LCT DETECTION PROJECT:

A summary of the key learning and business insights

ElectraLink

IBM

WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

The LCT Detection project

The Low Carbon Technologies (LCT) Detection project has been managed and delivered by ElectraLink, the UK's Energy Market Data Hub (EMDH), in partnership with IBM. It has been funded by Western Power Distribution's (WPD) Network Innovation Allowance. The driver for the project was the need for WPD to gain better insight into where electric vehicles and LCTs such as solar panels and heat pumps are connected to its low voltage network, at a domestic level. Better visibility is essential in order for Western Power Distribution, and other Distribution Network Operators, to manage their networks effectively as numbers of electric vehicles and solar panels start to increase.

A data-driven approach to innovation

The project has combined over six years' worth of structured energy market data from ElectraLink's Data Transfer Service (DTS) dataset with WPD's, making use of IBM's machine learning and advanced analytics to identify previously unknown instances of electric vehicles and LCTs on both the structured and freeform data. An agile sprint process was used to manipulate the data, train and build the proof of concept models.

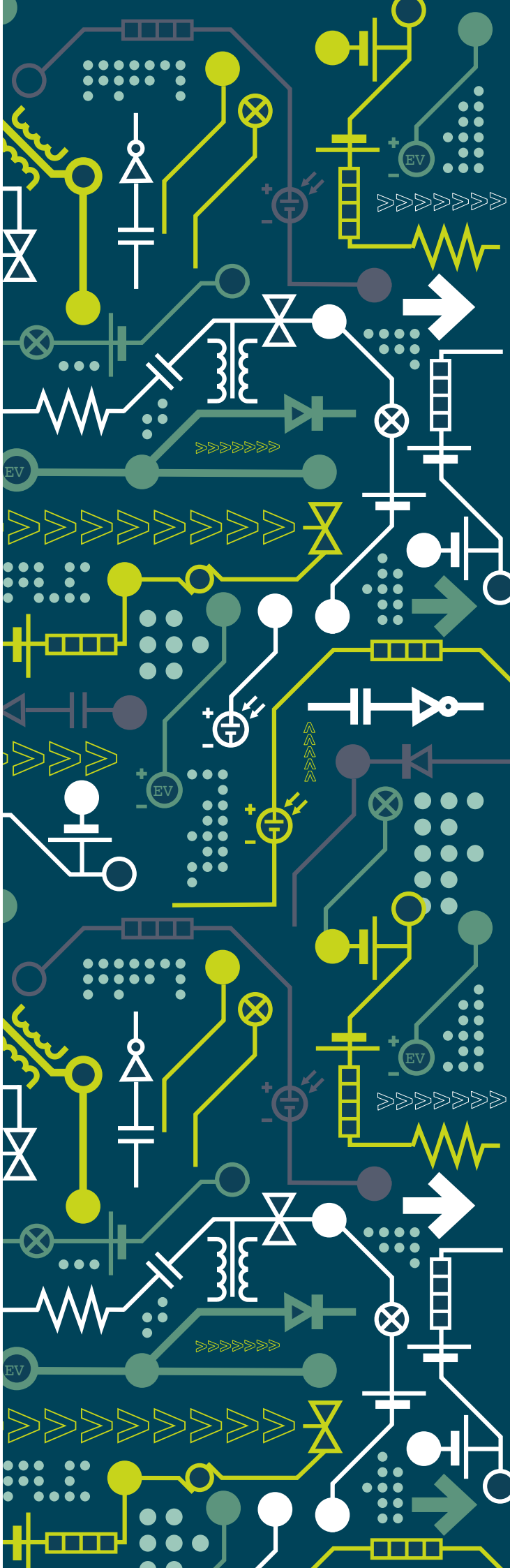
Proof of Concept models and key learning

The main project outputs are two proof of concept models that have successfully identified unregistered electric vehicles and LCTs on the network – from both structured and unstructured data.

The models have found indications of 15,000 previously unknown electric vehicles and solar panels connected to Western Power Distribution's local electricity network. The data suggests that there could be 13% more households with electric vehicles and solar panels on Western Power Distribution's network than were previously thought.

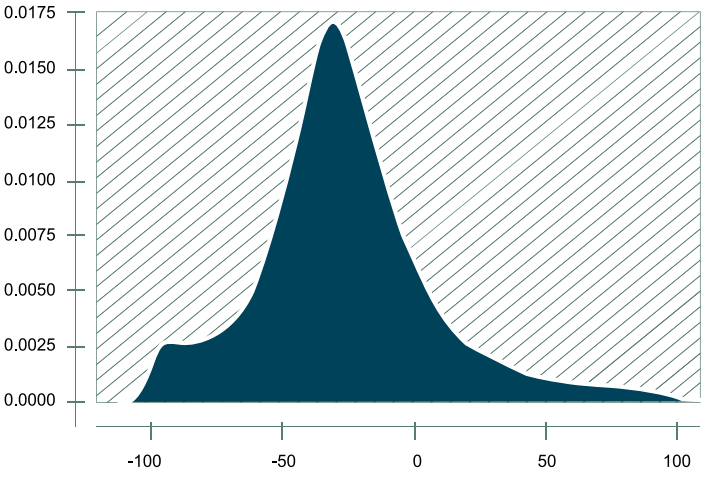
The proof of concept model based on unstructured data used machine learning to identify instances of electric vehicles and solar panels from freeform text comments captured by field engineers going out to domestic properties. Historically, nothing has been done with this information. Given the relative paucity of electric vehicles, solar panels and other low carbon technology-related words in freeform text in the data sets, a key piece of learning is that it would add value to the data and model output if engineers going out to properties recorded 'EV', 'PV, 'heat pumps' as a matter of course, in all cases, not just where issues are encountered. This could be achieved through adaptation of WPD's 'cut-out' app that is used by field engineers on all site visits.

The proof of concept models under the LCT Detection project are essential stepping stones to development of an holistic virtual monitoring capability for WPD to underpin its transition to Distribution System Operator.



Key data insights

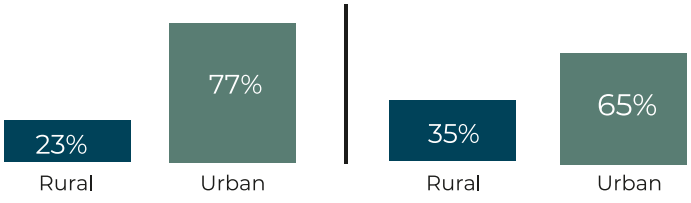
Using machine learning, the project has identified instances of electric vehicle and solar panels from unstructured data i.e. the forms that field engineers fill out when going on site visits. This is a valuable first, with a key recommendation being that it would add value to the data if engineers going out to properties recorded 'EV', 'PV, 'heat pumps' as a matter of course, not just where issues are encountered.



% Change in electricity consumption post solar panel installation

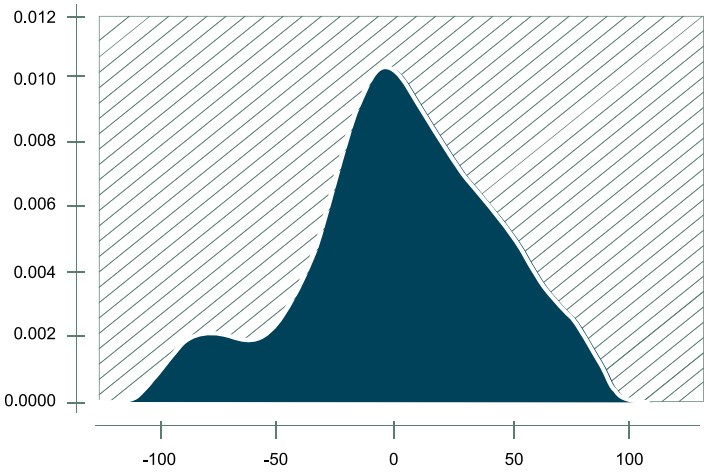
The project has also revealed valuable insights around energy consumption in general, including a 25% reduction in domestic electricity usage following solar panel installation, as well as a 5% increase in energy consumption where electric vehicle charge points are installed.

Energy consumption in domestic LCT households



Proportion of Domestic Households in Rural and Urban areas

Proportion of Domestic Households in Rural and Urban areas with Electric Vehicles



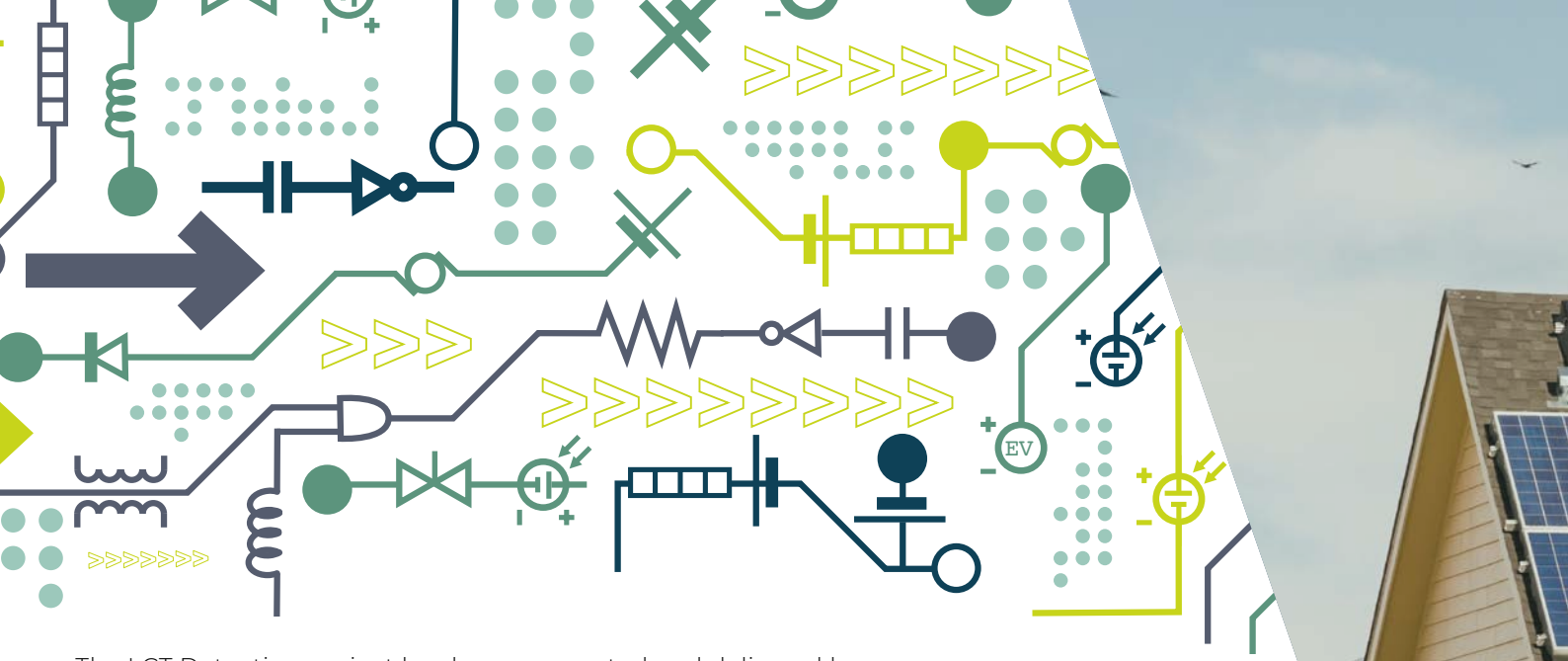
% Change in electricity consumption indicating Electric Vehicle charging

The proportion of LCTs connected to the low voltage network is high in rural areas considering the density of the population. The findings also show that electric vehicles and solar panels are more prevalent in affluent areas while solar panels are also present in areas of high deprivation, likely due to leasing of social housing roof space for solar panels.

What next?

The proof of concept model developed under this project has been based on consumption data only. It is clear from the static analyses carried out on the aggregated data that bringing in socio-economic data will enhance the model. Another key piece of learning centres on the need for more granular data and a negative dataset; the project developed its own negative data set which precluded use of, for example, socio-economic data. The proof of concept models under the LCT Detection project are an essential stepping stone to development of an holistic virtual monitoring capability for Western Power Distribution to underpin its transition to Distribution System Operator.

Find the LCT Detection Closedown Report here: https://www.westernpower.co.uk/downloads/47647



The LCT Detection project has been supported and delivered by:

Western Power Distribution

Western Power Distribution (WPD) is the distribution network operator for the East & West Midlands, South West and South Wales. It is responsible for delivering electricity to approximately 7.9 million customers in the UK.

www.westernpower.co.uk

ElectraLink

ElectraLink is a central body regulated by Ofgem at the heart of the UK energy market. We are owned by the DNOs and are responsible for operating the Data Transfer Service that underpins the UK energy market and we ensure that this solution remains secure, low cost and facilitates vibrant competition. Our management of the DTS provides us with unique access to a wealth of energy market data which allows us, with the permission of the users of the DTS, to support industry to develop solutions, facilitate innovation and reduce costs to consumers.

ElectraLink also provides expertise to several energy industry codes which set the 'rules' for the gas and electricity markets. Our reputation for impartiality and energy market expertise makes us an ideal partner in the implementation and change management of energy market governance arrangements. ElectraLink is the bridge that underpins the utility market and plays a key role in the transition to a smarter, more flexible energy network.

www.electralink.co.uk

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