

### Networks



In September the battery and control systems for our **Solar Storage Project** passed their Site Acceptance Tests. The project aims to demonstrate a number of use cases representing different ways the battery, installed at a solar generation site near Glastonbury in Somerset, can provide a service to either the solar site owner, the Distribution Network Operator or both. For example the battery could be used to store some of the electricity produced by the solar array at midday and release it during the evening peak, getting a higher price for the energy for the solar operator and reducing the load on the local transformers.

*Image: The battery and control room were fitted within a shipping container by the suppliers in China, simplifying the battery transportation and installation.*

The battery exceeded the specified ratings of 300kW maximum power and 640kWh stored energy and produced round trip efficiencies that were above the specified standards. The unit achieved a 91% round trip efficiency value when charging and discharging at full power suggesting that using the battery to store cheap off-peak energy for peak time sale could be commercially viable. The tests also showed how the RESolve control system could be used to schedule charging and discharging activities at predefined times or could support more complex control algorithms. In one scenario, the battery was used to smooth the output from the solar site by discharging at times when cloud cover reduced the solar generation. The system also mimicked receiving a signal from WPD to initiate the battery exporting power at a time when local loads were high. Over the next year the battery will undergo a schedule of experiments to see how the use cases perform over different seasons and days of the week. Tests will also show how well they can combine together as it is likely that storage owners might want to provide multiple services to optimise their income. Encouraging the development of flexible resources, like battery storage, could help WPD reduce reinforcement expenditure, saving customers money.

**Electric Nation** is seeking to recruit up to 700 people buying or leasing new electric vehicles (including pure electric and plug-in hybrids) to take part in the largest trial of its kind. Trial participants will get a free\* smart charger installed.


The findings of the trial will help electricity network operators manage the effect of the additional load caused by charging EVs on the local electricity network whilst allowing electric vehicle numbers to grow.

Motorists buying or leasing a new electric vehicle are invited to become part of the Electric Nation community and help to future-proof Britain's electricity networks to facilitate the continued uptake of EVs.

For more information and to check eligibility visit [www.electrictionation.org.uk](http://www.electrictionation.org.uk)

\* Subject to eligibility and conditions

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SMART  
CHARGE

**BE PART OF THE  
ELECTRIC NATION  
COMMUNITY**

We're looking for up to 700 people who are buying or leasing a new electric vehicle to take part in a trial to ensure the UK can charge EVs at peak times as their numbers rise. Trial participants will get a free\* smart charger installed.

**FIND OUT MORE AT  
[WWW.ELECTRICNATION.ORG.UK](http://WWW.ELECTRICNATION.ORG.UK)**

## Customers



**Active Network Management (ANM)**, the most complex and sophisticated of WPD's Alternative Connections is being rolled out across all WPD areas. ANM allows for generation to connect in areas of the network that already has significant amounts of generation and any additional generation could trigger costly or long term reinforcement works. ANM monitors the constraints on the network and then issues curtailment to the generators when the network approaches its limits. These generators are curtailed in a Last In First Out (LIFO) order meaning newer connections are curtailed first.

This helps ensure that the curtailment of existing generators are not affected by new ANM generation. To help customers have an informed view of their curtailment WPD produces a Curtailment Report which estimates the potential level of curtailment an ANM connection could expect.

There are currently two active ANM zones in the South West, Bridgwater and Indian Queens. Work is progressing well for these zones, The Bridgwater zone has been open for connection quotes since April 2015 and the system operational since April 2016. The Indian Queens ANM zone is a much larger and complex network, the network already has significant amounts of renewable generation connected and a large proportion of the network is meshed. Because of this, it was decided to use an ANM system which could run load flows as part of the calculation. In addition to the live systems WPD is developing a tool to estimate the level curtailment for the new connections so they can run this analysis in house. The system has been installed and testing is ongoing. Although the system currently only calculates the curtailment for the Indian Queens zone, it will be extended to calculate estimates for future zones. Indian Queens was opened for quoting in November 2015 with the intention of the system being ready to accept generators this autumn. The system has been installed and is being tested on WPD's servers.

Further information about all our alternative connection solutions is available on our [website](#).

The **Carbon Tracing Project** is seeking to produce an "app" for use on phones and tablets and a website that will provide customers with more information about the generation mix at their premise at a particular point in time. We are partnering with the Carbon Trust to source some interested customers who will be involved in shaping the website & app, as well as helping test the overall functionality, the look and feel, but also to be involved in shaping it before widespread release. The app and website, it is envisaged, will do exactly the same things.

The electricity system needs to change and our customer's attitudes to energy are shifting, as such we think that providing them with this insight will be powerful in helping shape customer behaviour. We have seen through many industry projects just how hard end user engagement is and so in order to make this project as successful as we can, we have contracted with the Carbon Trust who have a track record in customer engagement where energy matters are concerned. This is clearly an important factor in a project with a requirement as specific as this.

In addition we are undertaking this project because we have a sense, through various communication mediums, that customers are increasingly interested in how their electricity is generated. We believe the Carbon Tracing Project is the most efficient way to validate this.

We are currently exploring options for calculating the "mix" ahead of a procurement exercise in the New Year. The Carbon Trust will be part of that assessment process and this we believe to be key to getting the right product for customers. It is anticipated that the project will run until September 2017 when we will publish our findings along with the relevant information on how we have produced the calculation.

## New Projects

**Industrial & Commercial Storage** (I&C) is a recently registered NIA project. The project aims to investigate the feasibility of the use of Energy Storage Systems (ESS) on Western Power Distribution's (WPD's) network.

With the growth in low carbon generation, such as wind and solar PV, and the introduction of new demand technologies such as Electric Vehicles and heat pumps as well as the electrification of heat and transportation systems, WPD's electricity network is expected to see unprecedented swings between peaks and troughs of energy usage in localised areas. Part of WPD's approach to this challenge has been to look at new and more flexible ways to design, optimise and manage the network for the future. Low voltage networks will need to be upgraded to cope with the additional demands on the electricity network. In the past, network operators have used conventional reinforcement to deal with constraints. The deployment of an ESS provides one solution to avoid network reinforcement. The ESS trial will initially be conducted at 4 sites which have been carefully selected to conduct experiments in a controlled environment and to test different system configurations. These locations were selected with consideration of size, network complexity, occupancy and the availability of rooftop Solar PV.

This project will:

- Deliver more options for customer connections;
- Design new technical policies and render grid services;
- Demonstrate the integration of a storage device behind-the-meter on an I&C scale;
- Develop an alternative connection agreement for behind-the-meter storage for customers;
- Investigate different configurations in the application of storage;
- Simulate a range of Transmission System services such as STOR, FFR tests and response services, constraint management, reactive power, energy contracts and any future services.

**Project FREEDOM** is another recently registered NIA project that brings together the electricity and gas network operators. Registered jointly between Western Power Distribution (WPD) and Wales & West Utilities (WWU) the project aims to provide both organisations with robust, field tested data which can make a meaningful contribution to long-term network planning and system operation by using a hybrid heating solution. The project will deliver a network level demonstration of domestic demand response using hybrid heating solutions, which combine gas boiler and air-source heat pump technology, and can be used as fully flexible loads in domestic properties. The high uptake of heat pumps may pose challenges such as network operability (e.g. steep demand increases if heat pumps switch on simultaneously) and network planning (e.g. peak demand increase). However, hybrid heat pumps may support network management by providing energy services through potentially acting as flexible loads. The project will use load control through fuel switching to optimise outcomes for the consumer, energy supplier and network operator.

Project FREEDOM runs from October 2016 to December 2018, and has been broken down into 2 Phases which are defined in 14 work packages. 75 domestic households in Bridgend, South Wales, will be used for the trial.

The project will:

- Demonstrate the benefits that can be realised by network operators such as network investment deferral and constraint alleviation;
- Show benefits that can be realised for domestic consumers such as energy savings and reduction in customer bills;
- Test and analyse attitudes of participants with new commercial arrangements;
- Assess and evaluate the financial scale of hybrid heat pump techniques;
- Develop business process, policies, and standards, etc. for the use of hybrid heating system;
- Illustrate how the new technology contributes to the reduction of carbon emissions;
- Provide knowledge to inform new regulations;
- Document and share all key learning that is achieved in order that results should be replicable across all UK DNOs.



## Operations

**Project SYNC** has taken a significant stride forward with completion of the first season of Technique 3: DSR Turn Up. Through the project WPD has worked with National Grid to help deliver the Demand Turn Up service. With a joint contracting and dispatch process, the service provides a single point of contact to the customer for both requirements. Customers sign up for the services, as with any other ancillary service, however the contracting arrangement allows customers in WPD's area to be dispatched by either party. This joined up approach allows a simple customer proposition whilst also avoiding any conflicts between WPD and National Grid's requirements. The service went live in May and was extended by National Grid by one month until the end of October.

The first season has now been completed with over 55MW of volume contracted in WPD's area and successful calls by both parties. Performance data is still being analysed and an interim report will be produced shortly detailing the findings of the summer and the proposed next steps.

Operating a joint trial has helped clarify the different use cases for SO and DNO led Demand Turn Up and shown very little conflict in requirements. Both parties can benefit from demand increases but for different reasons and often at different times. For instance, increasing demand in the overnight window has little value to the DNO; however this provides significant value to the SO. A joint trial can also improve the customer experience and make it easier to participate in either service. Lessons have also been learnt from the contracting and dispatch mechanisms. Provider and interested party feedback has allowed potential barriers to be identified and improvements to be targeted for the next season. This should allow for a simpler customer journey and allow for additional volume to be contracted with higher availability.

Elsewhere, the consultation for the findings of Technique 1 has now been closed with no counter evidence found. This showed very little impact on network voltage from cloud cover over PV farms. Whilst there is high variability on individual cells, the geographical separation of different sites provides some diversity and lessens impact.



### Tier 2 Projects SDRC Success

Over the last year or so we have finalised three of our most important Tier 2 projects, Low Carbon Hub, SoLa Bristol and FALCON. All of these projects provided the industry with significant learning and insight on their specific areas of investigation and more importantly there are areas where changes have been made to our own business and enhancements made to improve things for customers due to the positive outputs of these projects. This is to us precisely what innovation funding is about.

Whilst there are of course areas where we can do better, we believe that these projects were extremely successful in their own right and we were delighted when they were awarded the following under their SDRC Awards:

Project	Amount
Low Carbon Hub	£306k
SoLa Bristol	£200k
FALCON	£1,236k

In addition the SoLa Bristol project was awarded Residential Energy Storage project of the year at the Solar Power Portal Awards held on 5<sup>th</sup> Oct 2016.

## Find out more

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