



Smart Street Project Partner Event

13th May 2014



electricity
north west
Bringing energy to your door



Innovation within Electricity North West

Simon Brooke

Low Carbon Projects Manager





- Electricity North West
- Innovation strategy & funding
- UK energy challenge

Connecting the North West



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Bringing energy to your door

We're not a big multinational we serve only the North West

We distribute electricity to approximately 5 million people at 2.4 million domestic and industrial locations consuming 23.5 terawatt hours of electricity annually

£12.3bn of network assets

- 57 500km of cable
- 15 grid supply points
- 96 bulk supply substations
- 363 primary substations
- 34 000 transforming points



Innovation Funding



Innovation Funding Incentive (DPCR5)

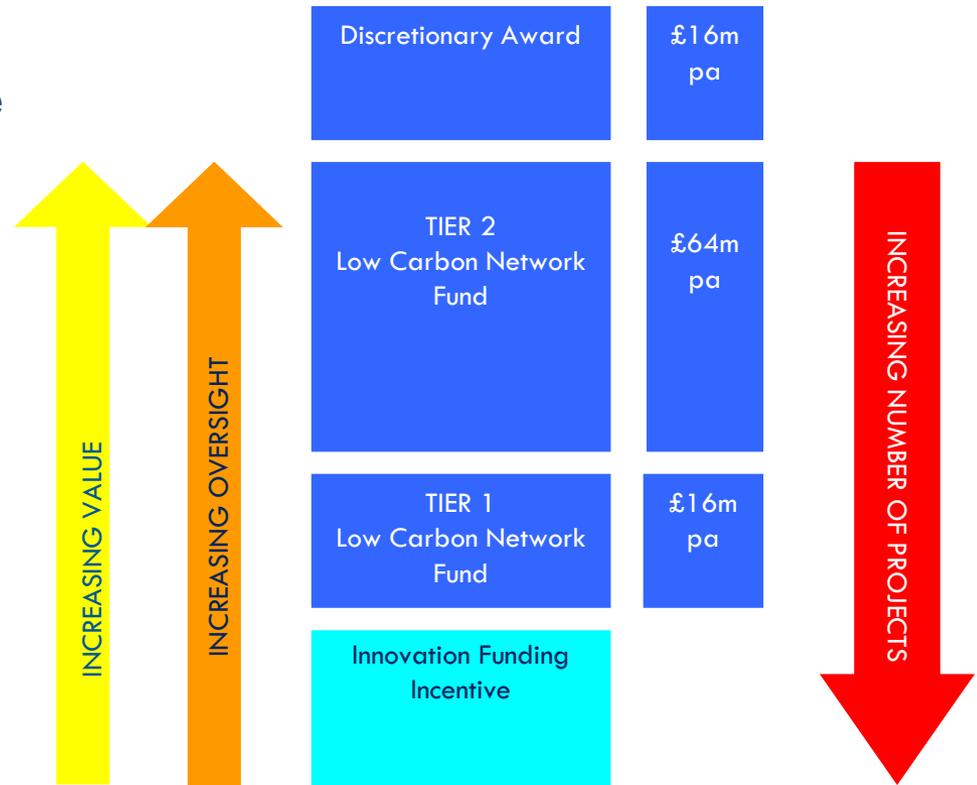
- Designed to encourage R&D
- Fixed proportion of eligible expenditure recoverable - 80% pa
- Capped at 0.5% of price control turnover, approx. £2.0m for 2012/13
- Internal spending capped at 15%

Low Carbon Networks Fund (DPCR5)

- Tier 1 provides fund for small scale demonstration projects
- Tier 2 is central fund for small no. of significant 'flagship' projects
- DNOs expected to fund 10% of Tiers 1 & 2 projects (refundable in Tier 2 subject to timely delivery)

Network Innovation Allowance and Network Innovation Competition (RIIO-ED1)

- New arrangements for RIIO-ED1, starting 2015
- NIA to replace IFI & LCN Fund T1 – 0.8% of turnover, based on innovation strategy
- NIC to replace LCN Fund T2 – value to be set



Our innovation strategy





Innovation strategy targets greater utilisation of existing assets to minimise the adoption costs of decarbonisation technologies

- C₂C is designed to release significant EHV and HV network capacity by utilising 'security of supply' capacity in conjunction with post-fault DSR
- CLASS harnesses the aggregated demand side response generated by low cost retrofit voltage controllers and delivers a variety of operational benefits
- Smart Street (*eta*) aims to maximise the capacity of existing networks, minimise losses and reduce energy consumption by managing network voltage and controlling networks in meshed configuration
- 2014/15 proposed project aims to minimise fault level reinforcement arising from demand growth and DG using radical low cost approaches

UK energy challenges



2014 position 1/3rd electricity, 1/3rd gas, 1/3rd oil

2020 **34%** reduction in CO₂

- 40% from wind / PV & new nuclear
- 5% transport 120,000 EV / hybrid
- 26M smart meters fitted

2050 **80%** reduction in CO₂

- Doubling in electricity demand

RIIO-ED1

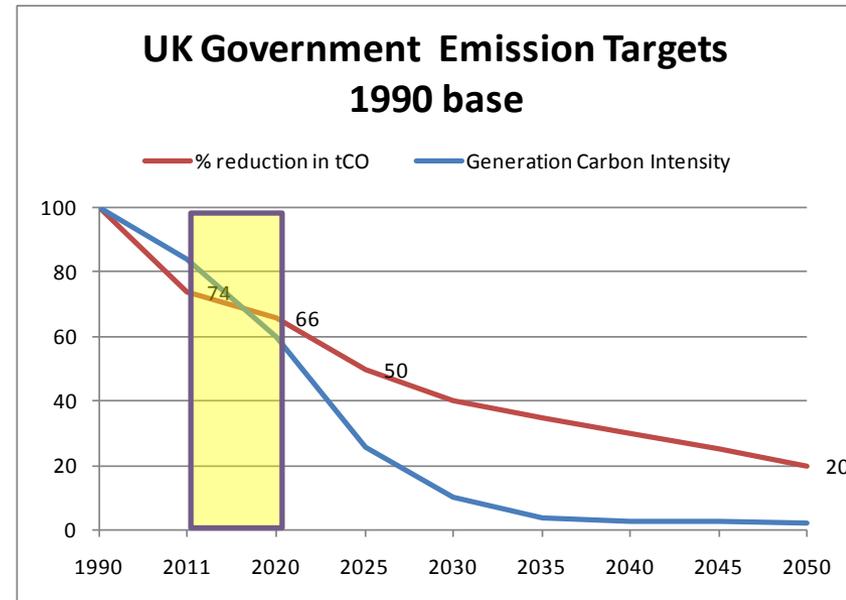
- Traditional reinforcement unaffordable
- DG represents the most immediate challenge

Challenge to identify 'smart' ways of meeting customers' future needs:

£30 million RD&D investment programme

~ 60 ongoing projects

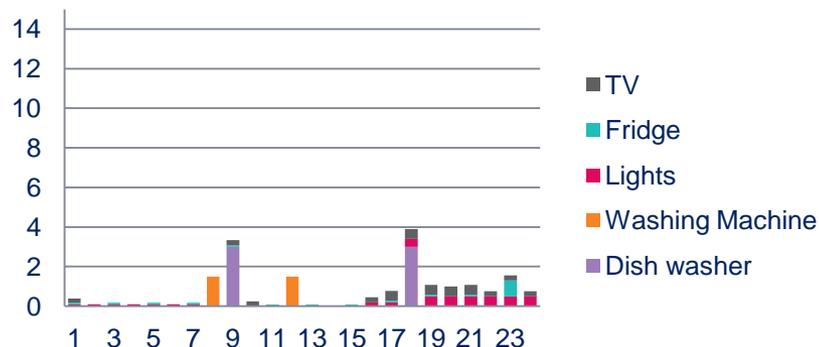
New equipment and technologies for step change in customer service



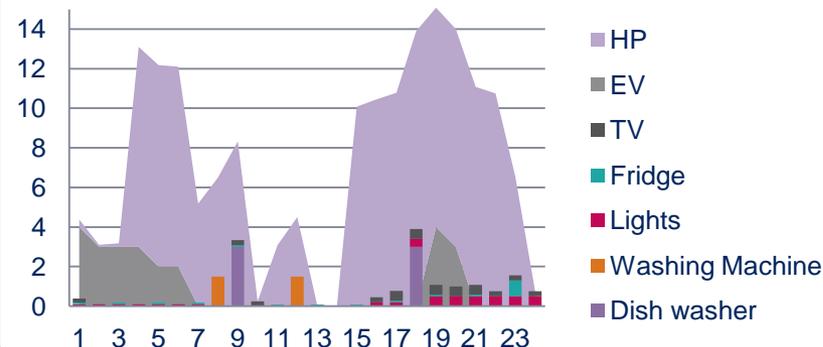
The scale of the challenge



Domestic demand profile 2014



Domestic demand profile 2025 - 2030



Customer characteristics

2.2 million customers live in gas centrally heated home

Network designed and operated with ADMD per property of 1.2kVA

Network impact

Customers' new low carbon technologies (LCT) create new network demands

Networks have limited ability to accommodate customers' LCTs

Network intervention always required



Questions & Answers



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Want to know more?

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🌐 www.enwl.co.uk/the-future

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An introduction to Smart Street

Cara Blockley

Low Carbon Projects Manager



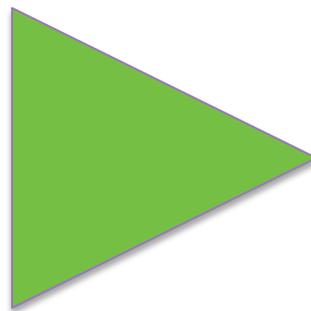


- Overview of Smart Street concept and objectives
- Workstreams and outputs
- Project delivery timeline
- Close

Flash video



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Efficiency



Network



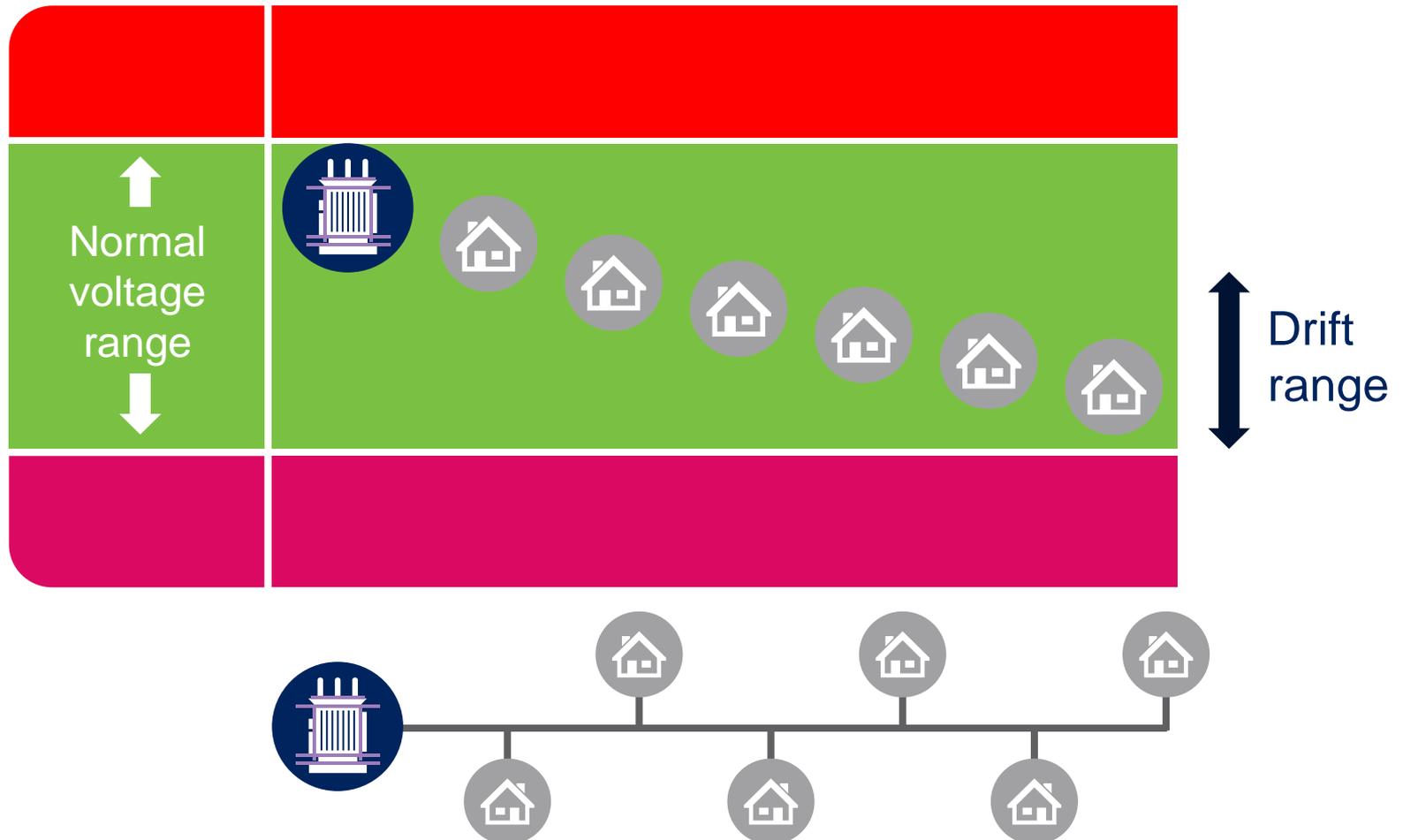
Customer appliances



Allows networks and appliances to work in harmony delivering efficiency across the energy supply chain

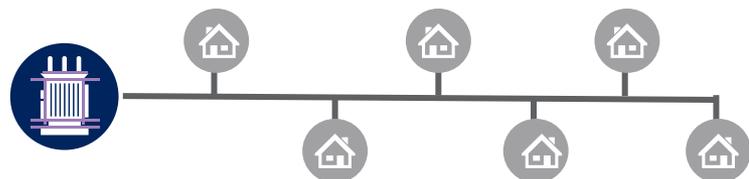
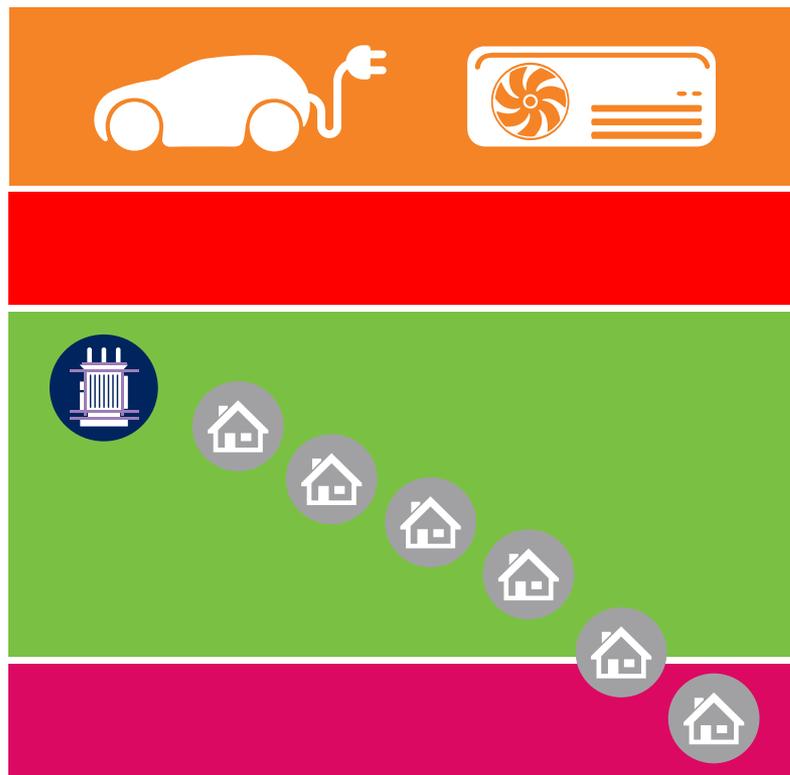
Low carbon ● Lower bills ● Faster LCT adoption ● Less disruption

Voltage regulation

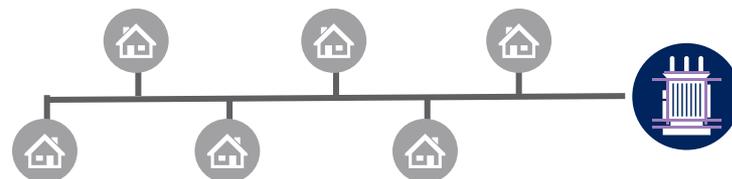
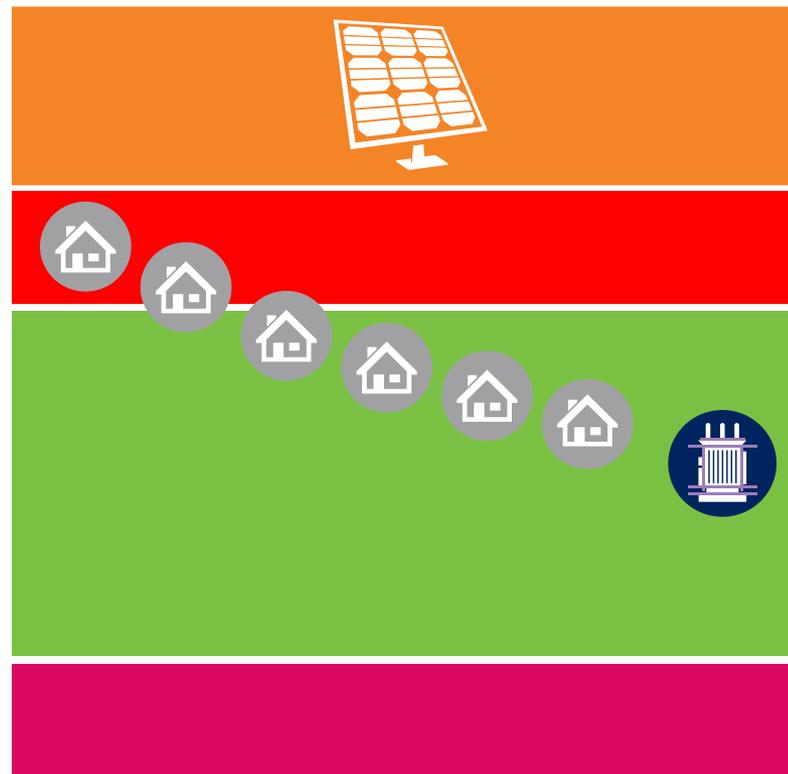


Historic networks have no active voltage regulation

Problem - LCTs create network issues



↑
Drift
range
↓



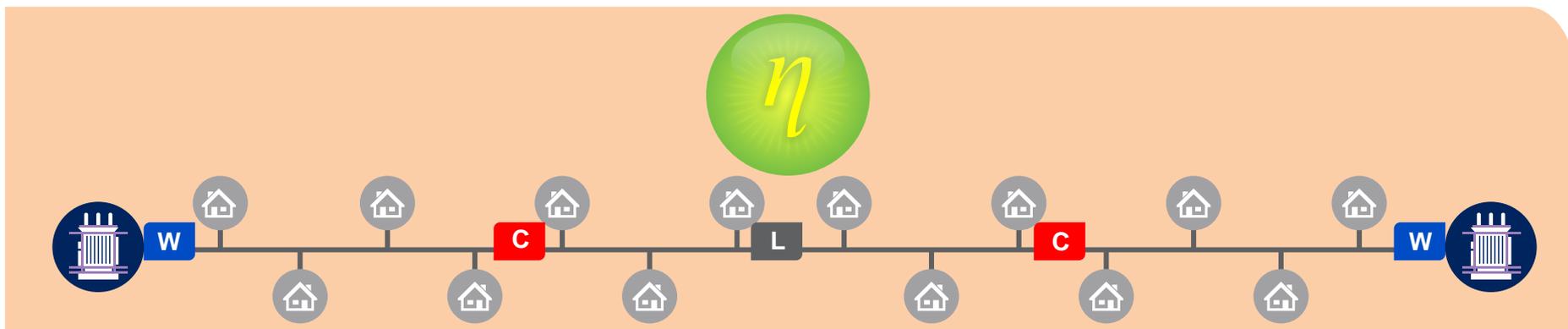
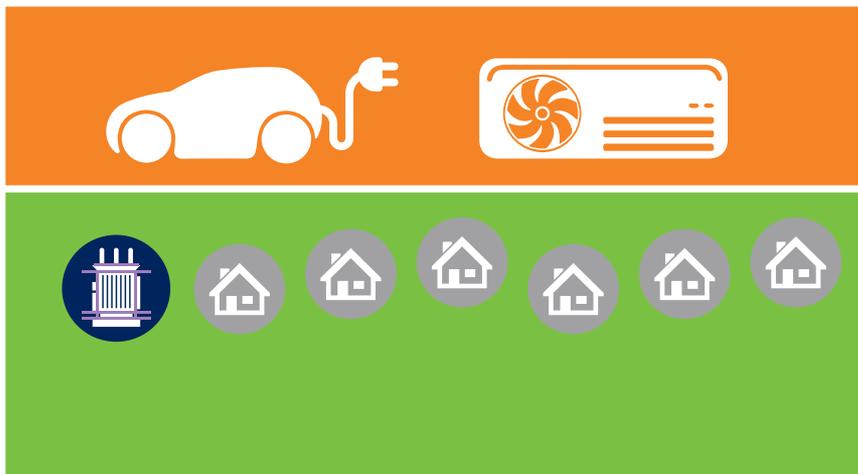
LCTs rapidly surpass voltage and thermal network capacity

Smart Street



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

Voltage stabilised across the load range • Power flows optimised

Now we can stabilise voltage,
which level should we choose?



Conservation Voltage Reduction

By operating towards the lower end of the range we can make customers' appliances more efficient **at no additional cost.**

Many appliances operate more efficiently; none use more energy. CVR is being trialled in a number of countries.

First application on UK network configuration.

How much could customers save?

		
Reinforcement savings via DUoS	£330 over 25 years	£8.6b over 25 years
Reduced energy consumption, 2013 (from CVR ≈ 3 - 7%)	£15 - £30 pa	£390 - £780m pa
Maximise DG output (from maximising Feed In Tariff income)	£70 pa	£20m pa

Efficient network solutions ● Energy savings ● Carbon benefits

Smart Street summary



- Combine into one end-to-end system
- Optimisation



Challenge

Learning

- First example of CVR
- First example of centrally controlled LV network
- Range of intervention solutions



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



Carbon Footprint

Benefit

- Lower energy bills
- More reliable supply
- Reinforcement savings





& Questions Answers

Smart Street delivery structure



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Project Management
Office

Smart Street Project

Project steering
group

Workstream 1: Technical

KELVATEK

SIEMENS

tnei
enterprise with energy

Workstream 2: Trials

KELVATEK

SIEMENS

MANCHESTER
1824
The University of Manchester

Tyndall Centre[®]
for Climate Change Research

Queen's University
Belfast

Impact
Research

tnei
enterprise with energy

Workstream 3: Customer

Impact
Research

Workstream 4: Research

MANCHESTER
1824
The University of Manchester

Tyndall Centre[®]
for Climate Change Research

tnei
enterprise with energy

Queen's University
Belfast

Workstream 5: Learning and dissemination

Tyndall Centre[®]
for Climate Change Research

Impact
Research

SIEMENS

KELVATEK

Queen's University
Belfast

tnei
enterprise with energy

MANCHESTER
1824
The University of Manchester

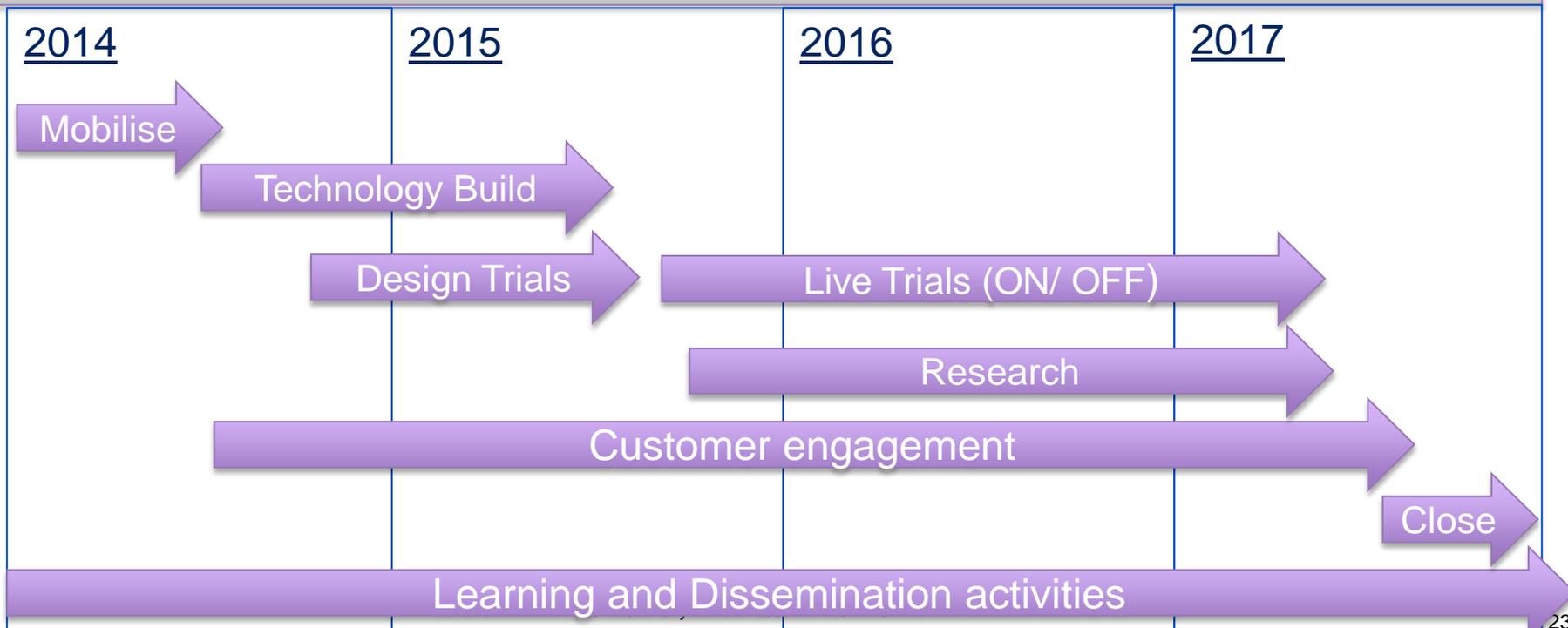


Hypotheses

Smart Street will test the following hypotheses *(in the identified Workstreams)*:

1. The Smart Street Method will deliver a reduction in customers' energy consumption *(Research Workstream)*
2. Customers within the Smart Street Trial area will not perceive any changes in their electricity supply *(Customer Workstream)*
3. The Smart Street Method will have no adverse effects on customers' internal installation or appliances *(Research Workstream)*
4. The Smart Street Method is faster to apply than traditional reinforcement, supports accelerated LCT connection and reduces network reinforcement costs *(Research Workstream)*
5. The Smart Street Method facilitates the prioritisation of the range of solutions across differing LCT adoption scenarios based on a cost benefit analysis to accommodate customers' uptake of LCTs *(Research Workstream)*
6. The Smart Street Method will deliver a reduction in overall losses through network configuration and voltage optimisation *(Research Workstream)*
7. The Smart Street Method facilitates real time control of a portfolio of LV network solutions, using retrofit technologies with application combined or in isolation *(Technology Workstream)*

Smart Street timeline



Project deliverables by workstream



Technology	Trials	Customer	Research	Learning & Dissemination
Smart Street network design applied to trial networks	Test regime implemented to trial Smart Street combinations	Customer approved engagement and awareness materials	LV network design and operating standard	Smart Street website as repository for all deliverables
Specification, installation and application methodologies	Consumption data at substation for CVR benefit	Customer surveys deliver proof of no perceived change	Optimisation implementation and control operating regimes	Share knowledge to internal and external stakeholders through webinars, social media, events etc
Portfolio of network solutions and safe systems of work	Losses reduction data		Smart Street cost benefit analysis and carbon impact assessment	



& Questions Answers