Webinar
30 April 2015
Agenda

- Introduction and overview
- Technical update
- Trial design
- Questions & answers
Webinar format

30 minutes presentation
Submit written questions online during the webinar

10 minutes questions & answers
Press 01 on your telephone key pad to take part in the live Q&A at the end of the presentation

or
Our innovation strategy

- **Maximise use of existing assets**
- **Innovative solutions to real problems**
- **Proven technology deployable today**
- **Offer new services and choice for the future**
- **Generate value for customers now**

'Fit and forget'
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
Low Carbon Networks

C2C
Capacity to Customers

CLASS
SMART STREET
RESPOND
Smart Street overview

New controllable switching devices stabilise voltage

Allows us to lower voltage levels

Enables networks and appliances to work in harmony

Low cost • Quick fit • Minimal disruption • Low carbon • Low loss • Invisible to customers • Faster connection of low carbon technologies
Key activities to date

Jan 2014

- Project mobilisation
  - Project team appointed
  - Contracts signed with project partners

- Site selection complete
  - Trial circuits identified
  - On site surveys completed

- Circuit design
  - Design methodology developed
  - Then applied to trial circuits
  - Circuit designs finalised

April 2015

- Customer engagement
  - Customer engagement plan
  - Project website live

- Customer mailings
  - Engaged with customers on trial circuits

- Technology installation
  - Technology installation and commissioning ongoing

Knowledge sharing and dissemination
## Customer impact and objectives

<table>
<thead>
<tr>
<th>Pre-trial</th>
<th>During/post-trial</th>
</tr>
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<tbody>
<tr>
<td>Customers have seen increased activity while equipment is installed</td>
<td>Reduction in fault duration during trial period</td>
</tr>
<tr>
<td>Occasional planned supply interruptions due to equipment installation</td>
<td>Possible change in voltage</td>
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**Objective:**
- **Pre-trial:** To engage with customers and explain impact of Smart Street trial
- **During/post-trial:** To prove that customers will not perceive a change to their electricity supply
## Progress and next steps

<table>
<thead>
<tr>
<th>Customer engagement plan submitted to Ofgem and approved</th>
<th>Go live of the Smart Street website and social media forums</th>
<th>Engaged customer panels held and lessons learned published</th>
<th>Customer leaflet designed and distributed to customers on trial circuits</th>
<th>Customers affected by new street furniture installations notified</th>
<th>Technology installation enquiries / complaints resolved</th>
</tr>
</thead>
</table>

**Successful technical installation as a result of well planned strategy and customer engagement activities**

### Next steps

- **Brief ENW contact centre before trial go live**
- **Further ECPs to gauge customer perception & acceptability of trials**
- **Produce report of customer research findings**
- **Ongoing engagement with customers during trial**

Successful technical installation as a result of well planned strategy and customer engagement activities.
Technology – Spectrum

Measures, optimises and responds

CVR and losses benefits unlocked

Oversees network and customer needs

Builds on CLASS smart voltage control
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
What customers will see –
LV capacitors in street furniture

84 LV capacitors
One on each closed ring
Tried and tested
What customers will see - HV capacitors

- **3 ground mounted HV capacitors**
  - Located in urban areas in GRP housings

- **4 pole mounted HV capacitors**
  - Installed similar to pole mounted transformers
Technology overview

84 LV capacitors installed

40 link boxes installed

50 end-point controllers installed

Spectrum 5 installed on network

Next steps

7 HV capacitors to be installed

5 OLTC transformers to be installed

IT integration and commissioning
### Technology lessons learnt

<table>
<thead>
<tr>
<th>Equipment</th>
<th>IT</th>
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<tbody>
<tr>
<td><strong>HV GM capacitors</strong>&lt;br&gt;Footprint larger than anticipated.&lt;br&gt;Required significant work with land owners and local authorities to agree wayleaves and planning permission</td>
<td><strong>LV capacitors</strong>&lt;br&gt;A number of units had to be reduced in size to ensure footpath access was not restricted</td>
</tr>
<tr>
<td>Development on interoperability between control systems and various new field devices, required engagement with all technical partners and manufacturers to identify possible issues early</td>
<td></td>
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</tbody>
</table>
Agenda

- Proposed test schedule
- Research overview
- Trial network overview
- Test regimes
Smart Street trial overview

- 6 primary substations
- 67,500 customers
- 11 HV circuits – 5 closable HV rings
- 4 pole mounted HV capacitors
- 3 ground mounted HV capacitors
- 38 distribution substations
- 5 OLTC transformers
- 5 substation capacitors
- 79 LV circuit capacitors
## Smart Street trial design

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

<table>
<thead>
<tr>
<th>Smart Street trial</th>
<th>Test regime</th>
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<tbody>
<tr>
<td><strong>LV voltage control</strong></td>
<td>1. On-load tap changing distribution transformer only</td>
</tr>
<tr>
<td></td>
<td>2. On-load tap changing distribution transformer and capacitor(s) on LV circuits</td>
</tr>
<tr>
<td></td>
<td>3. Capacitors at distribution substation only</td>
</tr>
<tr>
<td></td>
<td>4. Capacitors at distribution substation and on LV circuits</td>
</tr>
<tr>
<td></td>
<td>5. Capacitor(s) on LV circuits only</td>
</tr>
<tr>
<td><strong>LV network management &amp; interconnection</strong></td>
<td>1. LV radial circuits</td>
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<tr>
<td></td>
<td>2. LV interconnected circuits</td>
</tr>
<tr>
<td><strong>HV voltage control</strong></td>
<td>1. Voltage controllers at primary substation only</td>
</tr>
<tr>
<td></td>
<td>2. Voltage controllers at primary substation and capacitor(s) on HV circuits</td>
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<td><strong>HV network management &amp; interconnection</strong></td>
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</tr>
<tr>
<td></td>
<td>2. HV interconnected circuits</td>
</tr>
<tr>
<td><strong>Network configuration &amp; voltage optimisation</strong></td>
<td>1. Losses reduction</td>
</tr>
<tr>
<td></td>
<td>2. Energy consumption reduction</td>
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### Proposed test schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Trial 1 - LV Voltage Control</th>
<th>Trial 2 - LV Interconnection</th>
<th>Trial 3 - HV Voltage Control</th>
<th>Trial 4 - HV Interconnection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Week 2</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Week 3</td>
<td>EQUIPMENT TESTED IN ISOLATION</td>
<td>ON</td>
<td>EQUIPMENT TESTED IN ISOLATION</td>
<td>ON</td>
</tr>
<tr>
<td>Week 4</td>
<td>COMBINED TESTING</td>
<td>ON</td>
<td>COMBINED TESTING</td>
<td>ON</td>
</tr>
<tr>
<td>Week 5</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Week 6</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Week 7</td>
<td>EQUIPMENT TESTED IN ISOLATION</td>
<td>ON</td>
<td>COMBINED TESTING</td>
<td>ON</td>
</tr>
<tr>
<td>Week 8</td>
<td>COMBINED TESTING</td>
<td>ON</td>
<td>EQUIPMENT TESTED IN ISOLATION</td>
<td>ON</td>
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**Trial 5:** The optimisation will be applied during the trial on periods where week 4 allows for full optimisation.
### Overview of research workstream

<table>
<thead>
<tr>
<th>WP1</th>
<th>WP2</th>
<th>WP3</th>
<th>TNEI</th>
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<tbody>
<tr>
<td>will look to quantify the voltage optimisation and loss reduction techniques used in Smart Street</td>
<td>will look to produce the design and operation policies required to convert UK networks into optimal meshed configurations</td>
<td>will research the cost benefits and carbon impact related to the Smart Street solution</td>
<td>will provide research support and consultation for the duration of the trials</td>
</tr>
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**MANCHESTER 1824**

**Queen's University Belfast**

**Tyndall Manchester**

**TNEI**
Next steps

- **April 2015**: Technology installation
  - Continue with installation of transformers and capacitors

- **Sep 2015**: Start of trials
  - Trials will run for 2 years in conjunction with research deliverables

- **Sep 2017**: ECP and customer research
  - Qualitative research with customers on trial circuits

- **Dec 2017**: Project closedown
  - Project findings and final dissemination event for all stakeholders

Knowledge sharing and dissemination
Webinar

Please complete our online poll