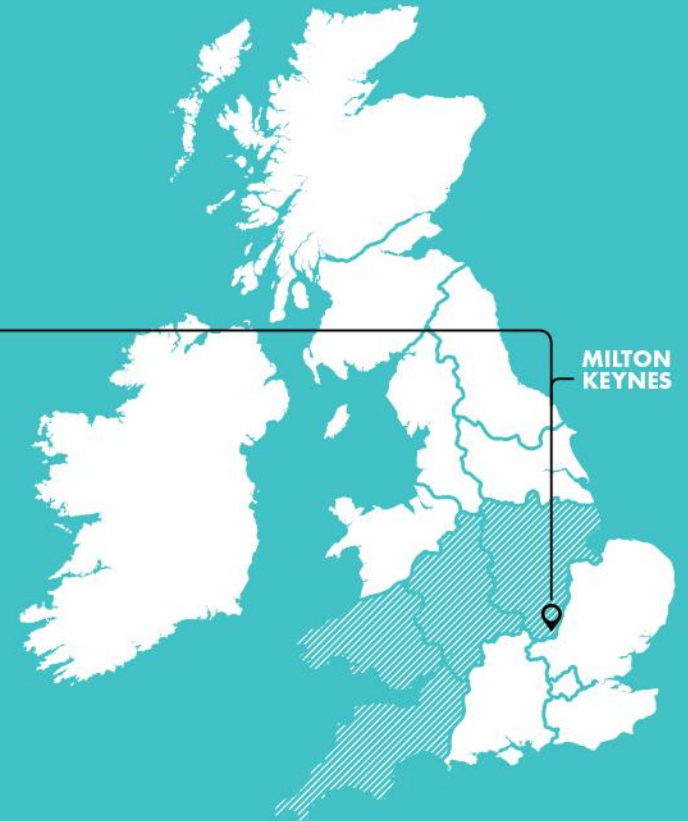


## DEVELOPING FUTURE POWER NETWORKS

Second Tier Reward

Panel Presentation



# Agenda

- Introduction
  - General Questions
  - Falcon Specific Questions
  - Summary
  - Questions
-

# Introductions



**Roger Hey** is Western Power Distribution's Future Networks Manager



**Jenny Woodruff** is an Innovation and Low Carbon Engineer for Western Power Distribution



**Richard Hampshire** is CGI UK's lead for Future Utilities

## Project Falcon Summary

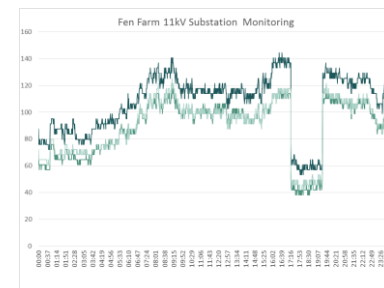
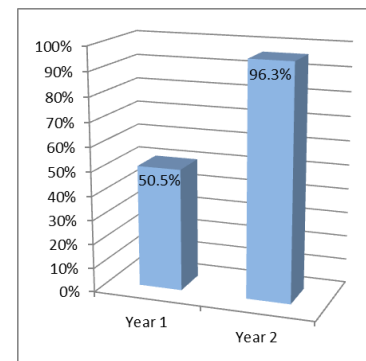
Why	To understand how combinations of network technologies and commercial approaches could help address the emerging challenges of designing and operating networks that are capable of supporting the growth in low carbon technologies on both the supply and the demand sides of those networks.
When	Awarded Funded in 2011, Ran 2012 to Sept 2015
Where	Milton Keynes Focus on 11kV network + some 33kV trials for Dynamic Asset Rating
What	Design and trial of smart grid and commercial techniques complemented by development in telecoms, monitoring, forecasting and complex analysis.
How	<ul style="list-style-type: none"><li>• Engineering Trials</li><li>• Commercial Trials</li><li>• Scenario Investment Model</li><li>• Telecommunications</li><li>• Knowledge Capture and Dissemination</li><li>• Load Estimation</li></ul>

# General | Q1

1. Please tell us, what are the exceptional outcomes from your project (**max 3**)? Please emphasise the truly exceptional outputs and/or transformational impact of project outputs on GB electricity networks? (**making clear comparison with what was expected at time of Project Direction**)

## Commercial Trials

- Demonstrated the value of building on emerging learning through the project.
- Reliability of dispatch improved from 50.5% in the first trial to 96.3% in the second trial.
- FALCON legacy provided WPD with the necessary confidence to launch Flexible Power to access to demand side flexibility to manage network constraints.
- Learning from FALCON has directly informed both the commercial offer and the approach to customer engagement for this initiative.



## General | Q2

2. How has the project changed the culture of innovation in your organisation? Provide evidence of this change.

### Approach to Data

Falcon highlighted some deficiencies in WPD's data. Subsequently we instigated Time Series Data Quality and CIM projects to improve data quality and usability. Now implementing Integrated Network Model.

### Planning

Falcon changed our approach to long term planning. Subsequently we have adopted scenarios, processes to allocate LCTs, and power flow analysis that provide a better balance between accuracy and practicality.

### Academics

Falcon highlighted some downsides with working with Academics. Subsequent to Falcon, closer supervision is required, as per EFFT, and planning to take account of academic year.

## General | Q3

3. How has this Second Tier Reward incentive influenced your project management and operational practices? Provide evidence.

The Second Tier Reward incentive influenced our approach to the projects as follows:

- Whilst Second Tier Successful Delivery Reward mechanism ensured delivery of the project, the Second Tier Reward incentive ensured the project approach supported delivery into 'Business as Usual'
- This led to the following changes to delivery approach:
  - WPD linked Policy, Strategy and Innovation teams
  - Policy engineers involved in innovation projects from the outset
    - This was to ensure that the project approach remained aware of BaU integration challenges and
    - Policy engineers, who would own changes to BaU, had an opportunity to influence and understand the project outcomes

## General | Q4i

4. Please detail any datasets/other IP, generated as part of the project, that has been shared with other DNOs, academia?

Organisation	Data used	Purpose	Date
<b>Aston University</b>	Falcon monitoring data for LV substations	Foundation degree and PhD projects on power systems including micro grid control using feed forward control with typical load data and statistical analysis of load variations for help with say DAR	28/04/2015
<b>Cardiff University</b>	Falcon ANM, data dictionary and other customer / load information.	For use in the PhD project to create an optimised model to minimise the cost of electricity supply to buildings within a microgrid while respecting operational constraints.	01/03/2016
<b>Cranfield University</b>	Falcon ANM, data dictionary and other customer / load information.	To support the project “Smart Grid Modelling & Simulation for Distributed Power Supply Networks”	12/11/2014
<b>De Montford University</b>	Falcon ANM, data dictionary and other customer / load information.	Supporting the AMEN project, which is an agent based model that includes both a detailed engineering model and the ability to model the operations of commercial markets.	27/09/2013



## General | Q4i

4. Please detail any datasets/other IP, generated as part of the project, that has been shared with other DNOs, academia?

Organisation(s)	Data used	Purpose	Date
EA Technology Open LV	Falcon and LVNT monitoring data	To inform the process of selecting substations with relevant attributes to be used for different techniques within the Open LV project. To ensure a representative sample from which wider conclusions can be inferred.	25/01/2017
Bedford University /Open University / Milton Keynes council	Falcon substation data, load estimate information	For use in the MK Data Hub which is the technical, data infrastructure of the MK:Smart project, to determine whether new insights can be gained by drawing together diverse datasets for Milton Keynes.	25/05/2016
NM group (Network Mapping Limited)	Falcon OHL network data, weather data, load data	To validate OHL DAR algorithms	07/10/2015
TNEI	Falcon ANM	Network modelling by TNEI for a G5/4 review.	06/07/2016

## General | Q4ii

4. What efforts did you take to improve access and usability of any such data for interested users (over and above what was proposed in your original full submission and any subsequent project directions, if applicable)?

Users have been helped to access our data providing personal responses to data requests.

These help the user understand the range of data available for:

- The project of interest
- Other projects in the innovation portfolio
- Other non-project related data, via DataPortal2 or custom retrievals.



Help has been provided with pre-selection of relevant sites to meet requirements rather than providing large volumes of unwanted data in an unwieldy format.

Simple processing of the data was often part of the extract process.

The WPD Data Sharing Agreement smooths the process and ensures a common understanding of data responsibilities.

## Project Specific | Qi

- i. What is the actual usage of DSR in business as usual since the project? Please explain (and quantify) the actual MW of network capacity released during the project and on your networks since the project?

Since FALCON, DSR use has related to projects SYNC, ENTIRE, ECHO, Community Energy, Sunshine Tariff and will be part of Visibility Plugs & Socket and EFFS

BAU rollout has begun with Flexible Power 's trio of services

- Secure
- Dynamic
- Response



The first round secured 60MW of capacity within the 14 target zones.

The opportunity to participate will be opened up in a further 26 zones in June 2018.



Expression of Interest



Procure



Build and test



Operate

# Project Specific | Qii

- ii. Please provide detail of the specific elements of the Carbon Plan and Clean Growth Strategy that have been shaped by the learnings from this project?

*"Whatever combination of technologies exists from now to 2050, we will need a smarter, more flexible grid that will be able to manage electricity generated from new technologies and respond to changes in energy demand."*

The UK Low Carbon  
Transition Plan  
National strategy for climate and energy



Building  
Britain's Future

## Box 10 Key elements of a UK smart grid

- Improved information for electricity consumers, notably through smart meters, to allow them to manage their energy use (and hence energy bills) more effectively.
- Facilitating demand management, providing data to technologies in homes and buildings that can regulate electricity use (e.g. encouraging electric cars to recharge when there is "surplus electricity" available on the system).
- Enabling individuals and businesses to sell electricity into the network as well as buying from it, through microgeneration and on-site technologies.
- Enhanced monitoring and information flows for network operators, allowing them to make more efficient decisions about where energy flows across the network on a real time basis. This is likely to be particularly important

with increasing levels of intermittent renewable generation on the system. A greater use of energy storage would also increase the need for smarter information flows for network operators on energy storage supply and timing of its use.

- Use of a range of technologies including advanced communications and information management systems, intelligent metering, demand side management, and storage. Many of the technologies to enable such capability are already available, but have not yet been integrated together in large scale demonstrations and the actual mix that is deployed will depend on their feasibility.
- More optimal usage of the whole network in meeting demand, which could limit the need for more reinforcement of the grid.

Storage Trials

Telecoms Trials

Technique Trials

Commercial Trials

LV Monitoring &  
Load Estimation

## Project Specific | Qii

- ii. Please provide detail of the specific elements of the Carbon Plan and Clean Growth Strategy that have been shaped by the learnings from this project?

*“37. Innovation, invest in smart systems to reduce the cost of electricity storage, advance innovative demand response and develop new ways of balancing the grid.”*

*(page 15)*

*“It also means upgrading our electricity system so it is smarter (using data to provide greater control), more flexible (providing energy when it is needed) and takes advantage of rapidly developing technologies such as energy storage”*

*(page 95)*

*“Enabling a smarter, more flexible system, unlocking significant expansion of interconnection, electricity storage, and demand side response, the first steps of which are set out in the Smart Systems and Flexibility Plan. For consumers, this could mean smart appliances and smart tariffs which help balance the grid in return for lower bills.”*

*(page 96)*



## Project Specific | Qii

- ii. Please provide detail of the specific elements of the Carbon Plan and Clean Growth Strategy that have been shaped by the learnings from this project?

### ***Smart Systems and Flexibility Plan Markets which work for Flexibility***

*“We believe that the key to overcoming these barriers is by ensuring there are open and transparent markets which work for flexibility. This includes ensuring the roles and responsibilities in the system are fit for purpose and network companies play a full role in the transition to a smarter, more flexible system.”*

*“In particular, the regulated monopolies will need to plan ahead, engage with new businesses, and explore fully the use of markets to solve issues.”*

Falcon demonstrated the value and suitability of flexibility services to manage network constraints, providing the confidence to move forward with Flexible Power and Cornwall Local Energy Market to demonstrate how such a market might work.



## Project Specific | Qiii

iii. Please explain how the savings of £700k in the project expenditure were made?

### Partner Selection

Partner selection reflected their project contribution in terms of reduced rate, involvement at cost.  
Use of contractors – booked time rather than FTE costs.

### IT Alternatives

Costs were driven out of the IT budget by sourcing alternative solutions that were still able to deliver the capabilities required by the project. Notably an alternative to GE's TSDS

### MOD Negotiation

Successfully negotiating with the Ministry of Defence for free access to the radio spectrum required for the Wi-Max telecommunications network that provided the backbone for collection of the high resolution data acquired as part of the project.



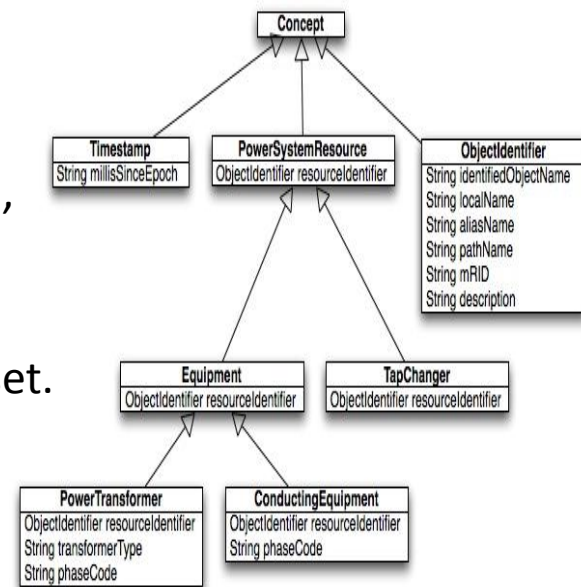
## Project Specific | Qiv

- iv. What are the reasons why the datasets released were picked up by only two universities apart from University of Bath, which is a key project partner from inception?

The submission did not list all the parties making use of Falcon data, which has been used by a variety of other organisations as outlined in the answer to General Question 4.

Sometimes Falcon data has not been used because of the availability of other project data.

- The LVNT dataset, though not as detailed as that for FALCON, has more substations over more years.
- Where organisations may previously have used the FALCON Authorised Network Model, they will now use the CIM dataset.





## Summary

- Foundational to BAU roll out of flexibility services, an essential element of DSO transition
- Triggered a revolution in the management of data & data quality
- Enabled realistic approaches to be adopted for the application of smart techniques, planning process ,etc
- Value for money e.g. significant financial return to customer and extra added value from subsequent data sharing.





# Thank You

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