

Transition to a Low Carbon Future

FREEDOM - Flexible Residential Energy Efficiency Demand Optimisation and Management

FREEDOM is a jointly registered project between Western Power Distribution (WPD) and Wales & West Utilities (WWU) in partnership with technology innovators PassivSystems. The project aimed to deliver a network-level demonstration of domestic demand response using hybrid heating solutions, combining gas boiler and air-source heat pump technology that can be used as fully flexible loads in domestic properties.

The FREEDOM Project pioneered the types of innovative technologies and approaches that are essential to building the future energy system. Seventy five domestic households in the County Borough of Bridgend, South Wales, were used for the trial. Bridgend was chosen as a target recruitment area because its population has a good demographic spread which is representative of the majority of Britain's population as a whole. With smart use of technologies there can be a more efficient, low carbon energy system, without the need for substantial investments in new generation or infrastructure, keeping customer bills down.

The launch for the FREEDOM final report took place in the House of Commons on October 9. The event was sponsored by the Conservative Member of Parliament for Wells, in Somerset, Hon. James Heapey. WPD staff were joined by 75 attendees including 15 political attendees. It was a great opportunity for industry and consumers as well as government to understand and incentivise the uptake of this great innovation.

Below: Network Strategy & Innovation Manager Nigel Turvey, (centre) discusses the FREEDOM project with delegates including MP James Heapey (left) at the launch event.



Customer and Stakeholder Focus

Communities are having their say – WPD has taken to the road to consult with communities about its DSO transition.

Community energy groups have a strong interest in the Distribution System Operator (DSO) transition and want to be part of it – that was one of the conclusions from the consultations we have been running with community energy organisations and local energy stakeholders.



The consultation was on the shift to a DSO and aimed to understand what communities think this transition means to them and how WPD's DSO plan and community engagement work should be shaped to incorporate the feedback received. The detailed results from the consultation are currently being processed to decide what actions WPD will take in response. In October, WPD also ran another round of community energy events in Birmingham and Nottingham which followed the theme of the DSO consultation to find out how communities think WPD can help them in the future.

Event attendees had the chance to network with other community groups, talk to WPD and share ideas in the interactive workshops. The participants were also made aware of the support material that WPD created earlier in the year to keep them informed about the changes in the industry; including our three animations on the DSO transition, flexibility markets and electric vehicles.

Above: Innovation & Low Carbon Networks Engineer Yiango Mavrocostanti presents to community group members at WPD's recent community energy event held in Nottingham.

Network Improvements and System Operability

CADET (Curtailment and Dispatch Estimation Toolkit) is a new NIA project for 2018.

The development of renewable energy and energy storage systems is increasing the amount of generation connected to distribution networks. The new generation sources (distributed energy resources or DER) which include wind, solar photovoltaic and battery storage, are displacing conventional methods of generation. The output behaviour of DER increases the variability of power flows observed on the distribution network. This makes network behaviour less predictable and more challenging to model.

Historically networks have been reinforced by upgrading infrastructure to overcome network exceedances such as overloads or high/low voltages. However it may be more cost effective to curtail DER to prevent exceedances occurring. Estimating the required DER curtailment requires a much larger amount of data than that currently used to assess network capability.

The project aims to use two different statistical techniques to reduce the amount of data required to estimate DER curtailment. Patterns in demand, generation and customer behaviour will be analysed in order to rationalise the amount of data imposed on network models. This will ultimately reduce the amount of time it takes to compute DER curtailment.

The project will be undertaken in three phases starting with the analysis of the data and development of algorithms after which the techniques developed will be expanded and generalised.

Events

WPD Innovation's next **Balancing Act Conference** will be held on November 21 and will provide an opportunity to explore the latest learnings from WPD's innovation projects related to Electric Vehicles. Registration is now open, click [here](#) for more info.



Over October 16 and 17 the Future Networks team attended the annual **LCNI Conference** at Telford International Centre.

Presentations from the conference will soon be available to view at on the event organiser's website [here](#).

New Technologies and Commercial Evolution

WPD in collaboration with our project partners, GridOn and RINA, has launched an innovation project that aims to upscale a newly developed power electronics **Fault Current Limiting Interrupter (FCLi)**, targeted for cost effective connection of distributed generation, from prototype level to a commercial scale device.

The solution will allow the faster connection of distributed generation to the grid without long delays often associated with network reinforcement. This device is designed for use at the point of connection of a generator and it will be installed and trialled in one of WPD's customer's sites with connected generation.

More information for interested parties that wish to consider holding the trial at their site can be found [here](#).

Safety, Health and Environment

DNOs require greater visibility of their networks and the low carbon technologies installed, to effectively plan ahead of need and manage their networks in a smarter, more flexible way. There is a notification process for the customer or installer to inform WPD when they install a low carbon technology (LCT) at their property; however, it seems that the number of notifications is less than the actual technologies installed. The **LCT Detection project** hopes to identify the unregistered equipment allowing WPD to better understand the network.

By using data flows to identify Electric Vehicles and Distributed Energy Resources such as solar photo voltaic (PV) and heat pumps (HP) on WPD's Low Voltage (LV) networks, the LCT Detection project will develop an enhanced data 'capability' – a new operational practice that is directly related to the operation of the electricity system. It will have the capability to support existing and developing industry processes, and make frontline staff more aware of LCT locations so they can ensure that additional checks and precautions are taken when working on the network or carrying out repairs under fault conditions.

WPD has partnered with Electralink and IBM, and will use artificial intelligence (AI) applied to metering data to identify the LCT technologies. The main project deliverable will be a proof of concept model – a process design document and demonstration dashboard that will identify LCTs.

Find out
more

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