

Celsius

A new approach to managing thermal capacity



The first solution of its kind in Great Britain, Celsius will deliver a co-ordinated approach to managing the temperature of electrical assets in distribution substations. The £5.5 million project will release additional capacity, reduce long-term costs for customers and avoid early asset replacement.

Electricity North West is leading the way in developing smart solutions to meet our future energy demands. As the regional electricity operator, the company is responsible for keeping the lights on for five million people in the North West of England. It's also their job to plan for the future and look at smarter ways of meeting the expected increase in demand as we start to reduce our reliance on fossil fuels.

Why do we need Celsius?

To meet the decarbonisation challenge laid down by the Government, customers are being encouraged to adopt new low carbon technologies such as electric vehicles and heat pumps. The resulting increase in electricity demand means an increase in the current flowing on the network. The greater the amount of current flowing, the greater the heat generated and the hotter an asset becomes. This will lead to thermal 'pinch points' at substations, where load is causing equipment to operate close to its maximum operating temperature.

What is Celsius?

Celsius is a four year trial of a co-ordinated approach to managing the temperature of electrical assets in distribution substations. A two-step approach will gather data to increase understanding of thermal behaviour and release capacity.

With greater knowledge of the behaviour of these assets, network operators will be able to support the connection of low carbon technologies more quickly and at lower cost.

Celsius will enable the release of capacity at a fraction of the cost of traditional reinforcement, reducing costs for British customers by around £0.6 billion by 2050 and releasing 13GW of capacity.

Stage 1 - Thermal monitoring

The first stage of the project is to record temperature and load measurements from 520 distribution substations which have been selected to be representative of 80% of the national substation population. Monitoring equipment has been deployed at all the trial substations and the raw temperature data is available on the Celsius website.

The data is being analysed by project partners Ricardo-AEA to develop a simple 'thermal ratings tool' which will enable network operators to understand what additional capacity can be released from their substations.

The project team are also working with the National Physical Laboratory to analyse the heat and air flows in substations. This will influence the design of future substations and potentially show how air flow in existing substations can be improved.

Stage 2 - Retrofit cooling techniques

To release further capacity, retrofit cooling techniques for cables and transformers will be evaluated and deployed on 100 of the initial 520 trial sites. These include passive techniques such as painting transformers with reflective paint, new backfill material for cables and active techniques such as fans on transformers.

Electricity North West has held a number of workshops with other network operators and has selected a number of techniques for trial.

Once these are installed, the benefits will be quantified via an extended period of monitoring for a minimum period of 12 months. The learning from this work will be captured as an enhancement to the thermal ratings tool.

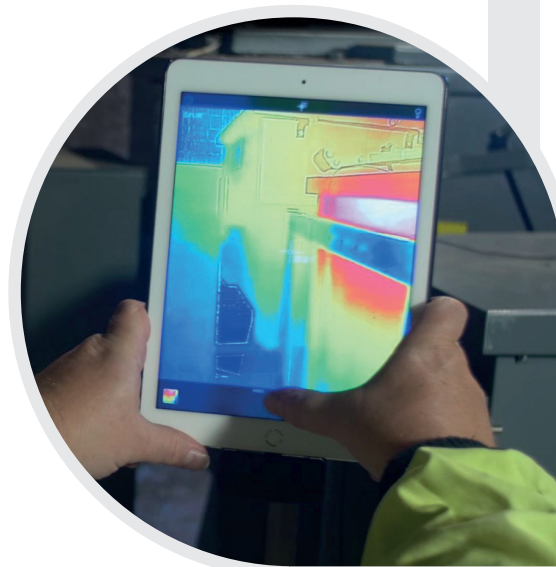
Engaging with customers

As the cooling techniques will be deployed at substations close to where customers live and work, a programme of engagement will determine if customers find them as acceptable as traditional solutions.

Two surveys will be carried out before and after the retrofit cooling technologies are installed in 2018 to understand any audible or visual impact on customers.

The research has been carefully designed to assess if customers who have been educated about the need for, and benefits of, Celsius are more or less accepting of the cooling technologies, than customers who have not received any information.

Celsius is funded by Ofgem's Network Innovation Competition. The project started in January 2016 and will run until March 2020.



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To find out more about the Celsius project, visit: www.enwl.co.uk/celsius