electricity north west

Bringing energy to your door

CLIMATE CHANGE ACT 2008

The Climate Change Act 2008 requires the UK to reduce greenhouse gas emissions by 80% by 2050. This will mean that we have to burn fewer fossil fuels.

At the same time, the demand on electricity networks is expected to double because:

- More homes are likely to be heated by electricity instead of gas or oil
- Domestic cars and commercial vehicles will be electric or plug in hybrid rather than petrol fuelled.

PROBLEM STATEMENT

Government forecasts predict an increase in electricity demand by of **60% by 2050**. It's difficult to predict how quickly the wholesale use of low carbon technologies **(solar generation / electric vehicles / electric heat pumps)** will become the norm but we expect to see **notable changes over the next 10 years.**

Distribution Network Operators (DNOs) are under a regulatory obligation to make sure that their distribution networks can accommodate the forecasted uptake in these technologies.

This chart illustrates the scale of the challenge:

- In an area of domestic properties with **gas central heating**, the electricity network is designed to supply **a peak demand of up to 2kW per property**
- Changing the gas heating to an **'all electric'** alternative and adding a new **electric vehicle** could result in a total demand of **up to 15kW per property**.

This increase of demand will impact all customers on the network, regardless of whether they have adopted these technologies themselves.

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THERMAL CONSTRAINTS

Greater demand for electricity will mean an increase in the current flowing on the network. The greater the current, the **greater the heat** generated and the **hotter cables** and the equipment located in substations **(transformers)** become. In some cases this will lead to equipment operating close to its **maximum operating temperature**.

In addition to the challenge of increased current, substations operate in different environments and in some cases **sun glare** can significantly affect the internal operating temperature of equipment.

A POSSIBLE SOLUTION

Currently, if equipment exceeds its capacity rating the network needs to be reinforced by replacing assets with new, higher capacity equipment. This is both expensive and disruptive and these costs are borne by all customers in the form of higher bills.

Our innovative project, Celsius, will develop simple **'Thermal monitoring'** techniques, which will identify where our equipment is starting to operate close to its **'thermal capacity'**.

At these sites, we will trial a range of cooling techniques to:

- ✓ **Reduce heat in cables and equipment caused by high load and current**
- ✓ **Improve air flow inside substations to assist in cooling this equipment**
- ✓ **Make some external modifications to help absorb or deflect solar heat.**

Cooling techniques will **quickly & cost effectively release capacity** from existing equipment, enabling the network to be **utilised more efficiently** to help meet increased demand, **without increasing bills**.