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<td>Technology House</td>
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Agenda

- Introduction
- Why Smart Street?
- Technology
- Questions
Connecting the North West

4.9 million

2.4 million

25 terawatt hours

£12 billion of network assets

56 000 km of network ● 96 bulk supply substations
363 primary substations ● 33 000 transformers
Our smart grid development

Leading work on developing smart solutions

- Deliver value from existing assets
- Customer choice

Four flagship products (second tier)  £36 million

LCN Fund

C2C  CLASS  SMART STREET  RESPOND

Capacity to Customers
Smart Street project overview

- £8.4m from LCNF, £1.5m from Kelvatek, £1m from ENW
- Started in Jan 2014 and finishes in Dec 2017
- Trials period 2015–2017
- Facilitates quicker cheaper connection of domestic LCTs
- £11.5m, 4 year innovation project
Project partners

KELVATEK

Tyndall Manchester
Climate Change Research

Siemens

TNEI
Enterprise with energy

Manchester
The University of Manchester

Impact Research
### Smart Street Trials

<table>
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<tr>
<th>Two years</th>
<th>One week on</th>
<th>One week off</th>
<th>Five trial techniques</th>
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<tr>
<td></td>
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<td>LV voltage control</td>
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<tr>
<td></td>
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<td>LV network management and interconnection</td>
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<tr>
<td>One year’s worth of data</td>
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<td>HV voltage control</td>
</tr>
<tr>
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<td>HV network management and interconnection</td>
</tr>
<tr>
<td>To be designed to avoid placebo affect</td>
<td></td>
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<td>Network configuration and voltage optimisation</td>
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<tr>
<td></td>
<td></td>
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<td>Five trial regimes to test full effects</td>
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</table>
Smart Street trial areas

- 6 primary substations
- 11 HV circuits
- 38 distribution substations
- 163 LV circuits
- Around 62,000 customers
### Existing radial network

#### Network limitations
- Diversity between feeders is untapped
- Fuses unable to cope with cold load pick up

#### Customer impact
- Customers’ needs invisible to the network
- Demand and generation levels limited by passive voltage control systems
- Reliability driven by fix on fail
## Voltage profile

### Normal voltage range

Historic networks have no active voltage regulation.
Problem - LCTs create network issues

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
Distribution voltage regulated transformer

- 5 OLTCs
- 9 taps
- Local or remote
HV capacitors

3 ground mounted HV capacitors
Secured within GRP housings in urban areas

3 pole mounted HV capacitors
Installed similar to pole mounted transformers
What customers will see – LV capacitors in street furniture

- 84 LV capacitors
- One on each closed ring
- Multi staged
WEEZAP

World leading LV vacuum circuit breaker

Advanced measurement and protection capability

Safe LV interconnection, live monitoring and control

Improves supply reliability and restoration through fault management and detection
LYNX

LV switch

 Allows active network meshing and un-meshing

Advanced monitoring capabilities

Ability to control the circuit locally or remotely
Technology – Spectrum

Measures, optimises and responds

CVR and losses benefits unlocked

Oversees network and customer needs

Builds on CLASS smart voltage control
Network reliability improvement

Builds on C2C and CLASS

- Storage compatible
- Transferable solutions
### Smart Street benefits

**Now we can stabilise voltage**
- We can set the voltage level lower
- This will lead to:
  - Reduced demand
  - Reduced customer energy consumption
  - Maximised DG output

### How much could customers save?

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<th>GB</th>
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<tbody>
<tr>
<td>Reinforcement savings via DUoS</td>
<td>£330 over 25 years</td>
<td>£8.6b over 25 years</td>
</tr>
<tr>
<td>Reduced energy consumption, 2013 (from CVR ≈ 3 - 7%)</td>
<td>£15 - £30 pa</td>
<td>£390 - £780m pa</td>
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<tr>
<td>Maximise DG output (from maximising Feed In Tariff income)</td>
<td>£70 pa</td>
<td>£20m pa</td>
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**Efficient network solutions ● Energy savings ● Carbon benefits**
## Technology overview

<table>
<thead>
<tr>
<th>84 LV capacitors installed</th>
<th>43 Lynx systems 498 Weezaps</th>
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<tbody>
<tr>
<td>50 end-point controllers installed</td>
<td>Spectrum 5 installed on network</td>
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### Next steps

- 6 HV capacitors to be installed
- Briefing and training
- Go live!
Smart Street summary

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

- **CO₂**

**Carbon Footprint**

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

**Low Risk**

- **Combining into one end-to-end system**
- **Network optimisation**

**Challenge**

- **Lower energy bills**
- **More reliable supply**
- **Reinforcement savings**

**Benefit**
A day in the life of Smart Street

• Videos\A day in the life of Smart Street.mp4
QUESTIONS & ANSWERS
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Thank you for your time and attention