Celsius

Webinar

1 September 2016

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Bringing energy to your door

Damien Coyle

Project Manager

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Agenda

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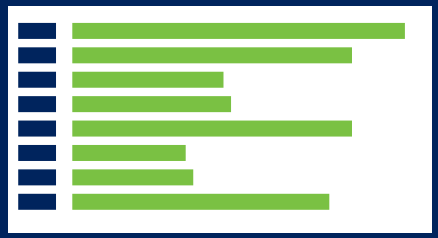
Celsius



Introduction

Project overview

Progress and next steps

Questions & answers

Webinar format

Bringing energy to your door

30 minutes presentation

20 minutes
questions & answers

Submit written questions
online during the webinar

Q&A panel

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Damien Coyle
Innovation Project Manager

Paul Turner
Innovation Delivery Manager

Kate Quigley
Innovation Customer Manager

Our smart grid development

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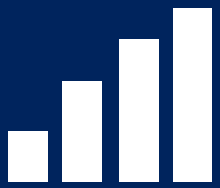
Leading work on developing smart solutions



Deliver value from existing assets

Customer choice

LCN Fund Low Carbon Networks — Five flagship products (second tier/NIC) £42 million

C2C

SMART STREET

Celsius

CLASS

RESPOND

Celsius

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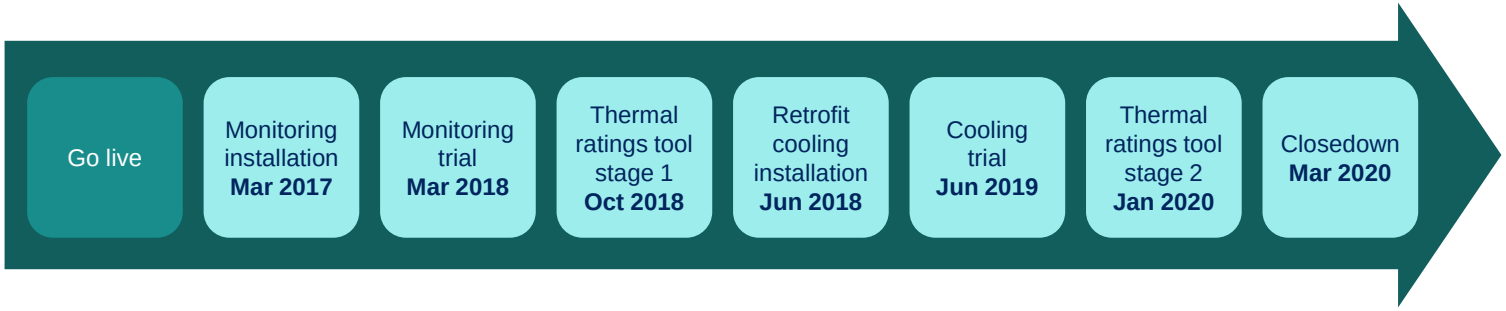
Awarded: 9 December 2015



Investment

£5.5 million

Up to £583m across GB by 2050

Financial benefits

RICARDO

ASH
CREATIVE WIRELESS ELECTRONICS

Impact Research

UK Power Networks
Delivering your electricity

Partners and roles on project

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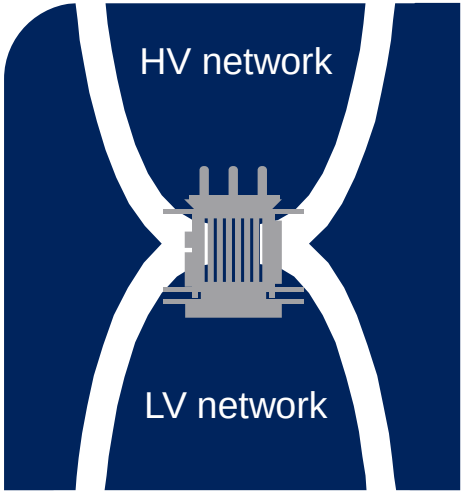
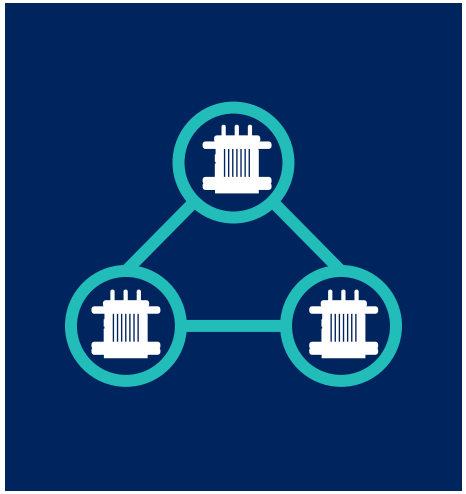
ASH	RICARDO	UK Power Networks	Impact Research	University of Southampton
Supply complete retrofit monitoring solution. Provide ongoing support throughout installation, commissioning and operation of the retrofit thermal monitoring workstream	Analyse trial data. Develop methodology to understand relationship between asset temperature, load characteristics and surrounding environment Determine impact of cooling technologies Develop tool and spec for low cost temperature sensor Recommendations for BAU rollout	Work with Ricardo-AEA and Electricity North West to develop site selection methodology, installation plan and guide for future retrofit thermal monitoring solution Participate in evaluation and selection of retrofit cooling techniques	Lead the customer survey engagement.	Peer review of the analysis methodology of the retrofit temperature sensor part of the project An investigative study on the impact of Celsius on the lifetime health of network assets

The problem





Objective is to maximise power through transformer

Assets have nominal thermal rating

Ratings = ^{o}C

Ratings ≠ amps

Diverse range of environments

Small changes in environmental factors can result in very different actual ratings

Assumed thermal ratings can lead to capacity being under-utilised or unnecessary risk

Celsius as part of the smart future

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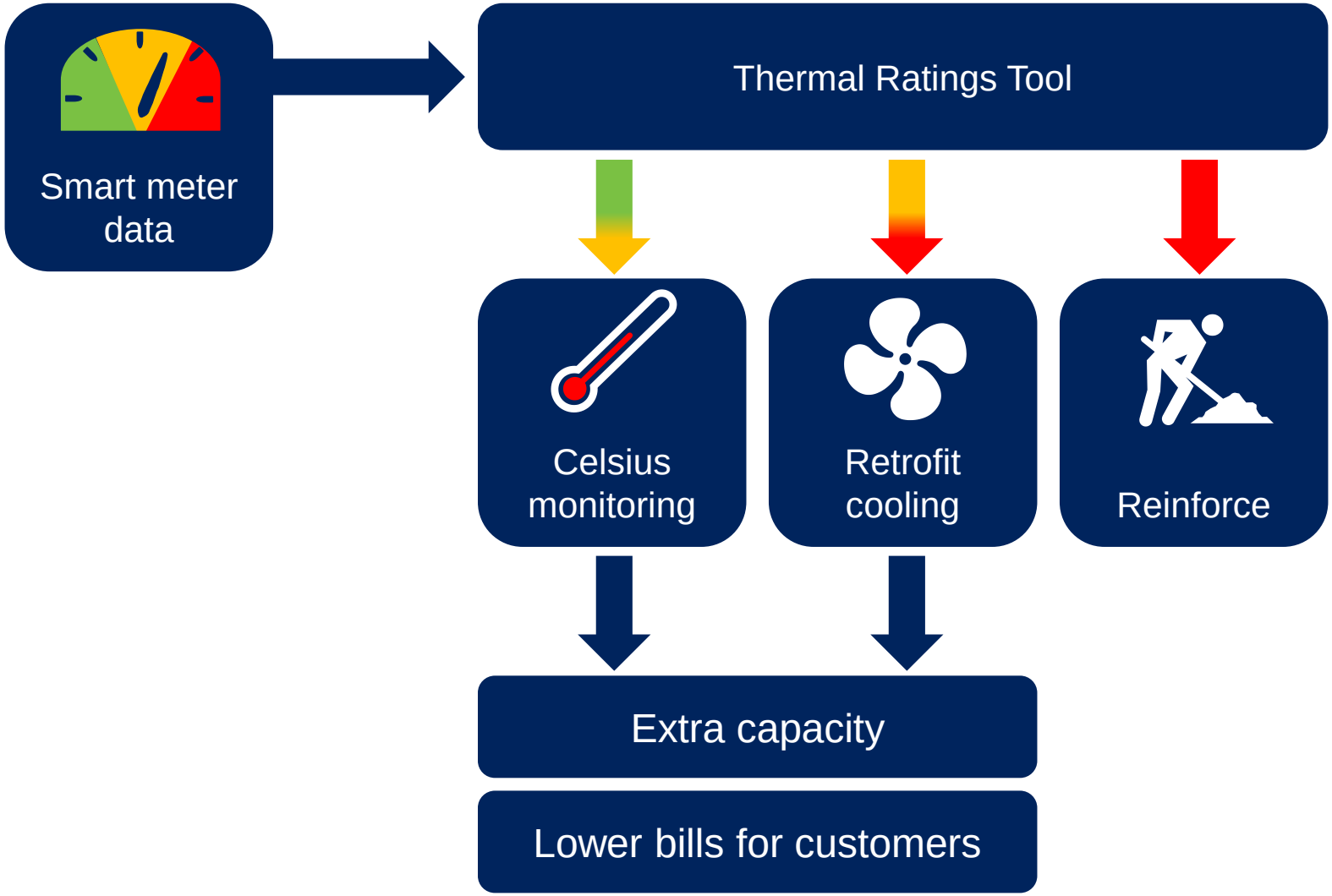
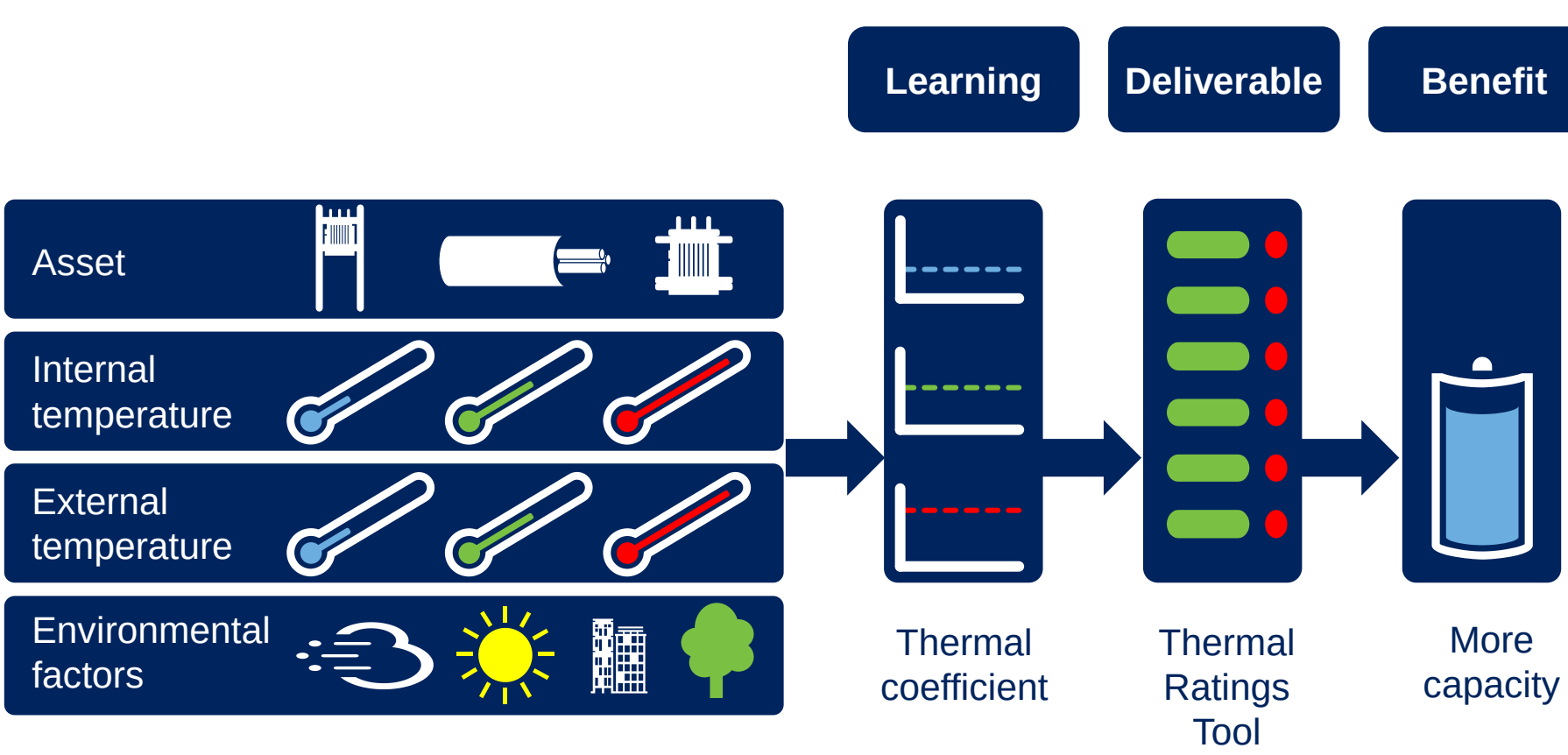


Step 1: Fit thermal monitoring



Step 2: Retrofit cooling

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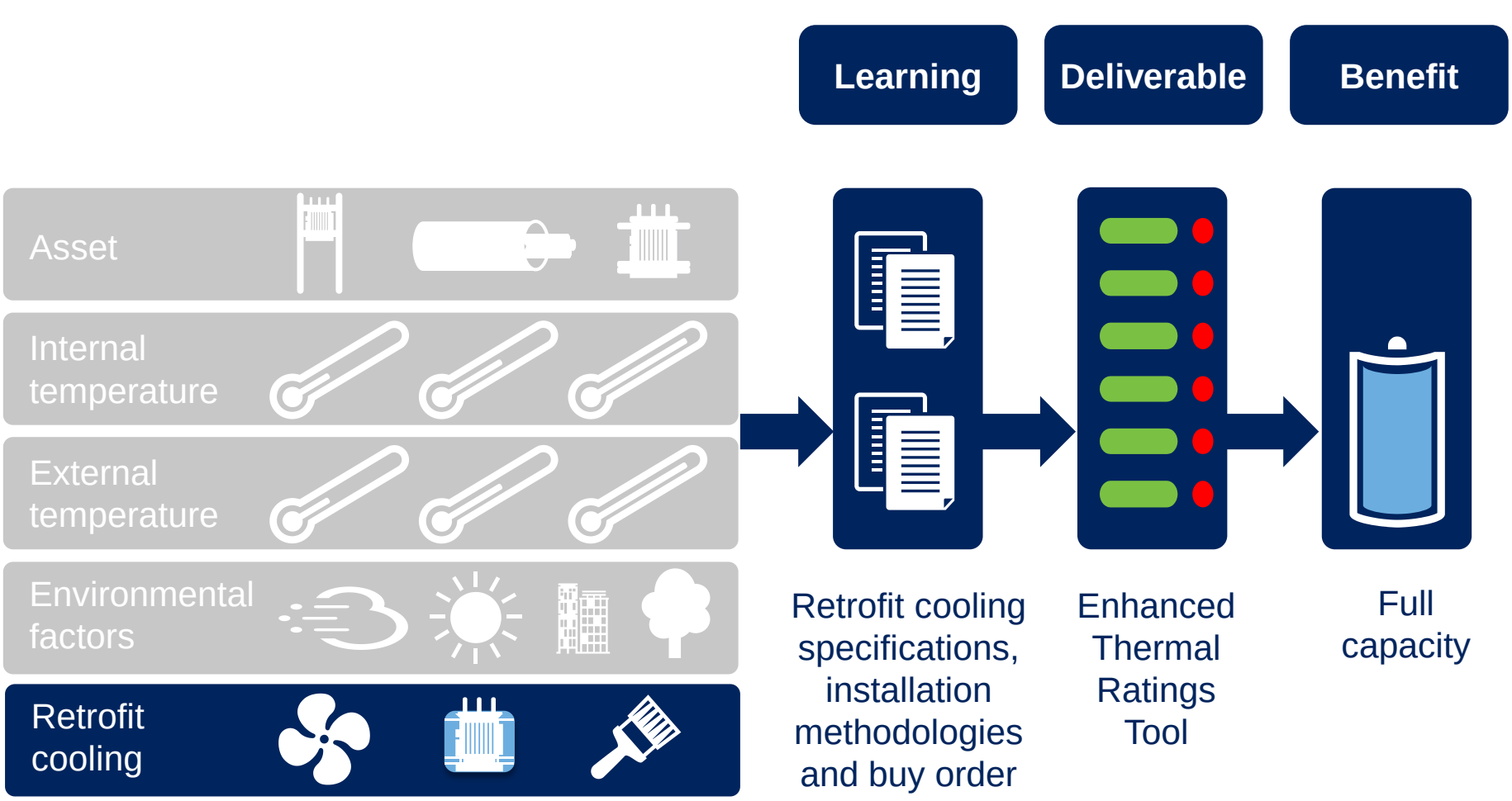

Celsius studies

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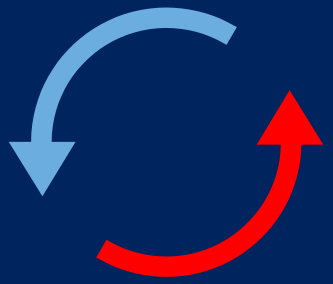
Thermal analysis (step 1)

Internal asset temperature = Thermal coefficient × External asset temperature

Thermal flow study (steps 1 & 2)



Research into heat and air flows for optimal substation design

Asset health study (steps 1 & 2)

Examines effects of increased load and cooling techniques on assets

Monitoring site selection and timescales

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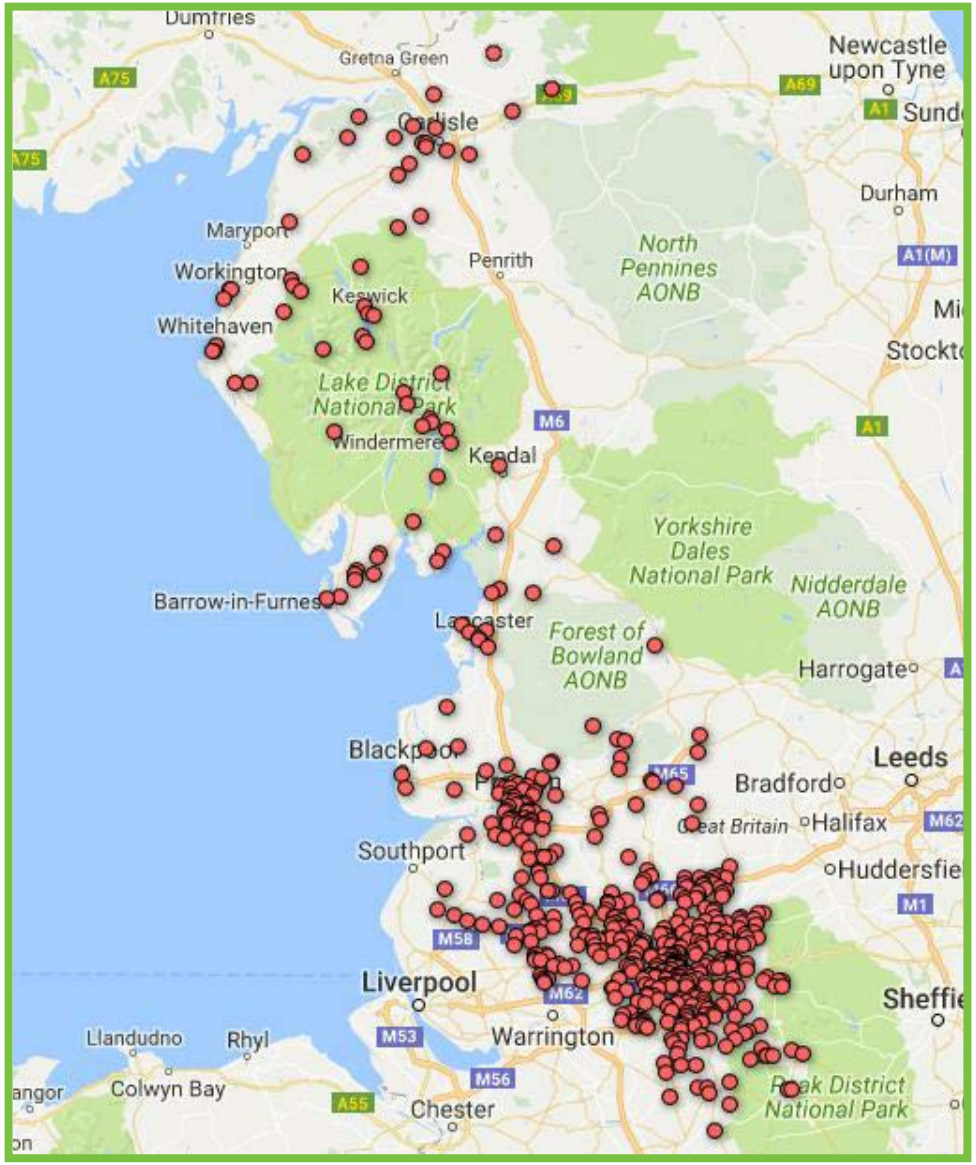
520 substations	100 cooling technique sites	Four year project
Enough substations to represent 80% of GB substation population	Subset of 520 substations – enough sites to adequately trial all techniques	To enable trials to take place during all seasons and to trial all cooling techniques

Site selection map



Site selection – rural and urban

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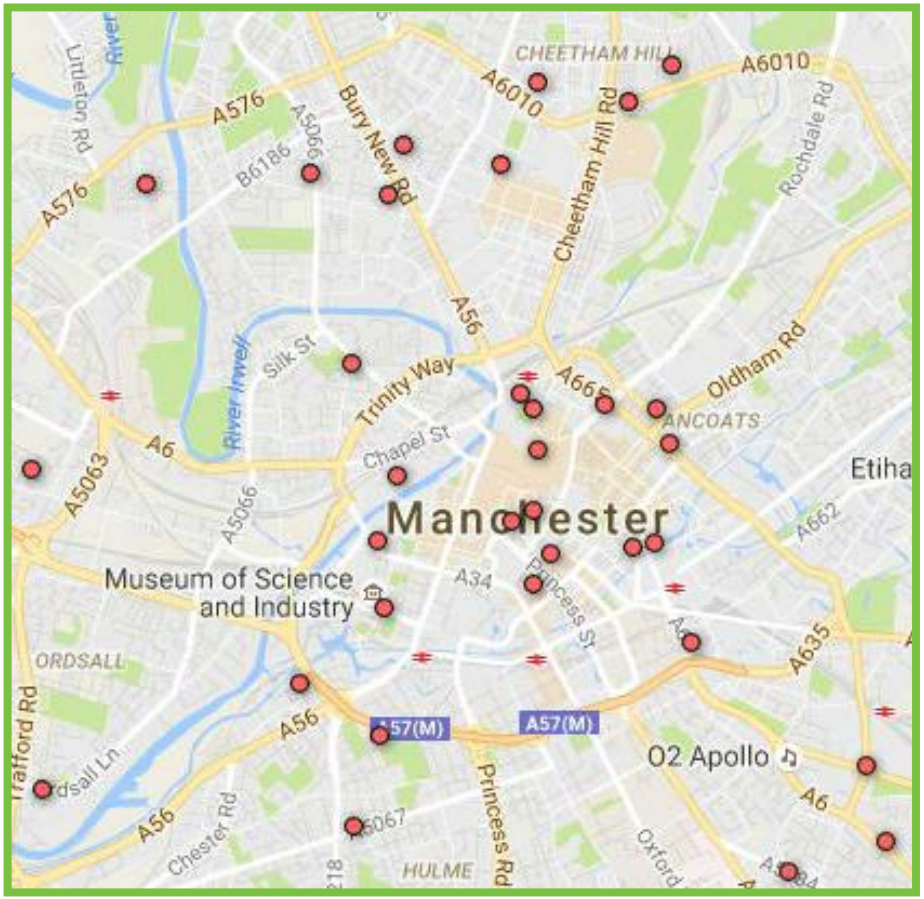
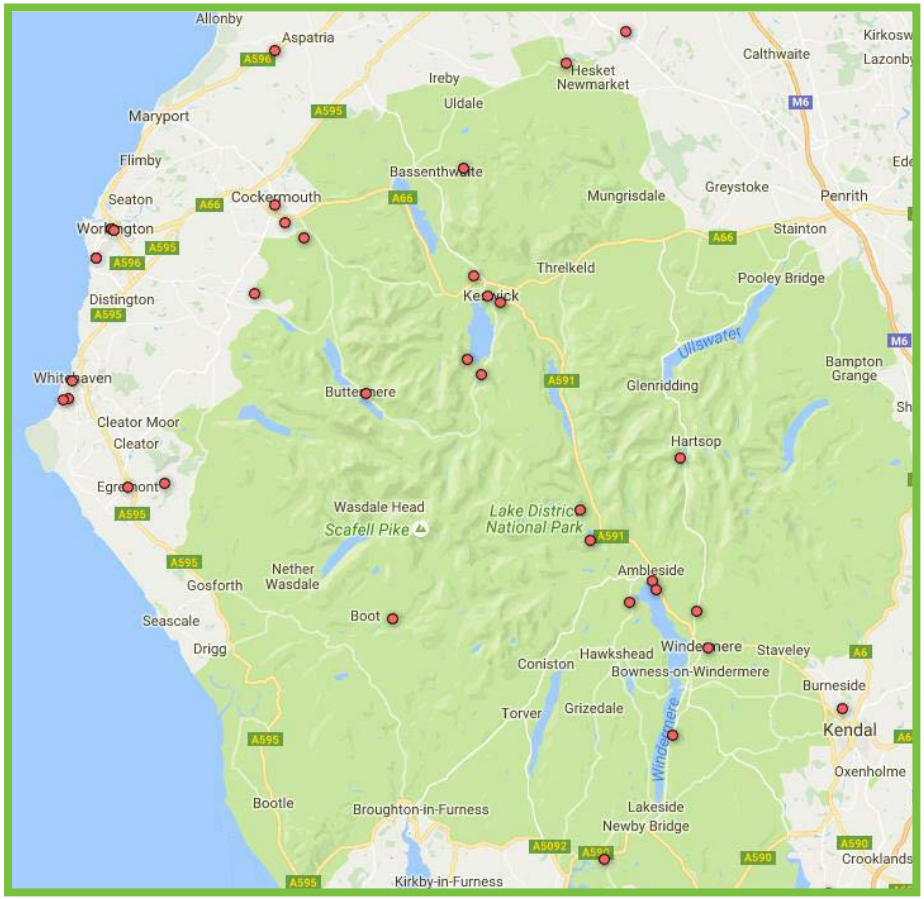
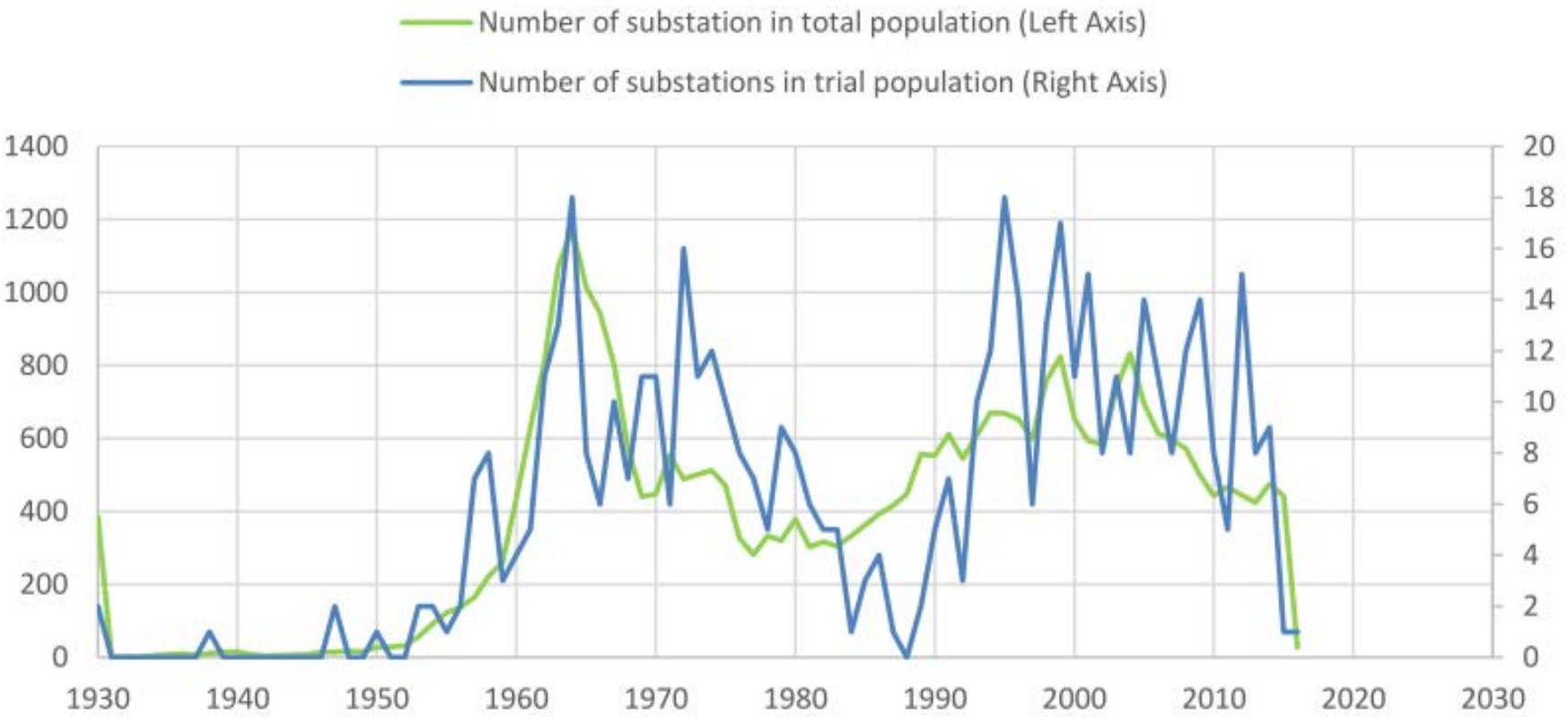
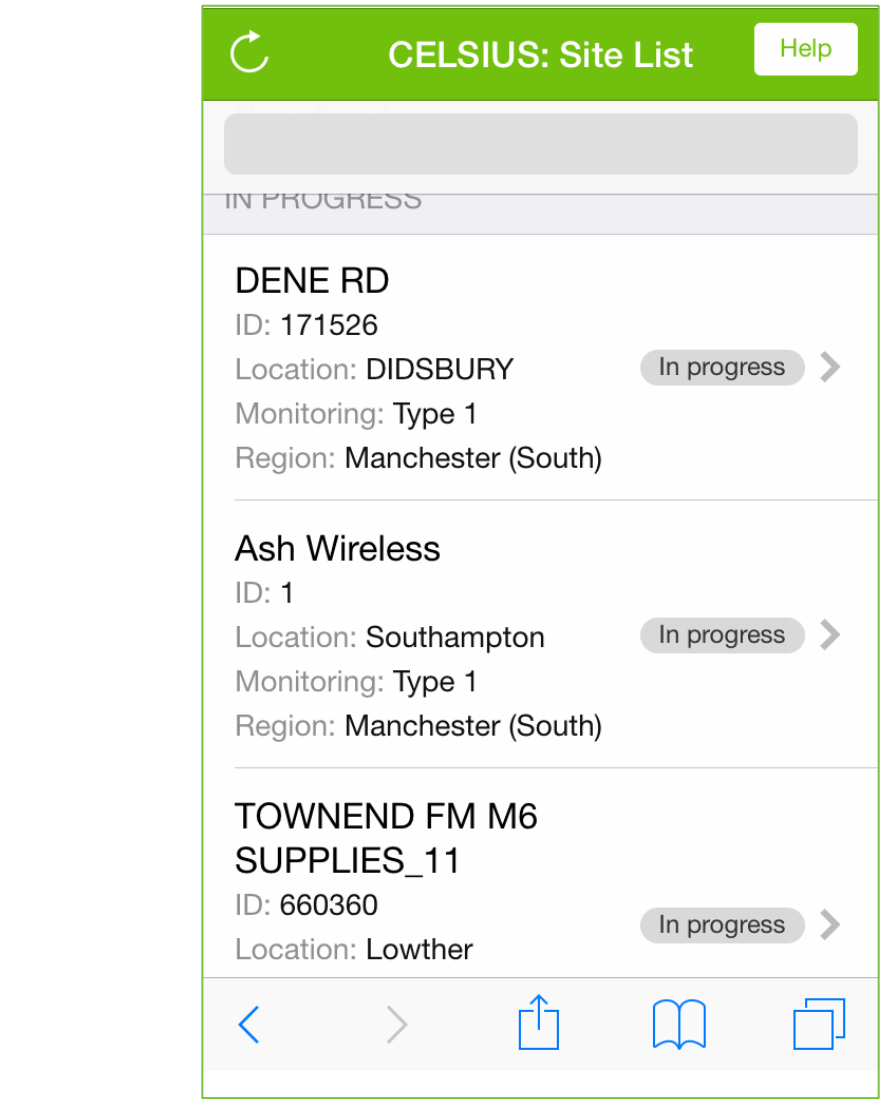


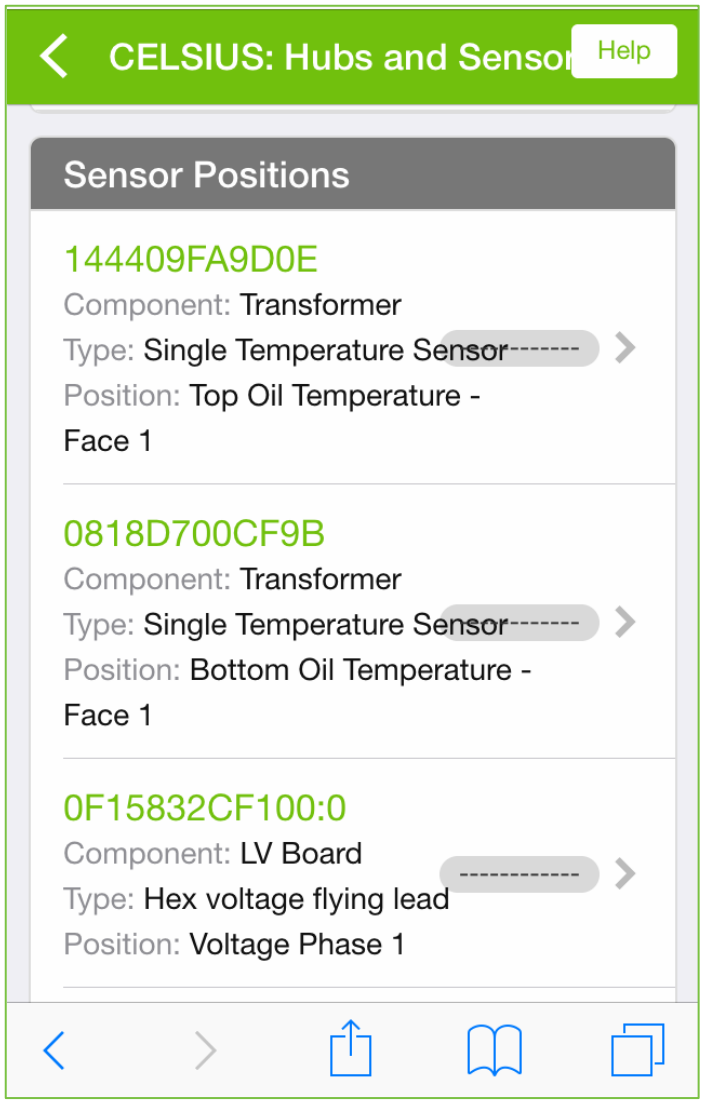


Site selection



Commissioning app





Celsius technology

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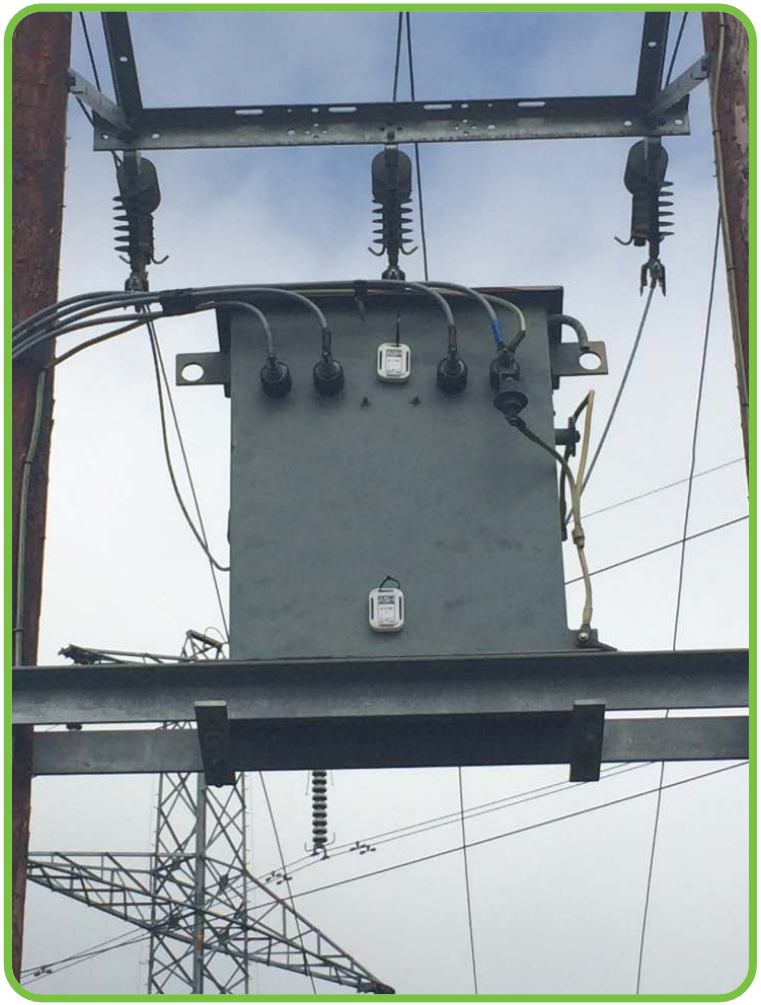
Hub

Wireless sensor



Celsius technology – trial fit

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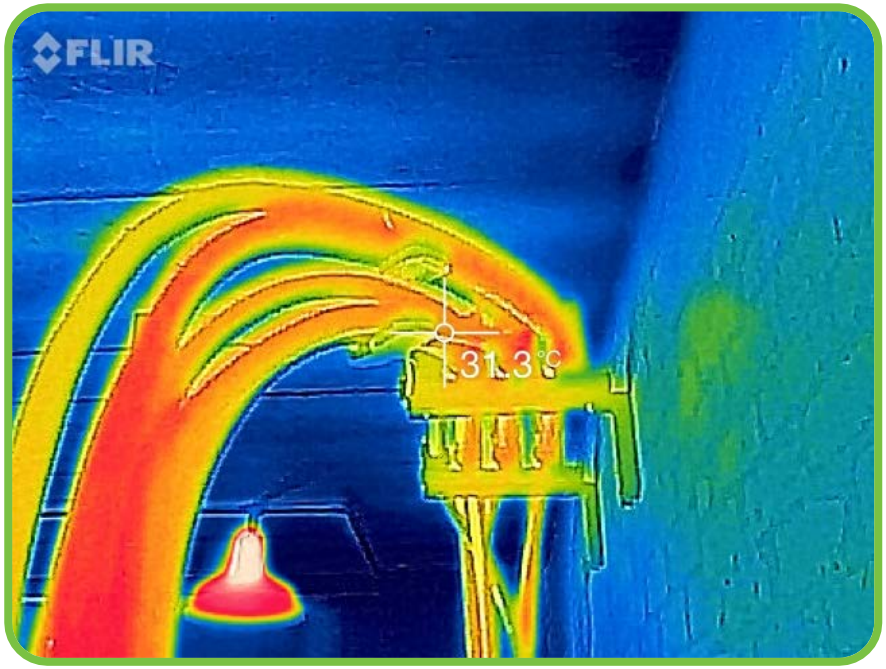
LV board with three sensors

Celsius technology – trial fit

Transformer singles



Celsius technology – trial fit

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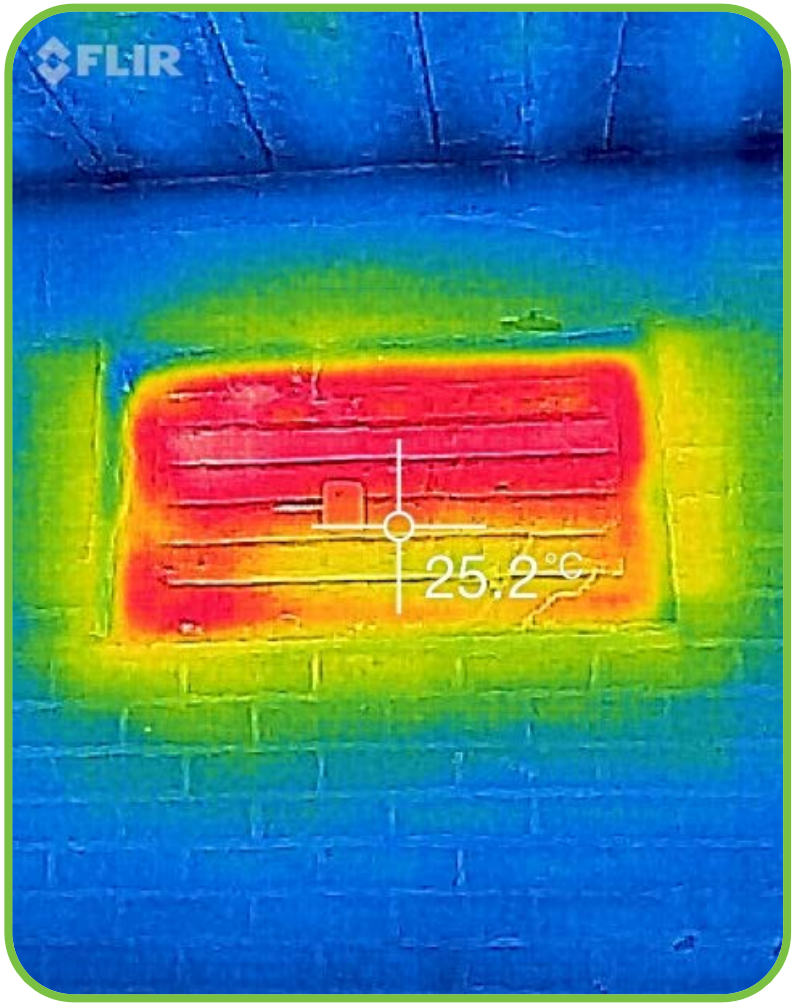
Ventilation



Celsius technology – trial fit

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Transformer

Traditional reinforcement v Celsius

	Traditional	Celsius
	Traditional replacement of ground-mounted transformer is expensive	Low cost options to release capacity as and when required
	Complex and time-consuming	Simple and quick to deploy
	Highly disruptive	Minimal or no disruption to customers

Customer engagement

Customers in the Celsius trial areas will find the implementation of innovative retrofit cooling techniques as acceptable as traditional reinforcement

Customers who are educated as to the need for and benefits of Celsius are significantly more likely to find it acceptable

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Customer engagement plan

Baseline survey

Test survey

Focus groups

Website

Video/ podcasts

Customer mailing

Social media

Progress and next steps

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January – June 2016	July - September 2016	October – December 2016	January – March 2017
Project mobilised	Website live	Commence monitoring installation	Thermal flow study
Partner contracts awarded	Monitoring site selection	Data capture	Complete monitoring install
Customer engagement plan	Monitoring equipment build	ENA ER P15 & P17 review workshop	Investigate cooling technology
Data privacy statement	Monitoring commissioning tool		
	Back end system		

Knowledge sharing and dissemination

Questions & answers

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Damien Coyle
Innovation Project Manager

Paul Turner
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Kate Quigley
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Submit written questions online

Post event feedback

	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
Today's webinar was successful in raising my understanding of the Celsius project				57%	43%
Webinars are suitable channels for communicating innovation project outcomes and are more convenient than attending an event in person.				14%	86%
I will take part in other webinars organised by Electricity North West to discuss low carbon projects.				29%	71%
Do you have any comments or suggestions about how we could have improved today's webinar?	1. Have you considered increasing noise levels by installing fans? 2. Have you considered Air handling units? 3. The project may release some capacity in the transformer but that suggest cables will be stressed by increased load. Will there be any monitoring of thermal impact on cables. 4. Experience suggests temperature raise in the core of transformer can not be monitored by top and bottom sensors. How will you monitor that?				

For more information

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	**facebook.com/ElectricityNorthWest**
	**youtube.com/ElectricityNorthWest**

Please contact us if you have any questions or would like to arrange a one-to-one briefing about our innovation projects