Northern Powergrid

Innovation Roundtable

Patrick Erwin
Policy and Markets Director

Tuesday 30th April

Active Engagement

Annual stakeholder report

Emerging thinking:
Distribution System Operator (DSO)

Sli.do

Feedback forms

On-going engagement plan

Business Planning –
Annual and Regulatory
Settlement 2023 - 2028

Northern Powergrid – Our Team

Tom Fielden, Finance Director

Iain Miller, Head of Innovation

Siobhan Barton, Head of Stakeholder Relations

Derek Fairbairn, System Design Manager

Andrew Webster, Project Manager – Innovation

Ross McFarlane, Project Manager – Innovation

Chris Goodhand, Project Manager - Innovation

Agenda

Agenda Item	Lead	Timings
Conference Welcome	Patrick Erwin	10:00 – 10:10
Innovation: **Ensuring our industry is fit for the future**	Iain Miller	10:10 – 10:30
Innovation Project Overview: **Silent Power**	Ross McFarlane	10:30 – 10:45
Innovation Project Overview: **Ace**	Andrew Webster	10:45 – 11:00
Break		
Innovation Project Overview: **Auto Design**	Derek Fairbairn	11:15 – 11:30
Innovation Project Overview: **Micro Resilience**	Iain Miller	11:30 – 11:45
Q&A Panel	Patrick Erwin; Iain Miller; Ross McFarlane; Andrew Webster; Derek Fairbairn	11:45 – 12:05
Lunch		
Roundtable Discussions	All	12:50 – 14:20
Summary and next steps	Patrick Erwin	14:20 – 14:30

House keeping

No planned fire alarms

Mobiles to silent please

Break – 11am
Lunch – 12noon
Served in Merchants Hall

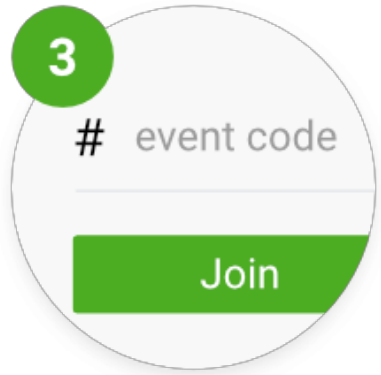
Sli.do

Throughout today we will be offering you the opportunity to vote and ask questions. In order to facilitate this we will be using sli.do

Please find below instruction on how to access sli.do and the event code you will need to be able to submit questions and take part in polls. Please note that iPads will be available on tables as an additional way to access this tool

Open browser

Go to sli.do



Enter event code

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A brief history of innovation

Iain Miller
Head of Innovation

A brief history lesson

- Electricity boards undertook research and innovation
  - Mainly technical
  - Tools, techniques and standards / policy

- Privatisation’s drive for cost reduction reduced this
  - New materials / equipment driven by manufacturers

Ofgem Innovation Stimuli

- Ofgem recognised the need for development and deployment of novel ideas…
- … and the issues RPI-X had with this.

- IFI, LCNF, NIA, NIC, IRM
- Northern Powergrid had CLNR

RIIO Strategy

- RIIO for the first time required a clearly documented innovation strategy
  - The creation of a smarter powergrid
  - The introduction of smart meters
  - Continued growth in web-based and digital-enabled services
  - Issues of affordability

2017/18 Thinking

- We hold with those strategic areas.
- But we need to be clearer about the outcomes required
  - Lower cost
  - Safety
  - Lower environmental impact
  - More reliable
  - Greater capacity

2017/18 Thinking

- We hold with those strategic areas.
- But we need to be clearer about the outcomes required
  - Lower cost
  - Safety
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  - More reliable

Always

  - Greater capacity

Increasingly

Distribution System Operator And Energy System Transformation

- DSO is about how we will use new techniques
- EST is a whole system approach
- As such they involves smart grid techniques and smart meter data.
- They will also use digitally enabled services
- They will need us to do more in terms of operating the system
  - The system was never entirely fit and forget
  - We have always had demand side management and some system operation
  - But we will need to expand this
- And they must still provide the outcomes discussed

Strategic Approach

- Marginal gains?
  - Incremental steps
  - Defined packages of improvement
  - Stepping stones
- Releasing key skill sets to DSO/EST by automating routine work – cost and utility benefit

- The acid test - does an element of innovation:
  - Directly benefit customers in lower costs or added utility, or
  - Indirectly by developing a market that benefits customers?
- Either is acceptable but customers must be at the front of our minds as we develop the portfolio.

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Silent Power

Ross McFarlane
Project Manager-Innovation

Project Need

- We use mobile diesel generators to provide power to small low voltage faults – a few houses.
- It is generally fuel inefficient - generators sized for peak load run below capacity most of the time.
- Consequently running cost, noise and CO2 emissions are in excess of what could be achieved with a more efficient method of maintaining temporary supplies.
- ‘Silent Power’ aims to explore if deploying a unique electrical energy storage system will create a mobile microgrid, absorbing local generation and supporting local demand.
- The benefits include:
  - Reduced running cost
  - Operates in silence
  - No fume and particulate contamination
  - Eliminates the risk of fuel leaks
  - Compatible with local generation
  - Any member of staff with a driving licence can drive to site

Project Outputs

- Three units with 25kWh payload battery and 40kVa output installed in to Nissan electric vehicles

- The vehicles will be based across the Northern Powergrid region and new EV charging facilities will also be installed.
- The units will be deployed to network faults affecting an estimated 1 to 3 domestic customers
- Ideally, the unit will be suited for single and looped premises at the end of LV network faults.

Project Partners

- This project has two partners; Hyperdrive Innovation Limited and Off Grid Energy.
  - Hyperdrive Innovation Limited are one of the UK's specialist in electric vehicle design and innovation and have close links to the manufacturing and development arm of Nissan motor manufacturing. They are based in the Sunderland.
  - Off Grid Energy is a specialist manufacturer and supplier of hybrid power systems. The currently supply hybrid solutions to a range of others DNO's and private organisations.

- These project partners have worked together on a number of projects and also developed a hybrid generator system for SSE. This was a trailer solution (over 5 metres long) which was deployed during faults and where connections had not been completed within the required timescale. This trial demonstrated the validity of the technology but the trailer was too large and required qualified drivers.

Variance to original plan

- The payload battery capacity reduced from 30kWh to 25kWh due to carrying capacity of Nissan EV and this in turn reduces the number of domestic customers we believe we can support

- A small motor was going to be installed to recharge the payload batteries during times of low demand but this functionality was omitted due to carrying capacity of Nissan EV

- The payload batteries were originally going to be Hyperdrive Generation 2 batteries but we are moving to the Generation 4 batteries due to the energy we can carry in a Nissan EV

Learning Outcomes

- Determine whether an electrical energy storage system can be installed in a standard sized fleet vehicle.
- Develop and fully test communications, tracking and control systems ensuring compatibility with our current, or modified operational approach.
- Determine operational characteristics of such a vehicle:
  - Assess carbon footprint , fuel usage, support time, recharge motor utilisation, noise pollution etc.
  - Assess maintenance regime, battery life etc.
- Determine the operating economics of such a vehicle, across the full asset life cycle and make comparisons with alternative approaches.
- Assess and make recommendations for adoption or otherwise

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Activating Community Engagement (ACE)

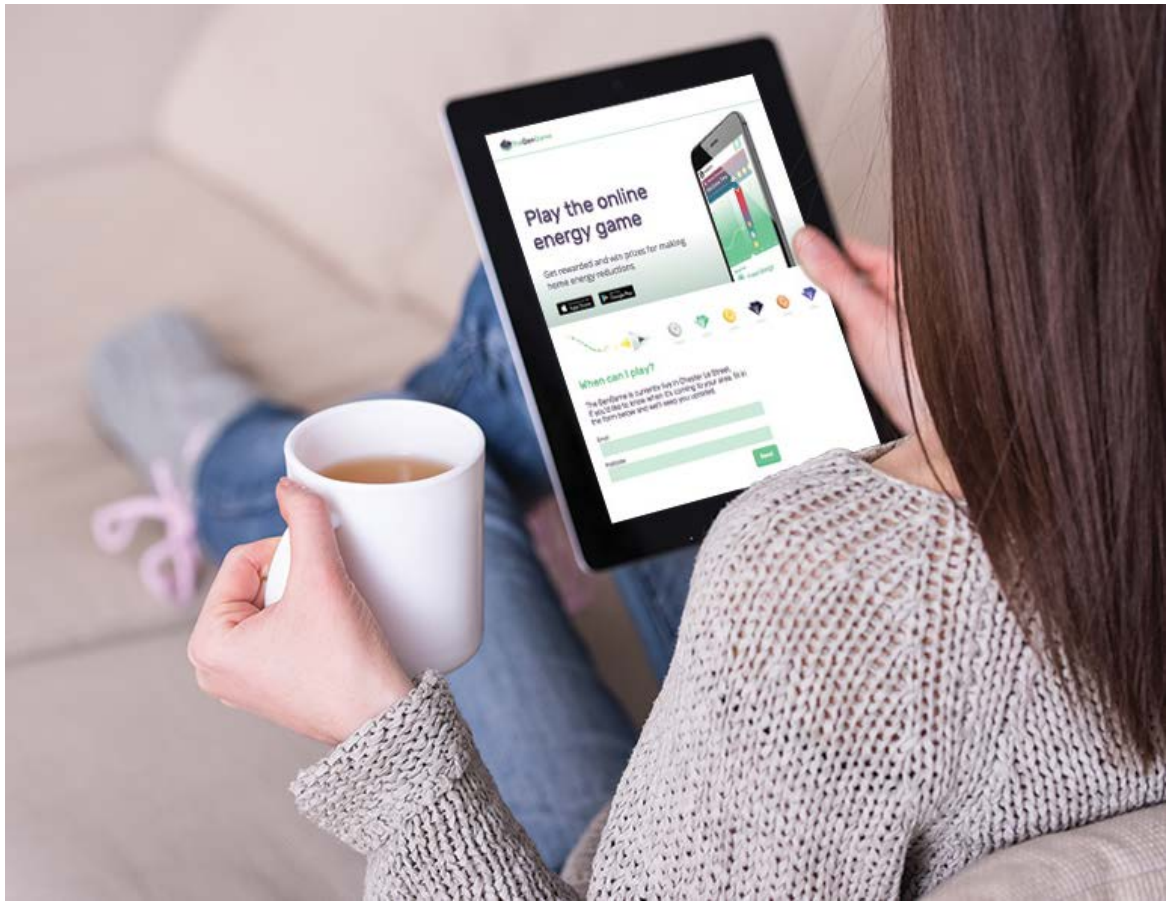
Andrew Webster
Innovation Project Manager

ACE Project Overview

- A community project which rewards customers for being flexible with their energy usage

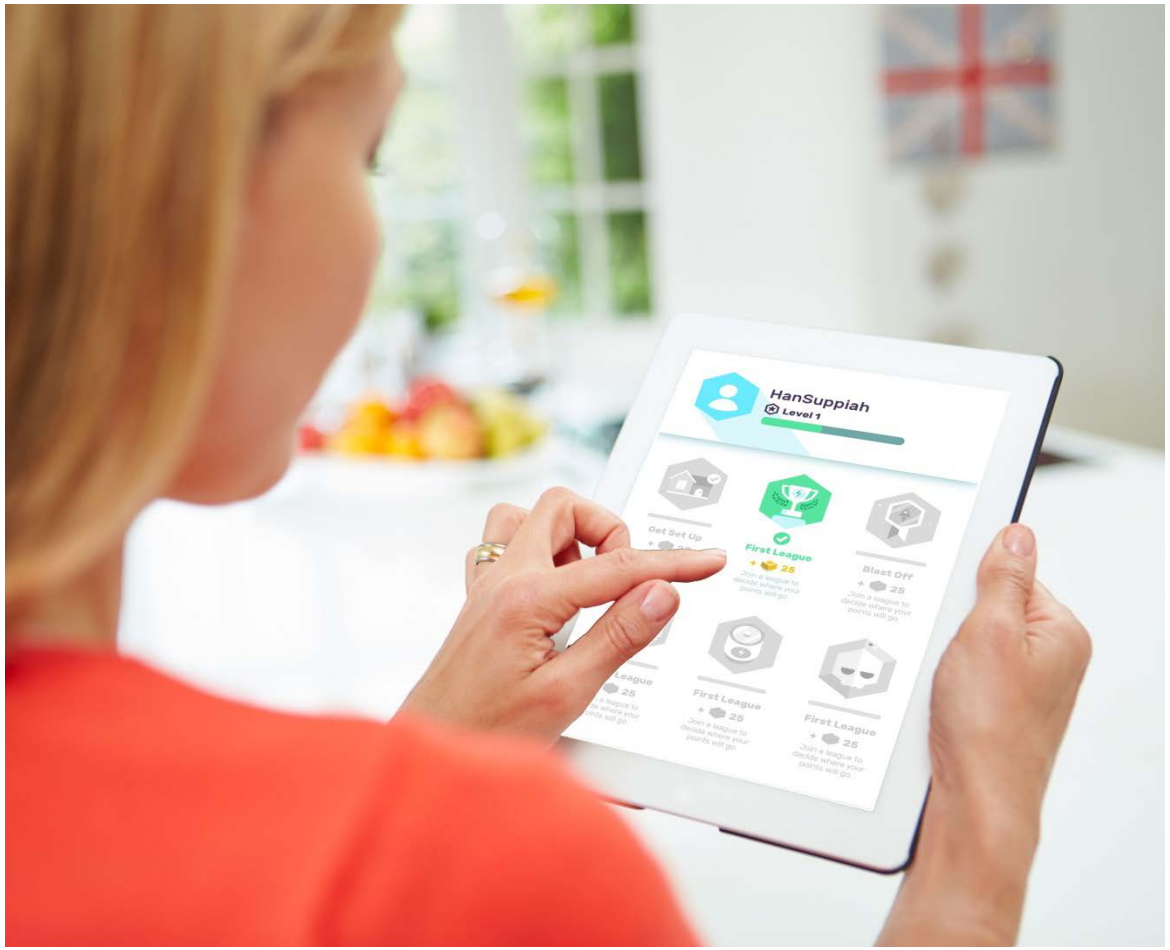
- Testing gamification of residential DSR (RDSR) as a recruitment and long term engagement method

- Investigation of the GenGame aggregation product to deliver RDSR



Project Objectives

- Develop a compelling proposition that encourages communities of residential customers to deliver a demand side response that is proven to be sufficiently worthwhile to add to the portfolio of DNO tools for deferring network reinforcement.
- Prove that a DSR proposition (GenGame) is an effective enabler for communities of residential customers to participate in demand side response - principally by offering load for direct control but also by actively modifying demand in response to a signal.
- The development of additional gaming options to address different types of network constraints and proposals for integrating the propositions into evolving DNO planning design tools.



https://youtu.be/qZyeZ1kdjFA

What we learned

Consumers are willing to be flexible.

We have proved that electricity consumers can be incentivised to engage in demand side response and that they are willing to be flexible with their energy usage.

A trusted name is key.

Marketing communications issued with both the GenGame and Northern Powergrid logos were much better received and acted upon.

Certain types of households can be more flexible.

EV and heat pump owners were more effective at flexing their energy usage – however gamificiation is an effective way to engage with and reward even those homeowners with limited ability to be flexible.

Gamification is no longer niche.

Mobile apps and games are an effective way to engage and with energy consumers – a high proportion of ACE trial participants asked to be included in follow-on projects

What we learned

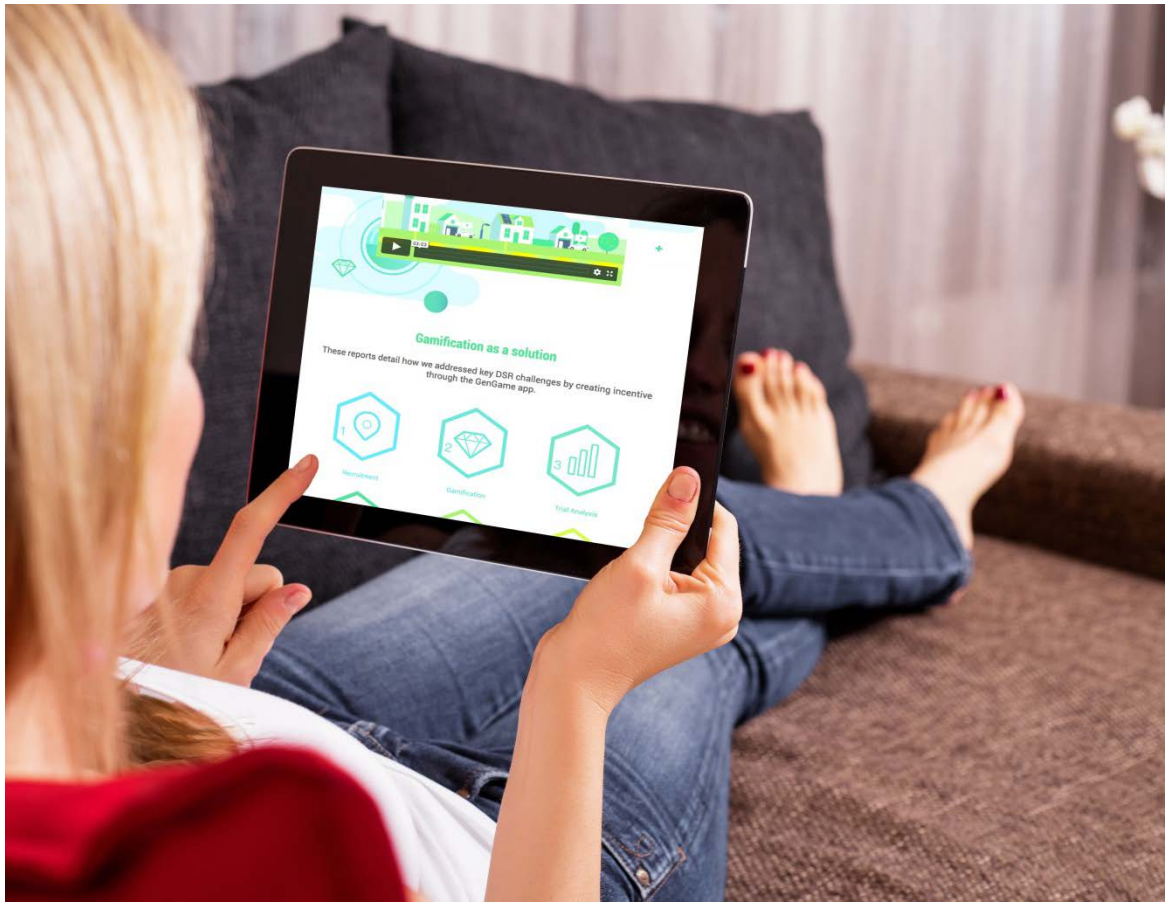
- Significant progress has been made in terms of customer engagement. We have proved that consumers are willing to be flexible with their energy usage.
- Recruitment is difficult but interactions between the DNO and its customers has improved with the introduction of digital communication channels like Facebook and Twitter.
- Identifiable communities and varied demographics can allow targeting of specific feeders that are potentially vulnerable to network constraints.

Find out more about ACE

We developed a website to disseminate the learning from the ACE project

- Key learning summaries
- Six detailed project reports
- ACE explainer video

https://www.npg-ace.com/



Follow on benefits and activities

- A follow on Innovate UK funded project named GenDrive that uses similar gamification techniques to incentivise smart / off-peak charging of Electric Vehicles.
- The formation of GenGame Ltd. a start-up enterprise that now employs 12 FTE's and is working with partners like Ecotricity, Octopus Energy and Green Energy UK on innovative domestic DSR projects.
- ACE recognised at the Network Awards for Partnership Initiative of the Year.

Break

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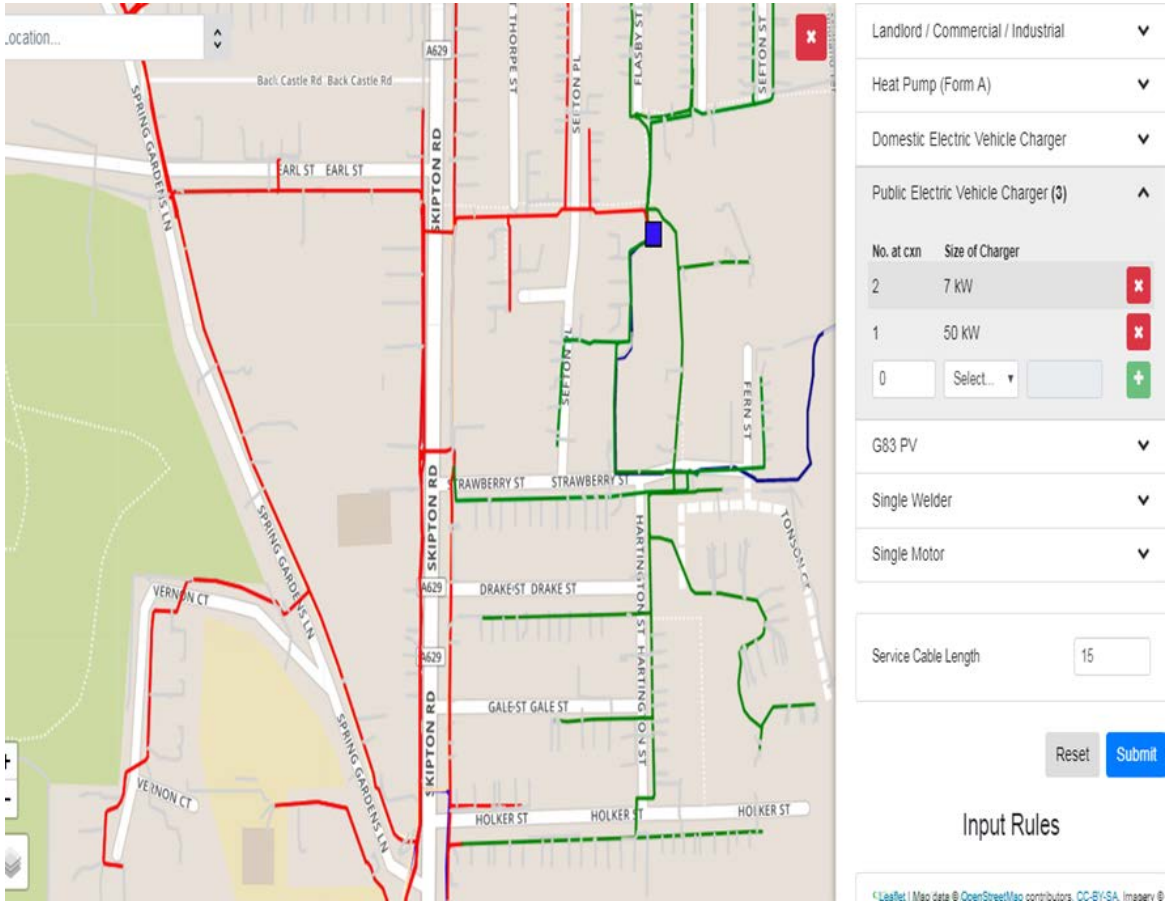
Auto Design

Derek Fairbairn
System Design Manager

Low Voltage Auto-Design tool

An innovation project in conjunction with EA Technology in order to provide information on locations which may be suitable to connect loads at low voltage.

- The project will encompass both demand and generation loads – particularly useful for the rise in Electric Vehicles
- It will develop a system that is capable of dealing with approximately 70% of design budget requests currently received by NPg
- It will require either no or very limited intervention by engineering design resource due to its simplicity



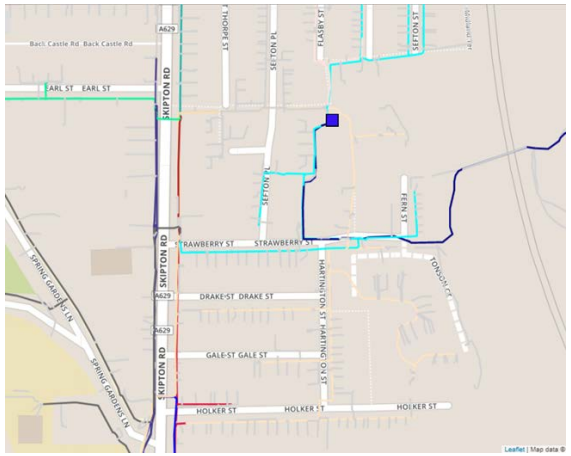
LV Auto-Design : You are in control

The key benefits we are seeking to achieve

- Improving customer service with users able to self-serve on the same day
- Greater transparency on where the network has more capacity for connections
- Help in planning for new EV charging locations which normally have the Point of Connection flexibility
- Customer optioneering allows load and location changes if they choose to self-serve
- If they self-serve they avoid Assessment & Design fees levied by DNOs for these serves saving money as well as time
- It is an opportunity to provide an industry leading design system
- Customers will use the same tool as NPg engineers

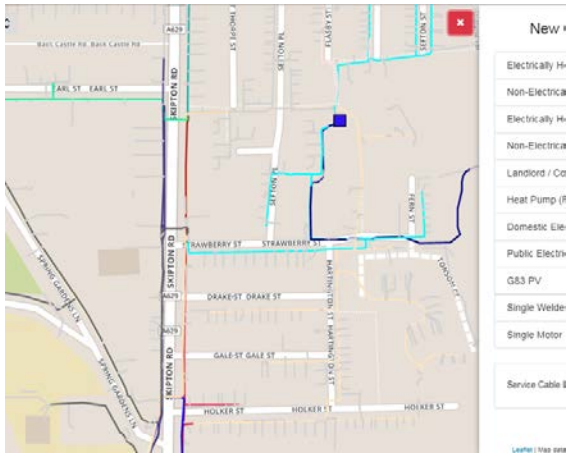
LV Auto-Design : System Overview

Initial View



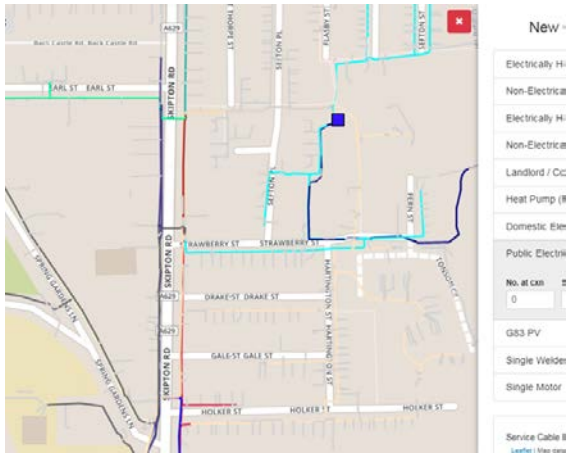
When the user logs in they will see an ordnance survey type map.

Load Type Options



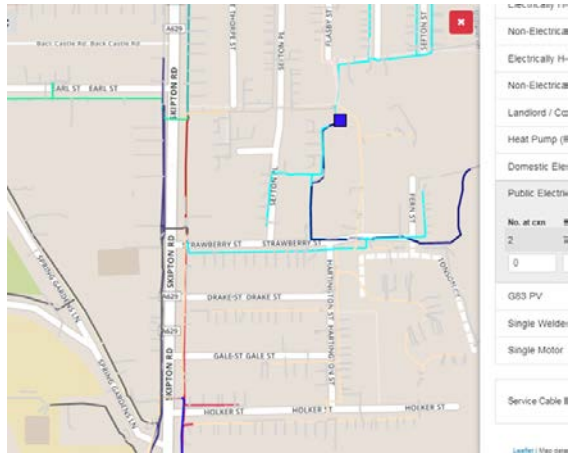
They will have a drop down menu to be able to select various types of load.

EV loads



We have developed to include EV's and believe this will become a valuable tool for planning.

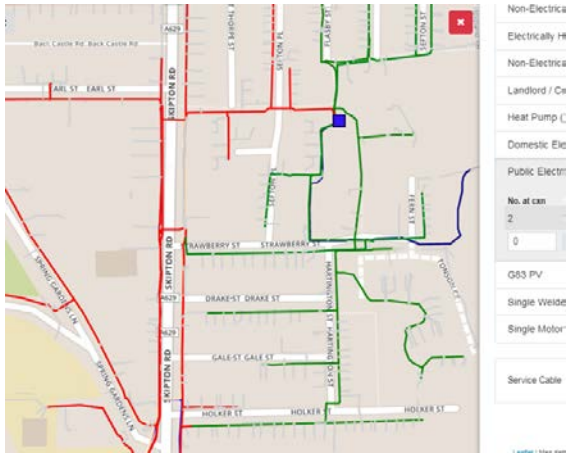
Other load types



To allow for the wider customer base you can also select on other types of loads i.e. a three phase commercial unit.

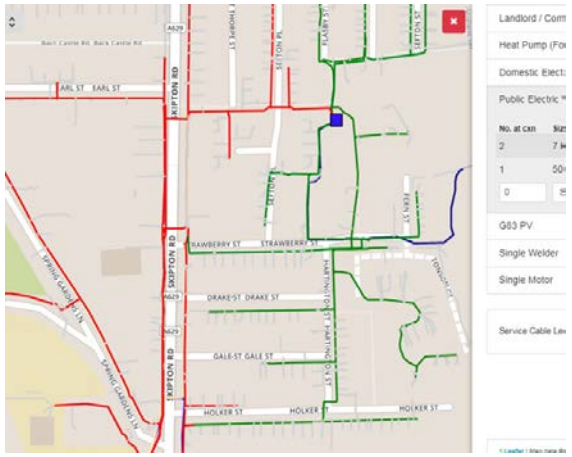
LV Auto-Design : System Overview

Calculation Results



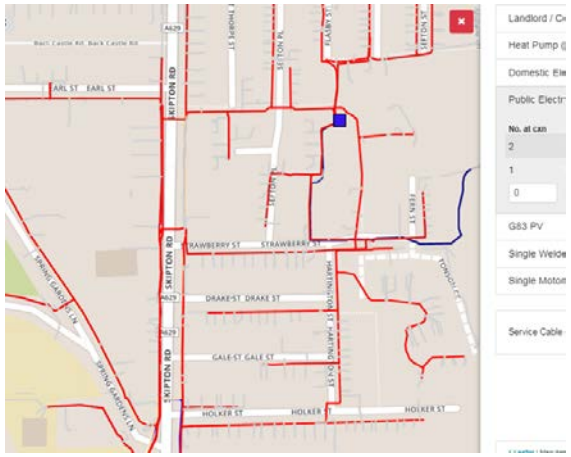
The low voltage ‘heat map’ of Red and Green cables shows what cables are indicating likely connections points may be possible.

Additional load



You can then add further load requirements in and test the capacity status until it changes from Green to Red.

Recalculated Results



Ultimately you may see all Red if too much load is being sought – either reduce the load, seek another area where the load may be available or see how much it may cost to change the cables

Low Voltage Auto-Design tool

Project has been running since the start of 2018 and is split between four phases .

- We have already tested the Beta version with a group of Local Authorities across the Northeast & Yorkshire in March 2019
- Well received and will be engaging them during the 2019 development – incorporating where possible ideas generated through the sessions
- Hopeful that the ‘base’ system will be further developed to allow move from budget estimates to formal connection offers

Stage	Name	Description	Target Date
Stage 1	Feasibility Studies & Planning	Assessment of data quality issues Identification of key design rules and assessment of feasibility of approach and Production of a fully designed plan for subsequent stages.	Q2 2018
Stage 2	Algorithms	Identification and assessment of appropriate and efficient algorithms to perform network assessments at Low Voltage.	Q4 2018
Stage 3	Phased Pilot	Phased pilot introduction and implementation of tool, based on stage 2 outcomes, to internal users.	Q3 2019
Stage 4	Customer Tool	Development of customer-friendly online connections tool.	Q1 2020

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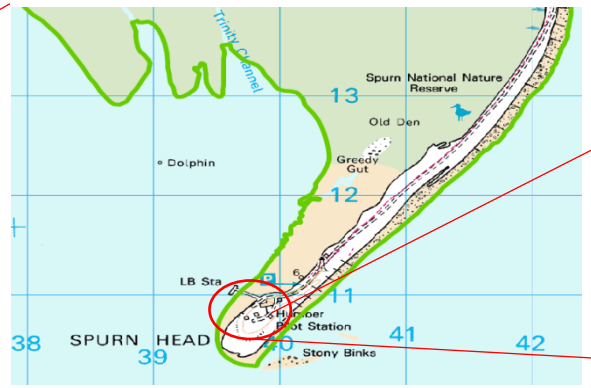
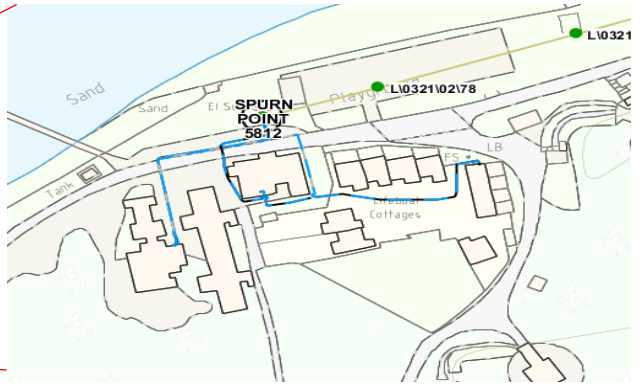
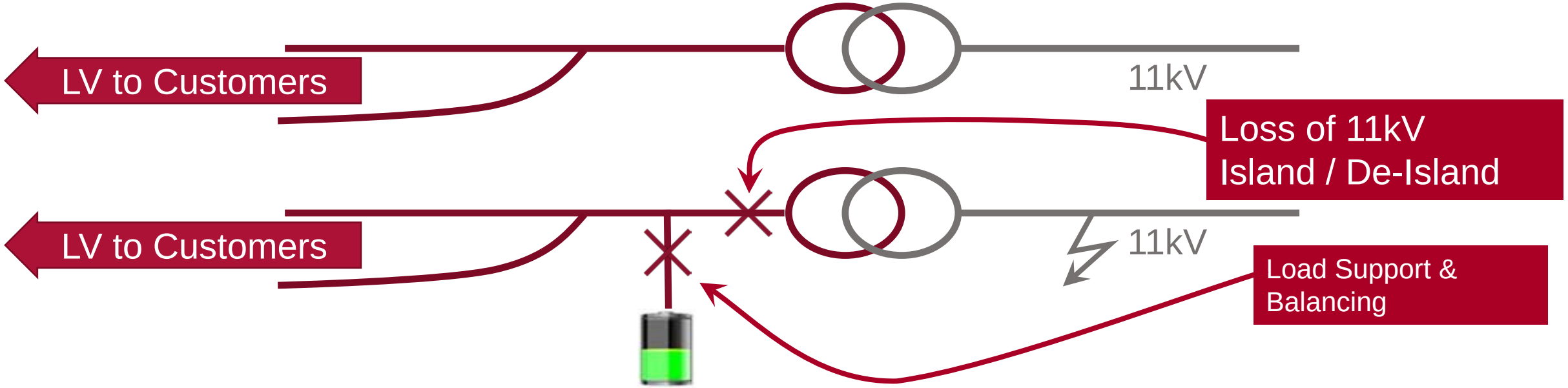
MicroResilence

Iain Miller
Head of Innovation

The Challenge – Resilience in remote locations

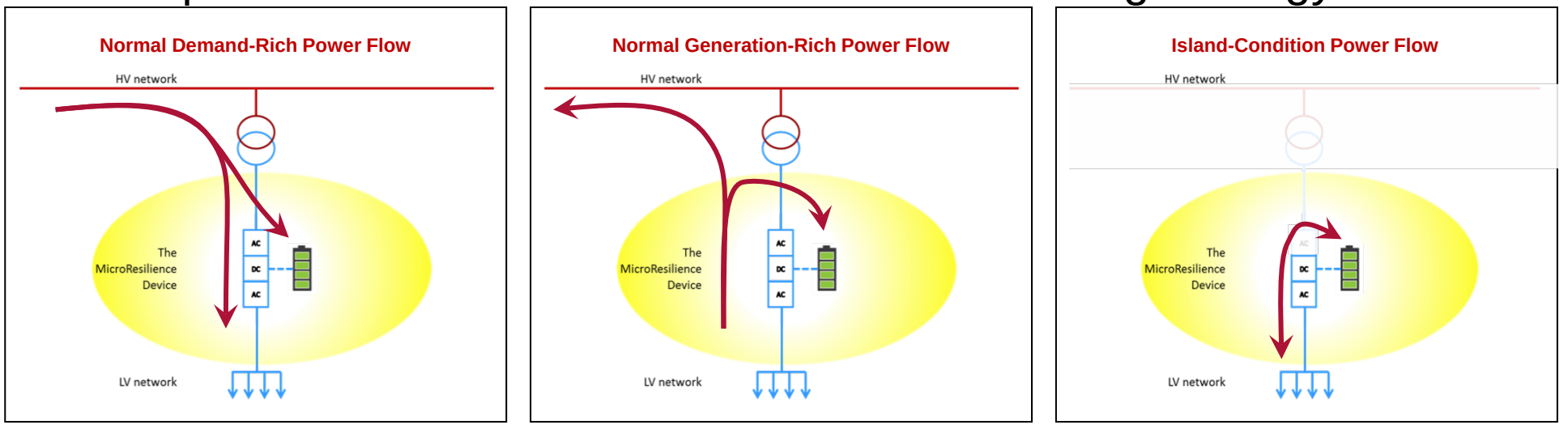






The project

- Assess normal prevailing power flows and use them to vary its state to cope with an outage of the upstream network. It is not intended to arbitrage energy.



- A method of maintaining LV supplies when the HV feeder has been lost, thereby improving resilience in areas that supply critical customers or are subject to increased likelihood of outage.
- Open-standards communications for interoperability and peer-to-peer communication.
- A benefits case for DNO-owned resilient microgrids.

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Panel Q&A

Panel Q&A

Patrick Erwin, Policy & Markets Director

Iain Miller, Head of Innovation

Derek Fairbairn, System Design Manager

Andrew Webster, Project Manager – Innovation

Ross McFarlane, Project Manager – Innovation

Chris Goodhand, Project Manager - Innovation

Lunch

Roundtables

What do you think the opportunities and challenges are in ensuring our industry is fit for the future?

How should we rank the opportunities in terms of importance to address?

Do we need to raise awareness of the innovation work we are already doing and if so, how should we do this?

Is there a question you would like us to ask as part of future innovation stakeholder engagement?

Summary of Roundtables

- xxxxxxxx

Forthcoming Events

Clean air zones and low emission vehicles: the challenges and opportunities

- Join us as we discuss the introduction of Clean Air Zones around the cities in our region and the implications for companies such as utilities and retailers. Tuesday 7th May, 9.30 – 13.00 at the Park Plaza, Leeds

The challenges and interdependencies of decarbonising heat

- Join us as we discuss what strategy / plans you have in place to begin the decarbonisation of heat? How can we best support you in this transition? What is missing to enable you to begin switching to low carbon heat? Friday 10th May, 09:00 - 12.30 at the Park Plaza, Leeds

Climate Change: the impact on regions and organisations

- Join us as we discuss the nature of the issues and risks organisations face as part of their climate change adaptation strategy and how they are planning to respond to those issues and risks. Monday 13th May

How do we build a smart energy system centred around the needs of our customers?

- Join our roundtable as we bring together energy retailers and providers of energy services to initiate the sharing of the vision for the future of energy markets, their mechanisms, and their priorities. Wednesday 15th May, 09.30 – 13.00 at the Barbican Centre, London

Annual Stakeholder Summit

- Friday 29th November at Cloth Hall Court, Leeds

Thank you