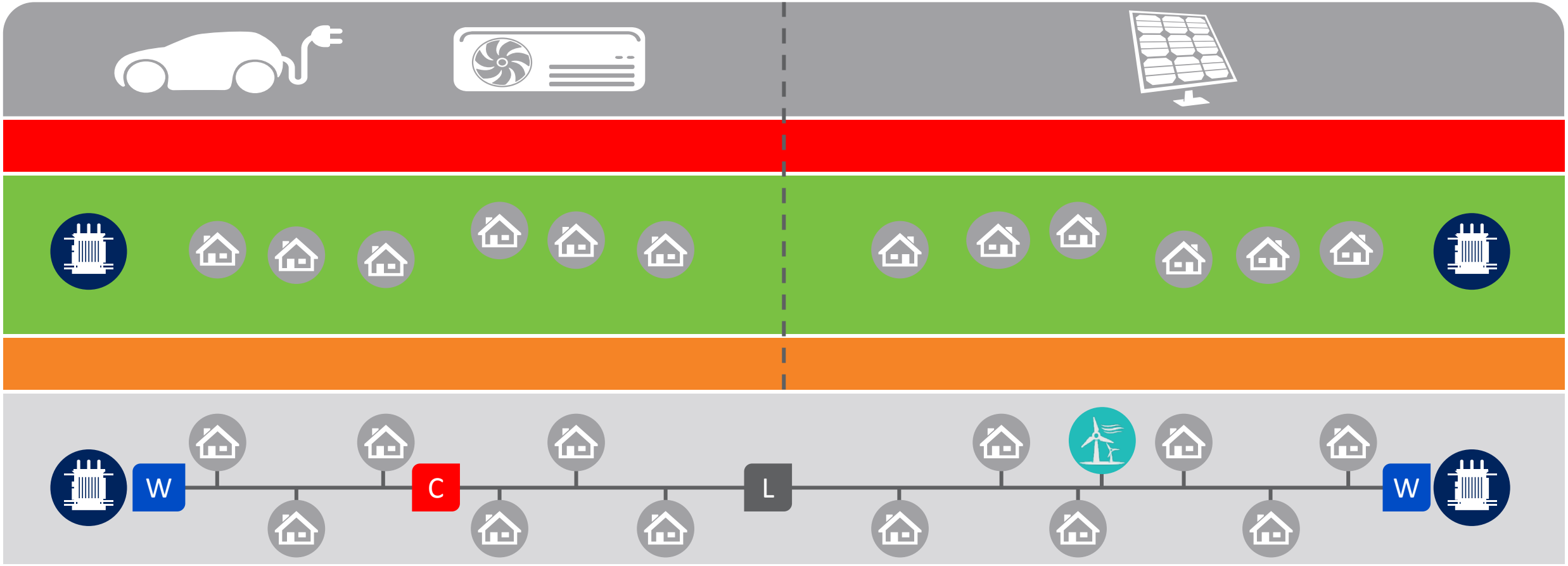
Historic networks have no active voltage regulation

Problem – LCTs create network issues



LCTs rapidly surpass voltage and thermal network capacity. Other projects only address one of these limits

Smart Street – the first intervention



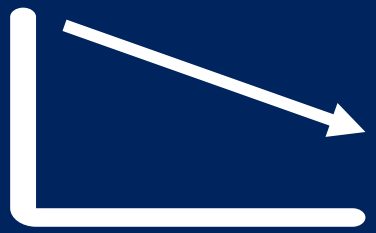
Low cost ● Quick fit ● Minimal disruption ● Low carbon ● Low loss ● Invisible to customers

Voltage stabilised across the load range ● Power flows optimised

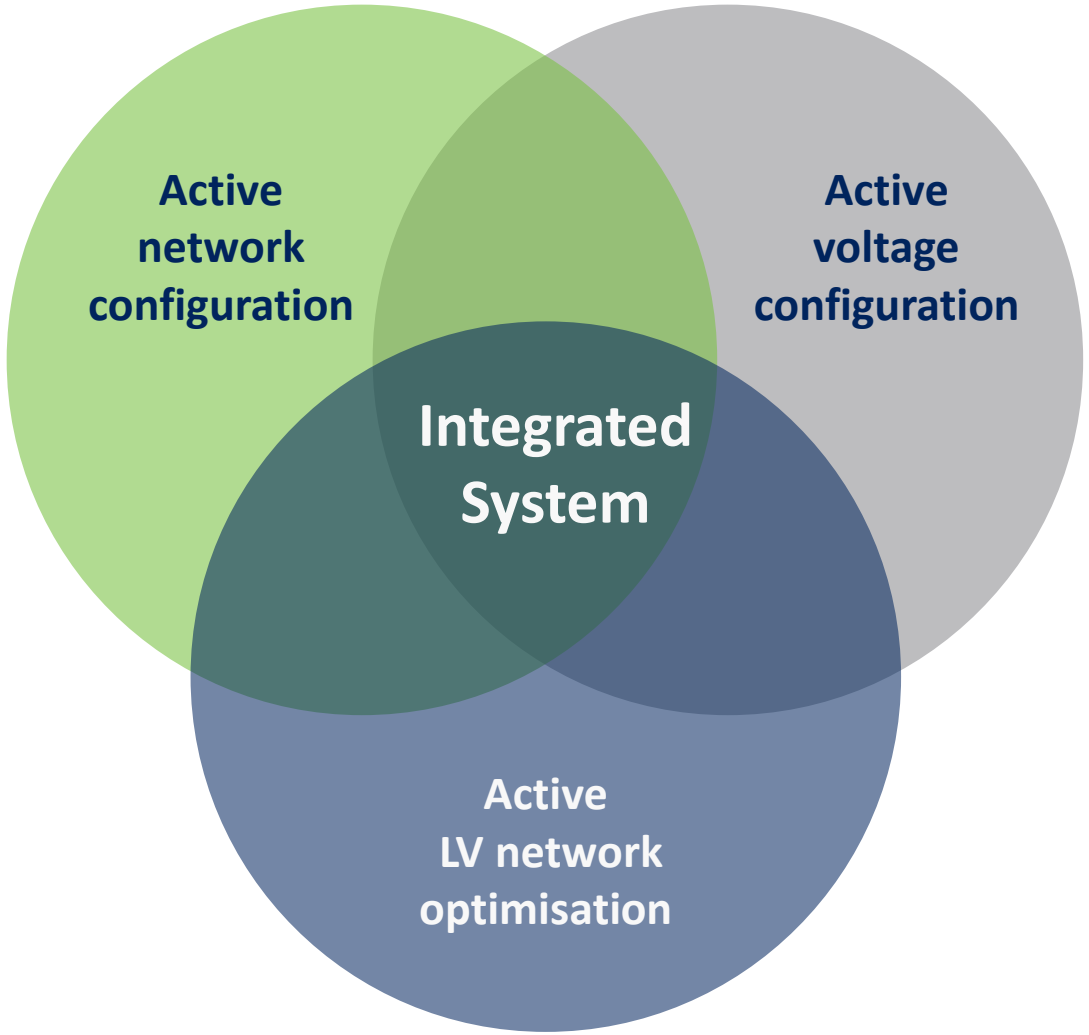
Smart Street project technology overview

Optimisation software

High level Smart Street project conclusions

Optimisation benefits (energy)	Optimisation benefits (losses)	Trade off between loss and energy consumption reduction	Carbon benefits
			
6-8% voltage reduction 5.5 – 8.5% energy reduction All networks similar energy reduction	Up to 15% loss reduction Rural network has highest loss reduction	Does exist but depends on load composition Energy consumption dominates Total energy reduction independent of weightings applied	Electricity system emissions reductions of 7% to 10% may be possible with a full application of Smart Street

Conclusion for wide-scale deployment and IRM

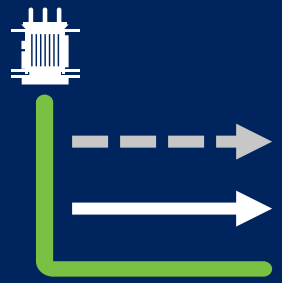


Active network configuration
Installation of LV circuit breakers and link box switches

Active voltage configuration
Installation of on-load tap changing transformers with revised tap changer specification for increased savings.
No short/medium term benefit for capacitors

Active LV network optimisation
Optimisation software controlling all devices centrally and automatically adjusting the network for real time situations

IRM overview

Site selection	OLTC	Meshing	Integration
			
Integrated system approach Deployed on 180 networks across Electricity North West	Active voltage regulation	Active LV network configuration	Active LV network optimisation

Site selection

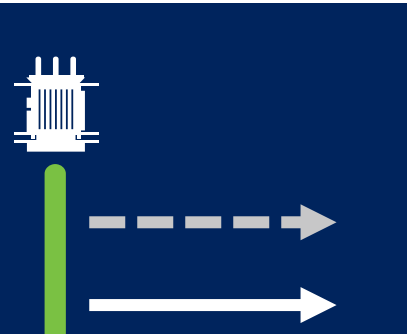
Predicted high LCT uptake

Areas with a high level of fuel poverty

Sites which satisfy both criteria

Benefits

Create capacity headroom to connect more LCTs



Prevent breach of statutory voltage limits associated with demand growth/ generation

Reduce energy consumption

Run network more efficiently

Decrease losses

Reduce carbon impact

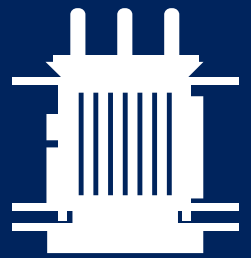
Meet national and regional targets

Help to reduce fuel poverty gap for Electricity North West's customers

Business case

Scenario	Total benefits (£m NPV)					
	2023	2031	2039	2047	2055	Payback year
Baseline	0.05	16.23	28.89	39.36	49.03	2023
High	1.52	23.63	40.86	55.02	68.00	2022
Low	-1.20	9.67	18.25	25.41	32.11	2024

Roll-out benefits

Carbon benefits	Long-term value for money for customers	No commercial benefits in RIIO-ED1	Proven innovation
			
Reduction of: 16,423tCO_2e by 2023 84,564tCO_2e by 2031 142,797tCO_2e by 2055	Savings of up to: £0.05m by 2023 £16.23m by 2031 £49.03m by 2055	Site selection will consider reinforcement needs from ED2 CI/CML benefit predicted at £0.027m in ED1	Will only deploy proven innovation demonstrated in the successful LCNF project

Implemented innovation

Active optimisation of the LV network is a completely new operating regime

A unique ‘integrated system’ arrangement of equipment

“A unique application to reduce customers bills and facilitate the transition to a low carbon economy”

QUESTIONS & ANSWERS

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Please contact us if you have any questions or would like to arrange a one-to-one briefing about our innovation projects