WESTERN POWER DISTRIBUTION

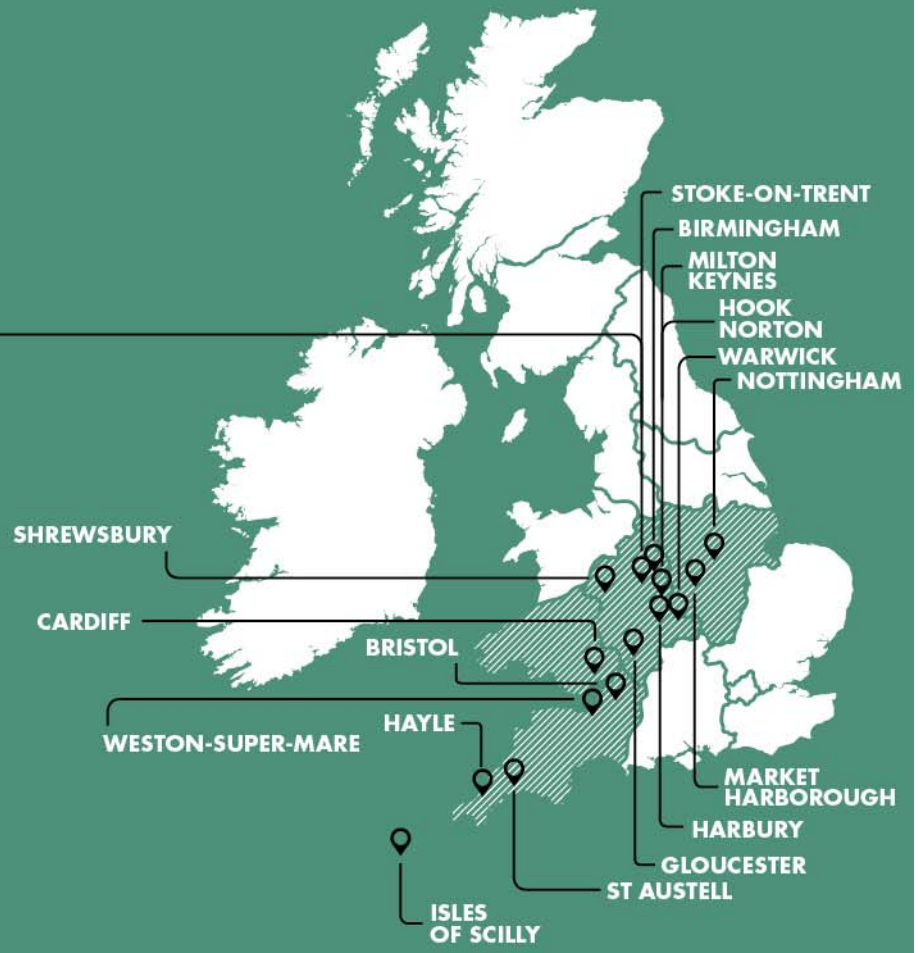
INNOVATION

NEXT GENERATION NETWORKS

Integrating Demand Side Response from I&C Customers

Roger Hey

Future Networks Manager



Who are WPD ?

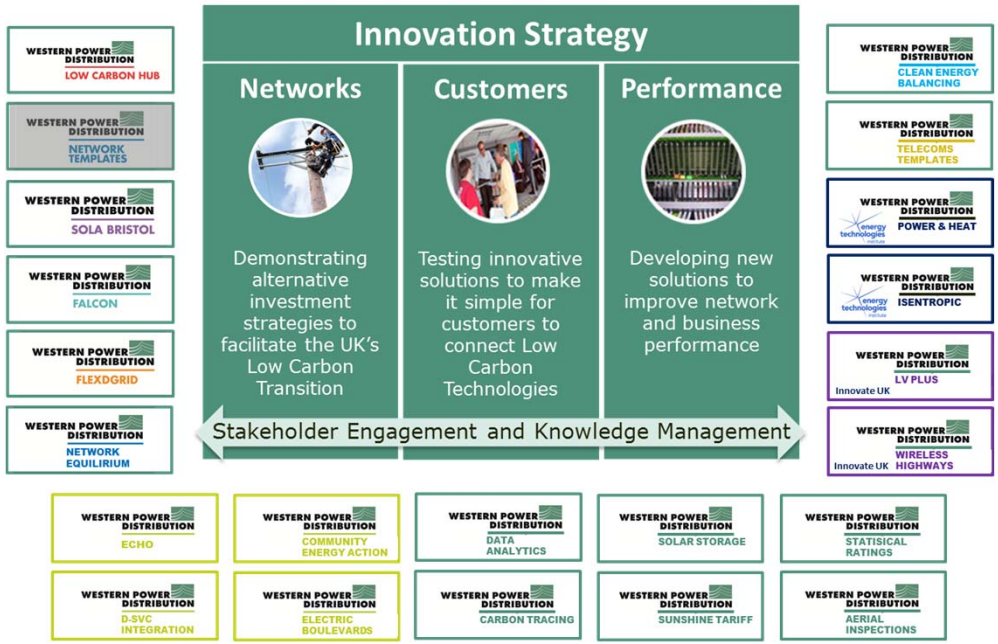
- Distribution Network Operator
- Midlands, South West and Wales.
- 7.8 million customers
- 55,500 square kilometres
- 220,000km of lines & cable
- 185,000 substations
- employ over 6,000 staff

What potential benefit is there to a DNO from DSR?

- Manage temporary or transient faults
- Address brief or occasional capacity issues
- Improve network security
- Avoid or deferring capital investment costs
- Reduce interruptions or durations of outages
- Increase existing asset utilisation

WPD's experiences with DSR

- ECHO
- SoLa Bristol
- Seasonal Generation Deployment
- Project FALCON



So Bristol La

Solar energy when you need it

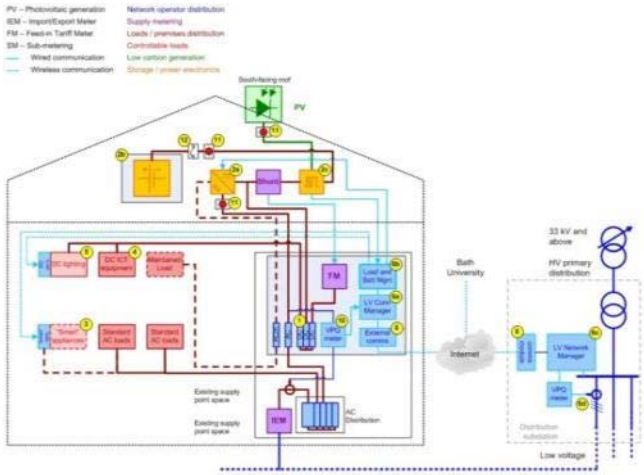
Domestic DSR with Integrated Storage

The SoLa Bristol Project

SoLa Bristol is an alternative method to enable high density photo voltaic solar generation to connect to the low voltage network more efficiently through using an in home battery and variable tariffs

The Solution

- Investigate how a battery installed in the home can reduce the impact of PV panel son the local grid.
- To help customers to manage their energy usage and save money on their bills.
- Test how customers respond when offered different electricity tariffs throughout the day.
- Explore the benefits of utilising direct current (DC) in the home.



Who is Involved

- Partners: Siemens, Bristol City Council, Knowle West Media Centre and Bath University
- Residents, Schools (governors, teaching staff and children)

Next Steps

The SoLa Bristol Solution is installed in 26 Homes, 5 Schools and an office. Results are being analysed by the University of Bath.

Energy Control for Household Optimisation

- Domestic Demand Side Response
- 200 premises

WESTERN POWER DISTRIBUTION ECHO

energy saving trust

Customer Learning

- Customer appetite for DDSR
- Scale of payments required
- Potential peak load reduction
- Scope for long term reduction

Technology Learning

- Similar technology as expected to integrate with smart meters.
- Non-interruptible/interruptible load types

Incentive

£25 – 3 month reward.
£25 – 12 month reward.

£50 DR events over the 12 months
Paid as High Street Vouchers

WPD's trials of non-domestic DSR

WESTERN POWER DISTRIBUTION SEASONAL GENERATION

Seasonal Generation Deployment

aggreko flexitricity Unlocking smart grid revenue

Creation of a generator storage facility at WPD substation.

Generator hire company to leave summer event generators during winter periods.

Operated by an aggregator who would manage service delivery

- STOR
- Triad
- DNO peak lopping

Objective:

Develop and deploy the engineering interface

Establish commercial arrangements

Create an economic generation control methodology.

Project FALCON

Flexible **A**pproaches to **L**ow **C**arbon **O**ptimised **N**etworks

Testing new smart engineering methods as an alternative to conventional reinforcement.

Create new commercial intervention alternatives.

Develop new advanced communications system to operate local ‘Smart’ network.

Create new network planning tool that intelligently selects the best and most economic method to upgrade networks.

Project FALCON trials preparation

- New resources and processes to engage with customers.
- Interact with customers directly and / or via aggregators
- Author and approve new ‘performance based’ contracts
- Financial approval of viable business proposition
- Control room dispatch arrangements
- Performance assessment software
- Back office systems for settlement processes
- Identify & detail market conflicts and propose any potential solutions
- Learning (statistical & attitudinal)

Project FALCON

Commercial trials season 1 completed Feb 2014

FALCON met all recruitment objectives for **Distributed Generation** trials

- Direct and third party contracts
- Participation of six aggregators, three of which successfully recruited trialist
- In excess of 10MW of capacity from 11 participants
- Small, medium & large capacity generators
- Stand by and CHP
- Diesel & Gas engines

Despite several prospects there were no **Load Reduction** participants either directly or via aggregators

Project FALCON – Season 1 Results

- 30 minutes notice of an event
- Maximum duration 2 hours / Minimum 1 hour
- 18 Events called between 27th November & 28th February
- Approximately ¼ GWh of generation for purposes of trial
- DNO DSR programme conflicts with National Grid Balancing Service

site	04-Nov	11-Nov	18-Nov	25-Nov	02-Dec	09-Dec	16-Dec	23-Dec	30-Dec	06-Jan	13-Jan	20-Jan	27-Jan	03-Feb	10-Feb	17-Feb	24-Feb
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	n	n	n	n	y	y	n	n	n	y	y	y	y	y	y	y	y
2	n	n	y	n	n	n	n	n	n	n	n	n	n	n	n	y	y
3	n	n	y	n	y	y	n	n	n	y	y	y	y	y	y	y	y
4	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
5	n	n	n	y	y	y	n	n	n	y	y	y	y	y	y	y	y
6	na	na	na	na	na	na	n	y	y	y	y	y	y	y	y	y	y
7	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
8	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
9	y	y	y	y	y	y	y	y	y	y	y	y	y	n	n	y	y
10	y	y	y	y	n	n	n	n	n	n	n	n	y	y	y	y	y
11	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y

- 181 potential availability windows
- 61 declaration unavailable
- 66.3% reliability factor
- Not suitable for local grid peaks

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Project FALCON - Season 2

Parameters

- Week ahead notification of operating schedule
- Capped consumption target based on previous year's peaks
- New back office systems
- Increased incentive for load reduction
- Additional aggregator involvement
- Data from new Smart Meter solution

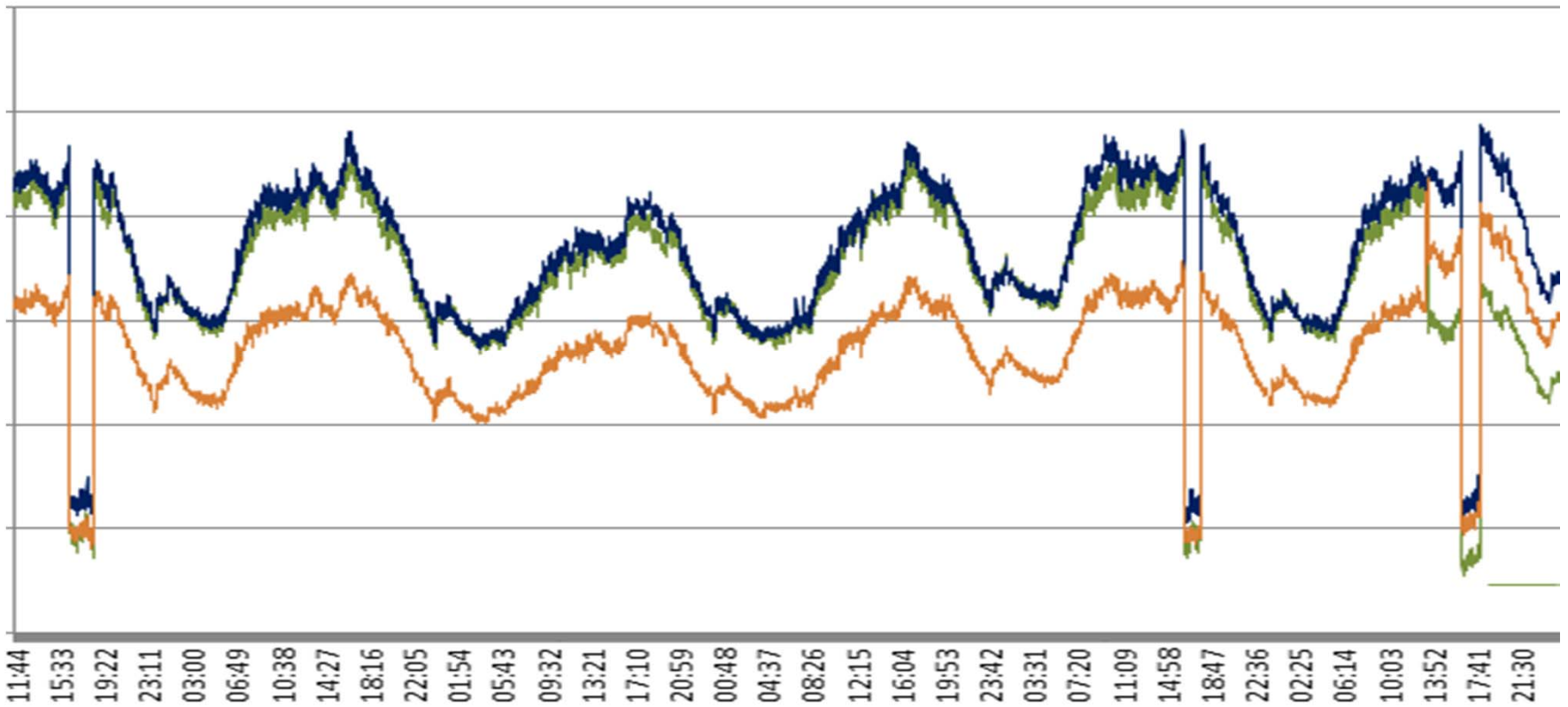
Project FALCON - Season 2

Initial Results

- Trials completed on time & budget
- Reliability improved
- Processes proven
- Systems proven
- Early feedback from participants is positive

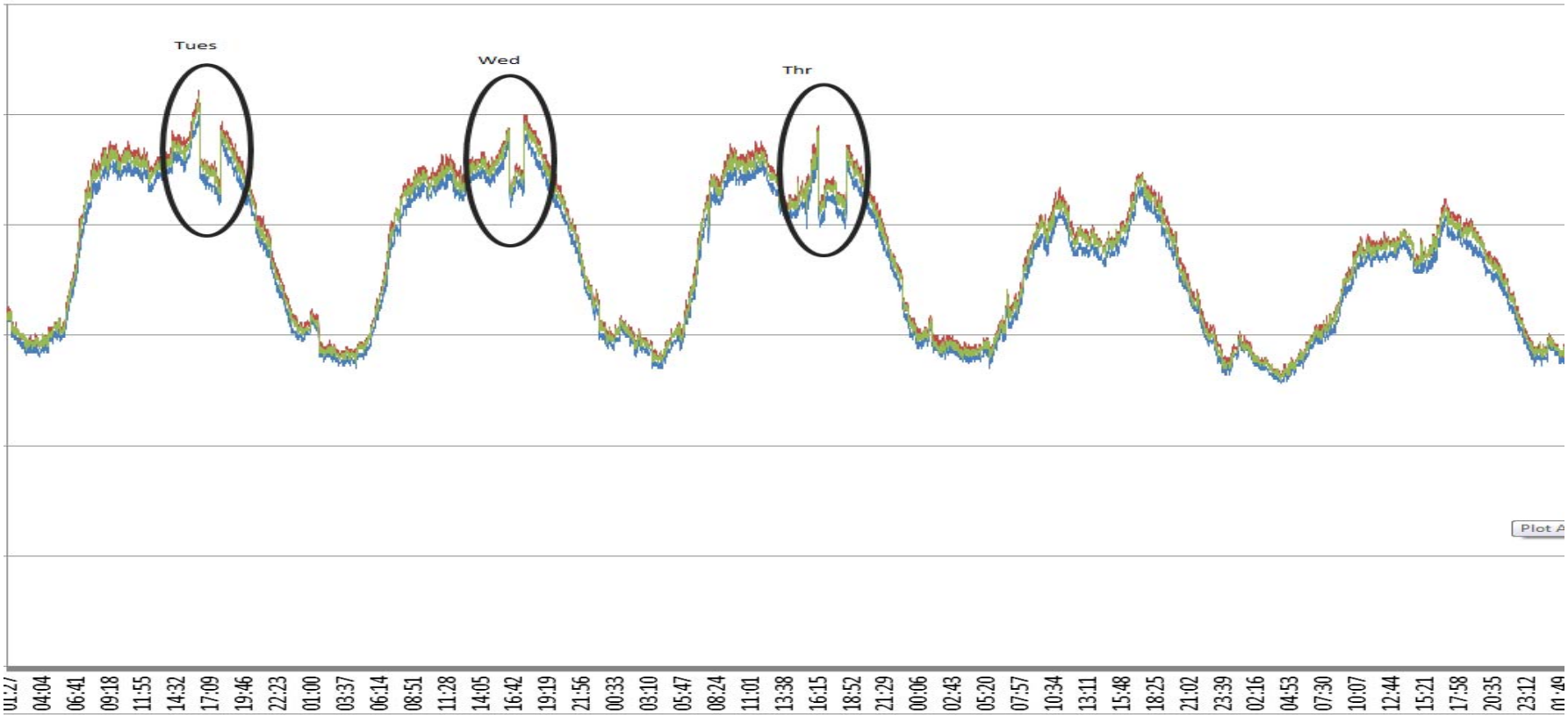
Project FALCON - Season 2

11kV Transformer Impact



Project FALCON - Season 2

33kV Transformer Impact



DSR Next Steps

- Detailed analysis of FALCON and other LCNF project results
- Review of WPD databases to prioritise all potential customer generators that could provide DSR
- Larger demonstration of I&C DSR targeted at 33kV constraint management
- Modifying connections policies and processes to better support DSR

Roger Hey – Future Networks Manager, WPD