

SMART STREET

Workshop

Tuesday 28 February 2017

electricity
north west

Bringing energy to your door



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Agenda



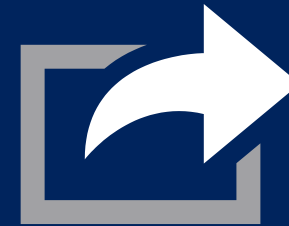
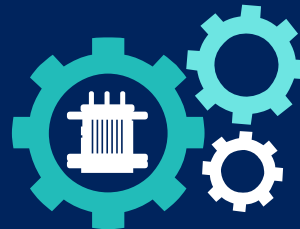
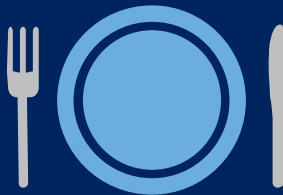
SMART STREET



Background & recap
10:00 – 11:00

Demonstration
11:00 – 11:30

Q&A
11:30 – 12:00



Lunch
12:00 – 13:00

Site visit
13:00 – 15:30

Close
16:00

Smart Street project overview



£11.5m,
four-year
innovation project



Started in Jan
2014 and finishes
in Apr 2018



Quicker
connection of
LCTs
Lower energy bills
Improved supply
reliability



Trials period
Jan 2016 –
Dec 2017



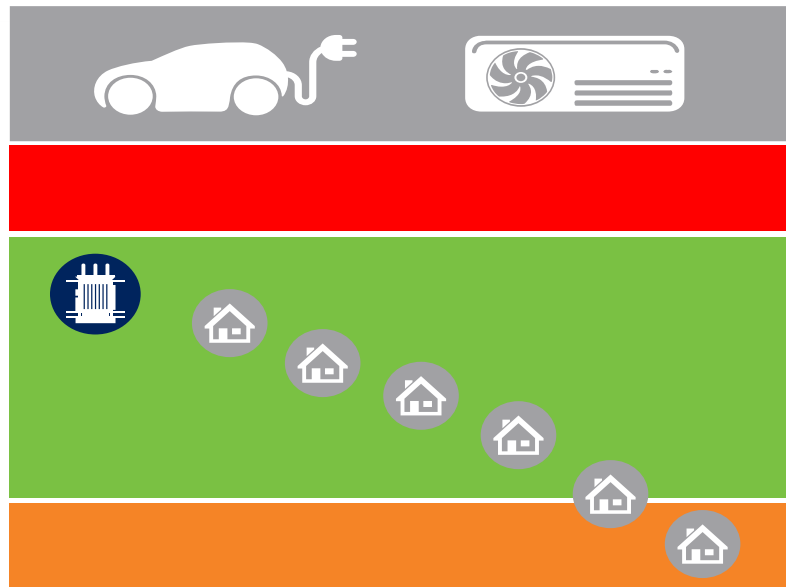
Extensive
customer
engagement
programme
throughout
project

Voltage profile

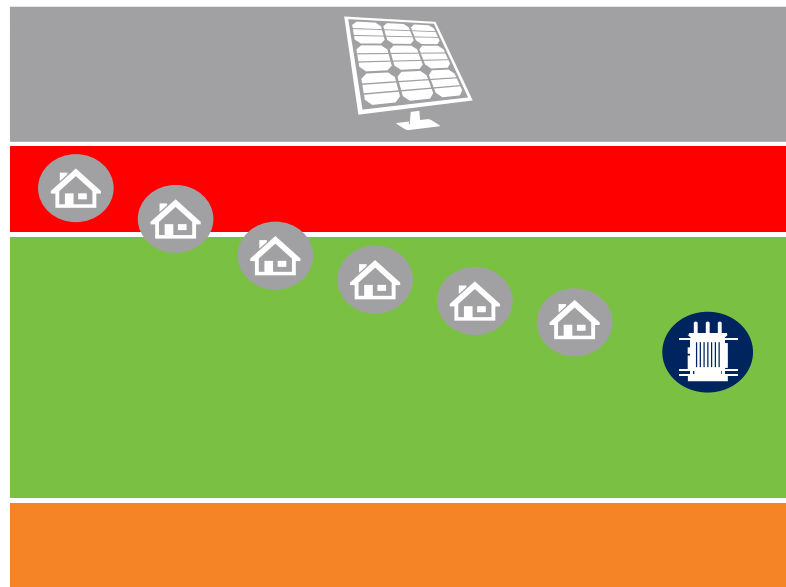


Historic networks have no active voltage regulation

Problem - LCTs create network issues

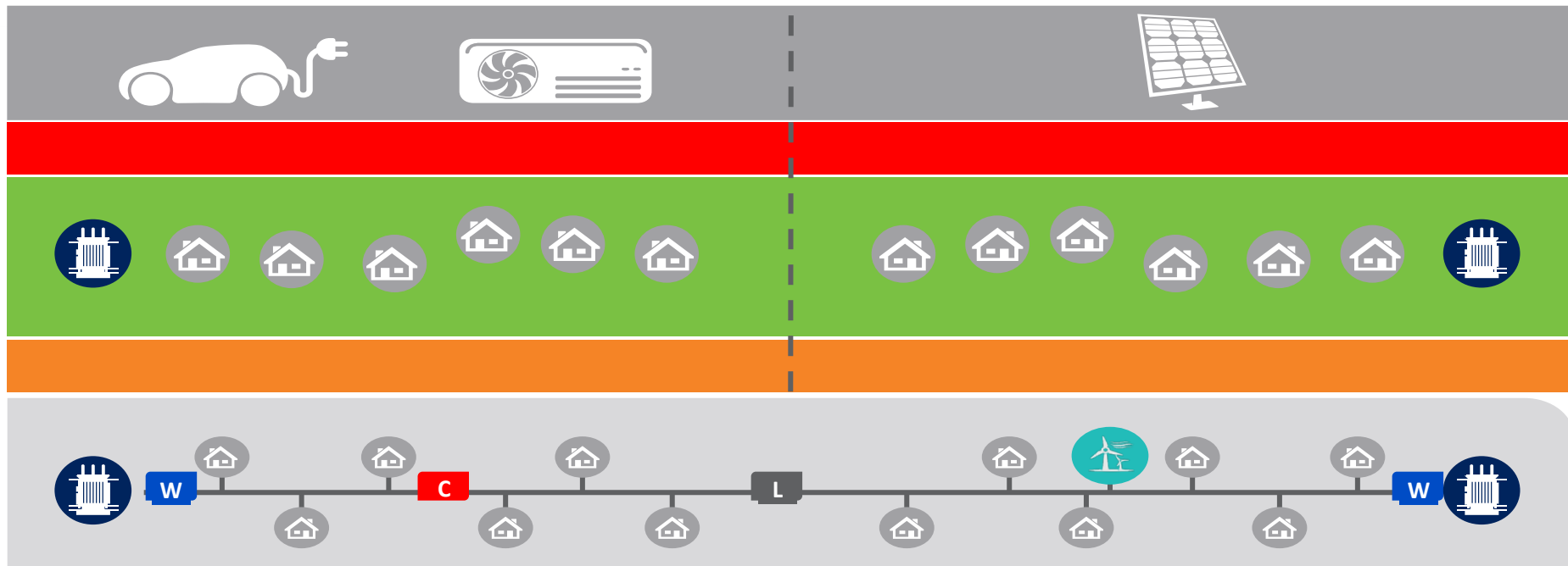


↑
Drift range
↓



LCTs rapidly surpass voltage and thermal network capacity

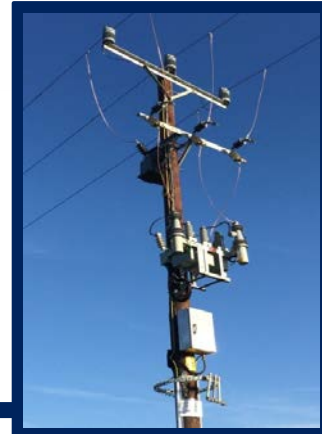
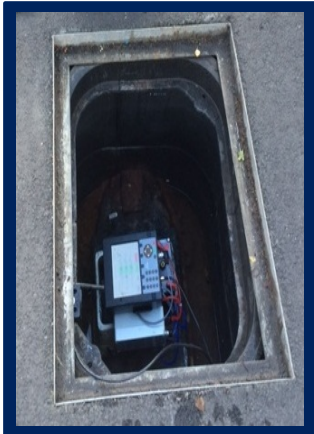
Smart Street – the first intervention



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

Voltage stabilised across the load range ● Power flows optimised

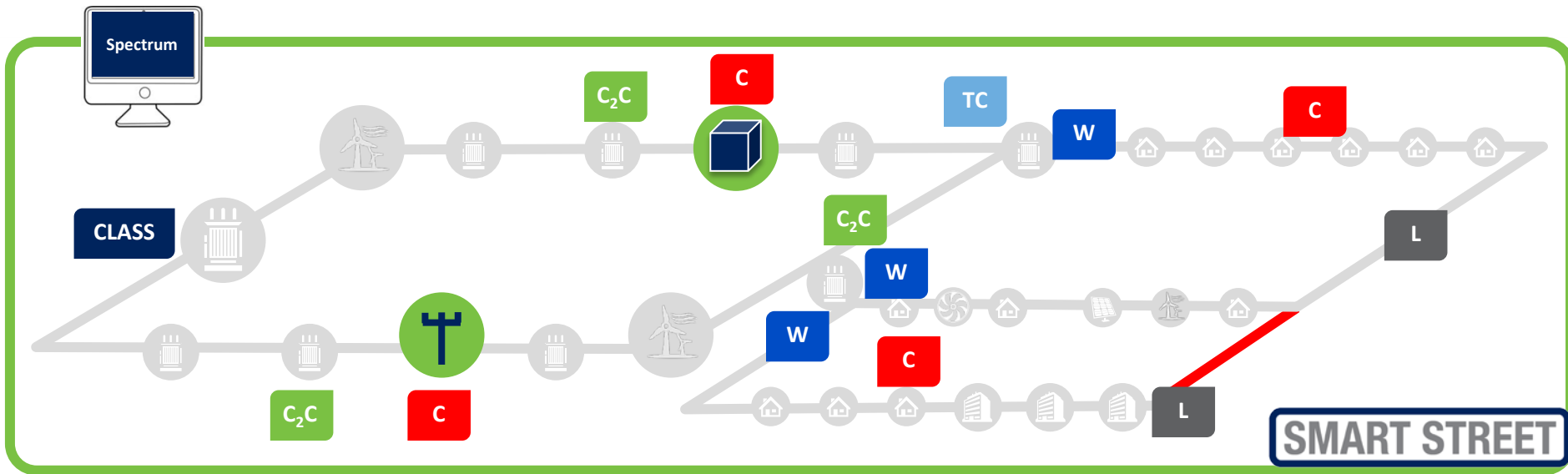
The Smart Street System



Spectrum 5 (NMS)



Network reliability improvement



- C₂C Capacity to Customers
- C Capacitor
- W WEEZAP
- L LYNX
- TC On-load tap changer

Builds on C₂C and CLASS ● Storage compatible ● Transferable solutions

Trials – test regimes



Smart Street trial	Test regime
LV voltage control	1. On-load tap changing distribution transformer only
	2. On-load tap changing distribution transformer and capacitor(s) on LV circuits
	3. Capacitors at distribution substation only
	4. Capacitors at distribution substation and on LV circuits
	5. Capacitor(s) on LV circuits only
LV network management & interconnection	1. LV radial circuits
	2. LV interconnected circuits
HV voltage control	1. Voltage controllers at primary substation only
	2. Voltage controllers at primary substation and capacitor(s) on HV circuits
HV network management & interconnection	1. HV radial circuits
	2. HV interconnected circuits
Network configuration & voltage optimisation	1. Losses reduction
	2. Energy consumption reduction



Quantification
of CVR benefits



Validation of
optimisation
techniques

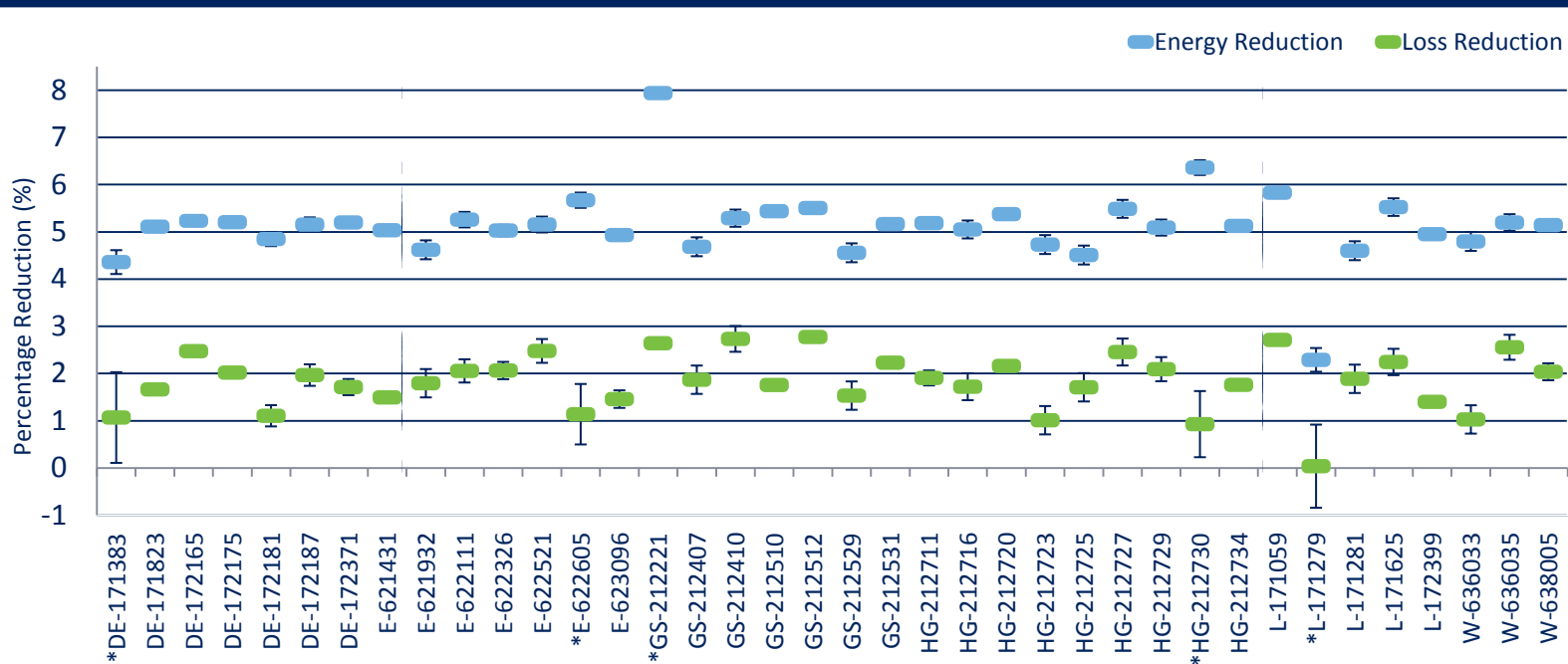


Identify potential
power quality
and customer
side impacts



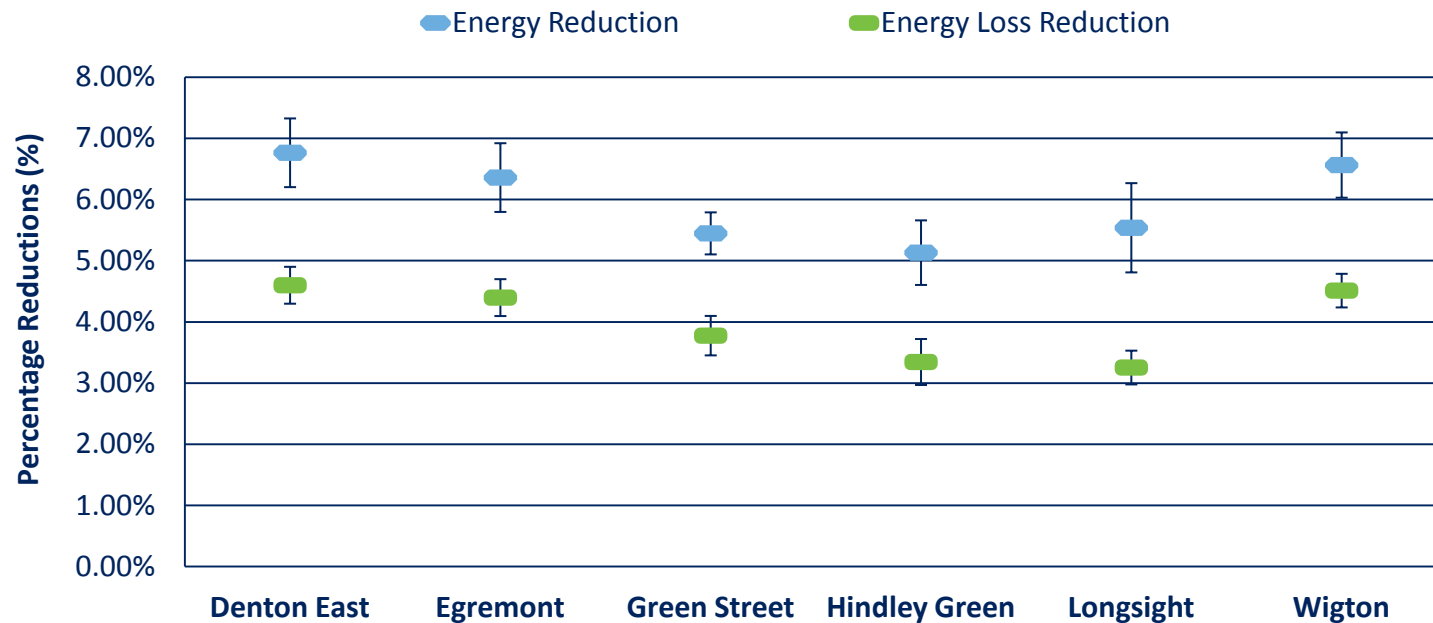


Percentage reductions on LV networks



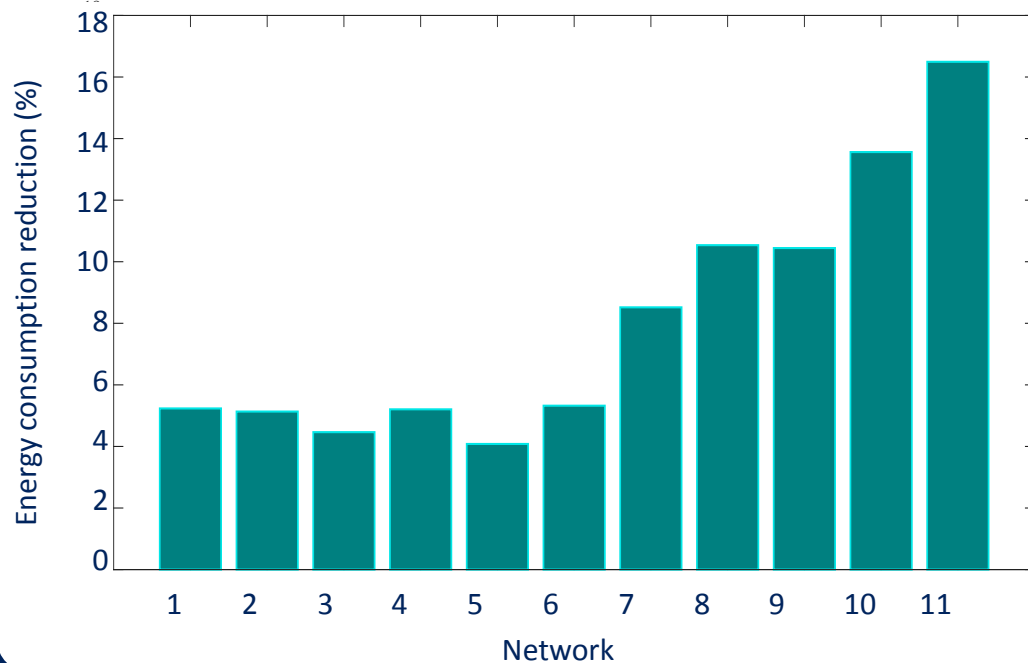


Energy and losses reductions on HV networks





Energy consumption reduction

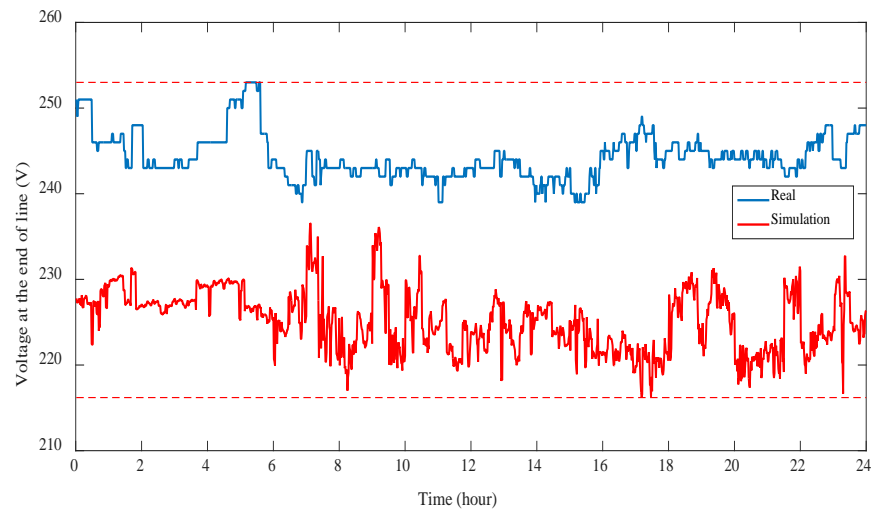
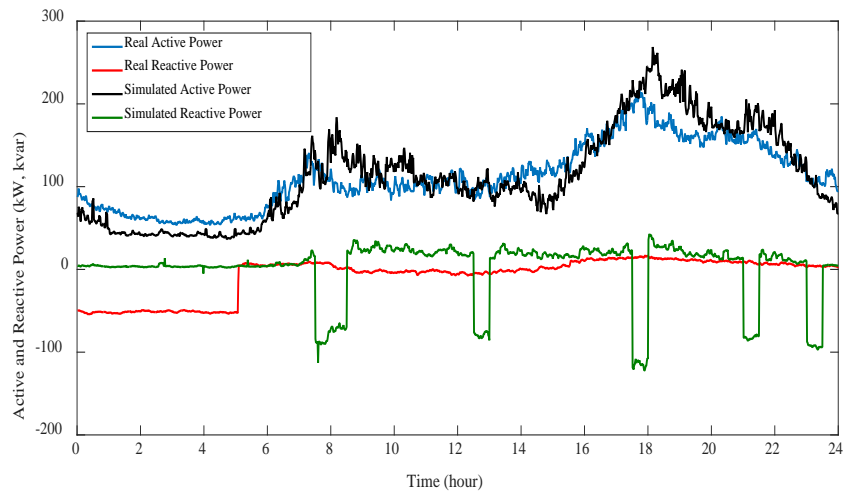


11 networks only

5 with OLTC

6 heavily loaded

Trial results



UoM results



		Voltage reduction	Energy reduction	Losses reduction
UoM simulated results	HV	5.50%	5.97%	3.98%
	LV	4.88%	5.12%	1.83%
QUB results	LV		8%	4%
Trial data	LV		8.7%	

Outcomes to date



~25GB of data recorded so far



Trial area networks modelled



Calculated CVR factor of 1.10 for LV and 1.01 for HV networks



Analysis techniques indicate optimisation algorithm is close to optimal



Ring operation modelled and compared to radial



Effects of voltage reduction on lighting and domestic appliances under investigation



Carbon impact being studied



Modifications to Trials
Analysis of trials data ongoing

Smart Street summary



Combine into one
end-to-end
system

Optimisation



Challenge

Learning



First example of centrally
controlled LV network
Range of intervention
solutions

SMART STREET

Faster LCT adoption
Less embedded carbon
Re-usable technology
Optimise energy and losses



Carbon
Footprint

Benefit



Lower energy bills
More reliable supply
Reinforcement savings

For more information



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