LCNI conference
Increasing Network Automation, Session 2.3
21 October 2014

Damien Coyle
Agenda

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

- **£8 billion of network assets**
- 4.9 million
- 2.4 million
- 25 terawatt hours
Project overview

- £8.4m from LCNF, £1.5m from Kelvatek, £1m from ENW

- £11.5m, 4 year innovation project

- Trials period Sep 2015 – Aug 2017

- Started in Jan 2014 and finishes in Dec 2017

- Facilitates quicker cheaper connection of domestic LCTs

Smart Street project overview
Project partners
Smart Street trial areas

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

Locations:
- Wigton & Egremont
- Wigan & Leigh
- Manchester

Map showing the areas covered by the Smart Street trial.
Smart Street trial design

Two years
One week on
One week off

One year’s worth of data

To be designed to avoid placebo affect

Five trial regimes to test full effects

Five trial techniques

LV voltage control

LV network management and interconnection

HV voltage control

HV network management and interconnection

Network configuration and voltage optimisation
LV capacitors in street furniture

80 LV capacitors

Tried and tested high spec

One on each closed ring
<table>
<thead>
<tr>
<th>4 ground mounted HV capacitors</th>
<th>4 pole mounted HV capacitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housed in containers but not on street</td>
<td>Installed similar to pole mounted transformers</td>
</tr>
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</table>
Weezap & Lynx

489 Weezaps

Fitted across 163 LV Circuits

240 LYNX

Installed in 80 LV link boxes
Existing radial network

<table>
<thead>
<tr>
<th>Network limitations</th>
<th>Customer impact</th>
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<tr>
<td>Diversity between feeders is untapped</td>
<td>Customers’ needs invisible to the network</td>
</tr>
<tr>
<td>Fuses unable to cope with cold load pick up</td>
<td>Demand and generation levels limited by passive voltage control systems</td>
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<tr>
<td></td>
<td>Reliability driven by fix on fail</td>
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Drift range

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

- Voltage stabilised across the load range
- Power flows optimised
- Low cost
- Quick fit
- Minimal disruption
- Low carbon
- Low loss
- Invisible to customers

Voltage stabilised across the load range • Power flows optimised
Network reliability improvement

Builds on C2C and CLASS

- Storage compatible
- Transferable solutions

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

<table>
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<tr>
<th>Description</th>
<th>GB</th>
<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>
</tr>
<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
Smart Street summary

Challenge:
- Combine into one end-to-end system
- Network optimisation

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

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

Benefit:
- Lower energy bills
- More reliable supply
- Reinforcement savings
QUESTIONS & ANSWERS
Want to know more?

- futurenetworks@enwl.co.uk
- www.enwl.co.uk/smartstreet
- 0800 195 4141
- @ElecNW_News
- linkedin.com/company/electricity-north-west
- facebook.com/ElectricityNorthWest
- youtube.com/ElectricityNorthWest

Thank you for your time and attention