WESTERN POWER DISTRIBUTION

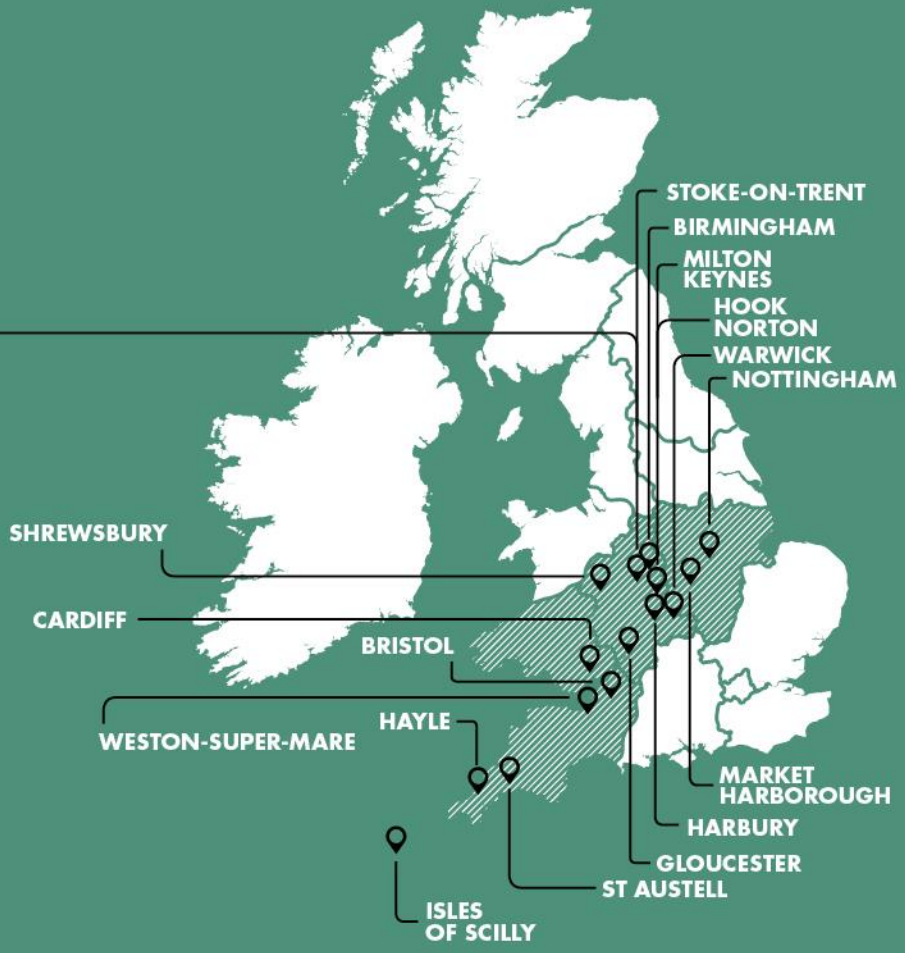
INNOVATION

NEXT GENERATION NETWORKS

WPD Innovation

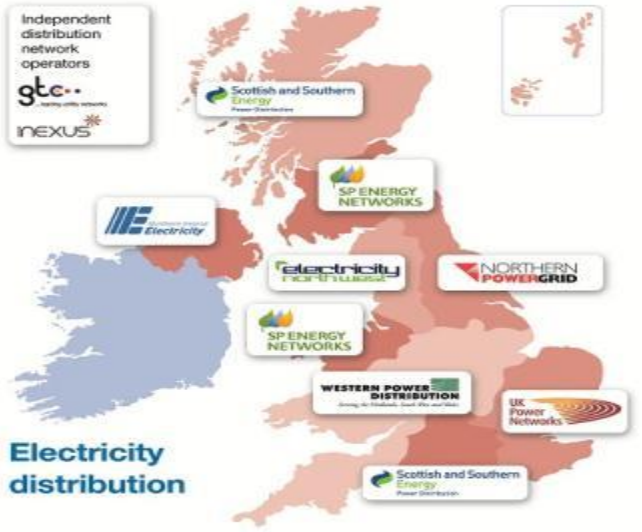
Roger Hey

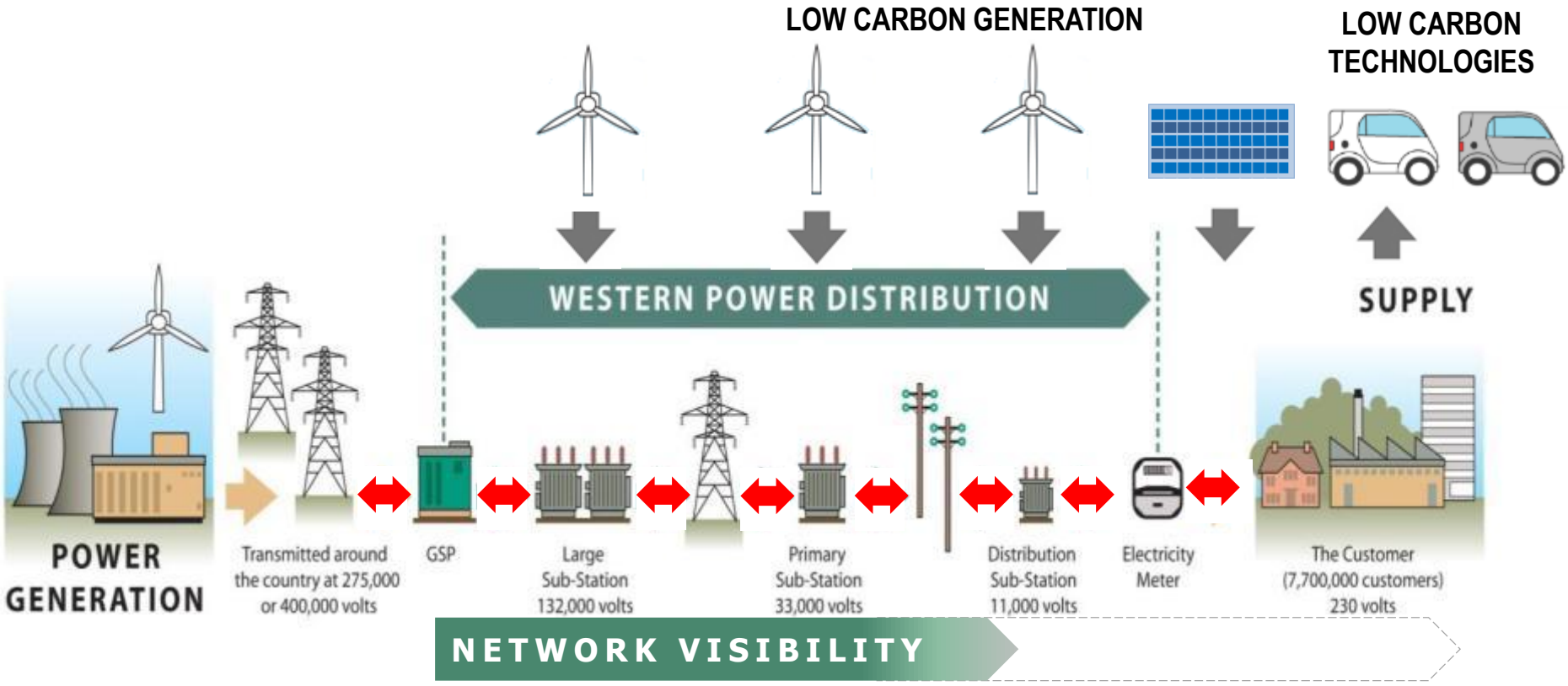
Future Networks Manager



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





- Limited capacity
- Passive design / operation
- Centralised Generation
- Limited Visibility
- One-way power flow
- Load centric design

- Reduced headroom
- Increased Intelligence / Active Management
- Distributed Generation
- Need for increased visibility
- Two-way power flows
- Utilisation centric design

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SOLA BRISTOL

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FLEXDGRID

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NETWORK EQUILIBRIUM

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CLEAN ENERGY BALANCE H2

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TELECOMS TEMPLATES

Innovation Strategy

Networks

Demonstrating alternative investment strategies to facilitate the UK's Low Carbon Transition

Customers

Testing innovative solutions to make it simple for customers to connect Low Carbon Technologies

Performance

Developing new solutions to improve network and business performance

Stakeholder Engagement and Knowledge Management

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LOW CARBON HUB

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NETWORK TEMPLATES

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energy technologies institute
POWER & HEAT

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LV PLUS
Innovate UK

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WIRELESS HIGHWAYS
Innovate UK

WESTERN POWER DISTRIBUTION
ECHO

WESTERN POWER DISTRIBUTION
SOLAR STORAGE

WESTERN POWER DISTRIBUTION
LOSSES INVESTIGATION

WESTERN POWER DISTRIBUTION
STATISICAL RATINGS

WESTERN POWER DISTRIBUTION
PROJECT SYNC

WESTERN POWER DISTRIBUTION
REACT

WESTERN POWER DISTRIBUTION
D-SVC INTEGRATION

WESTERN POWER DISTRIBUTION
ELECTRIC BOULEVARDS

WESTERN POWER DISTRIBUTION
SUNSHINE TARIFF

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AIRBORNE INSPECTIONS

WESTERN POWER DISTRIBUTION
VOLTAGE LEVEL ASSESSMENT

WESTERN POWER DISTRIBUTION
DS2030

Innovation into Business as Usual

- Innovation Team and Policy/Standards Team are combined
- Innovation is delivered by operational teams, who also feed in new ideas
- Projects develop policies and procedures as the projects grow
- Alternative Generator Connections – driven from an LCNF trial

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DEVELOPING FUTURE POWER NETWORKS

Project FALCON

LCN Fund Low Carbon Networks ALSTOM Aston University Birmingham CGI CISCO Cranfield UNIVERSITY

Distribution Network Goals for Smarter Networks

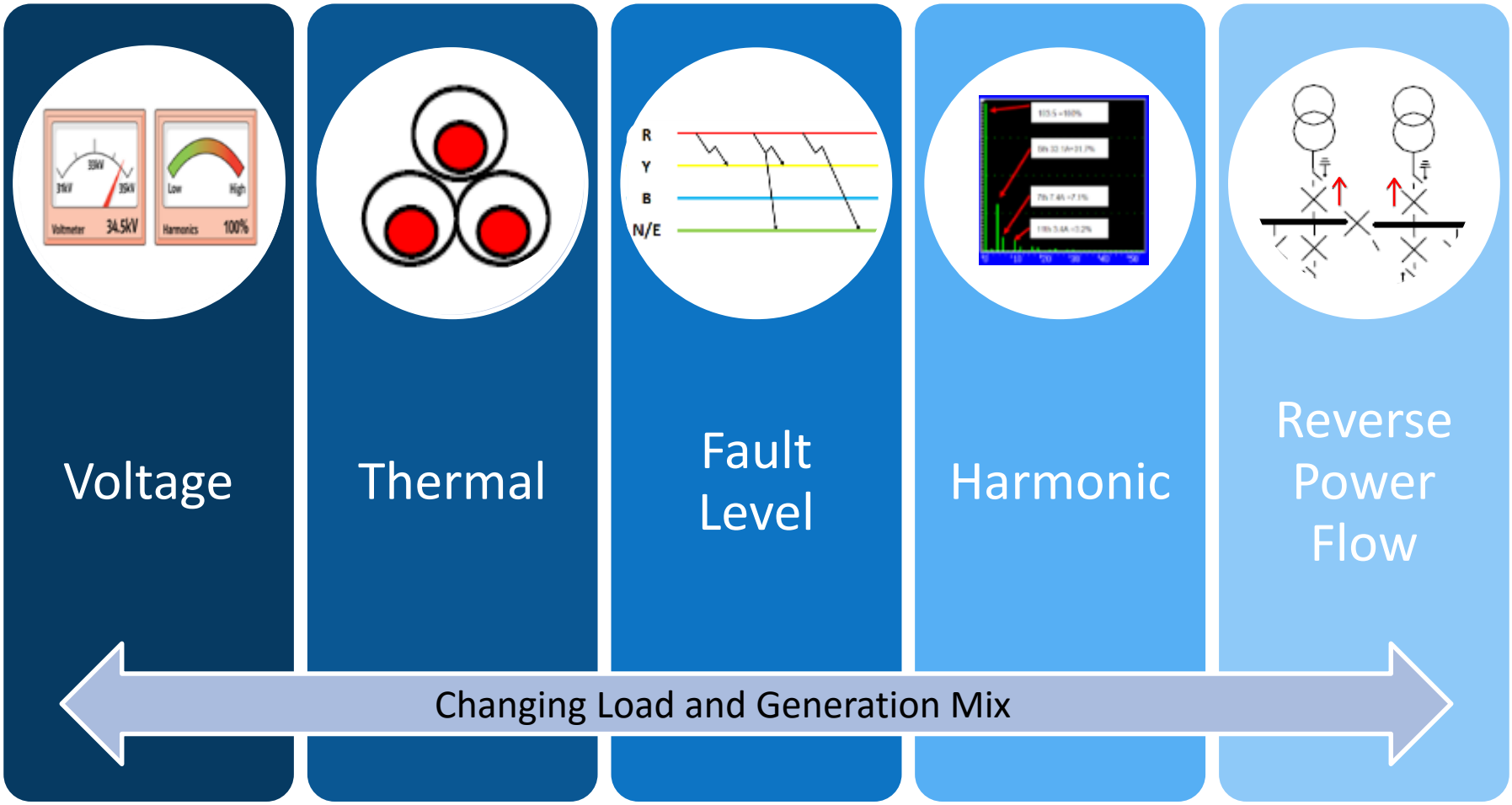
- Addressing brief or occasional capacity issues
- Reducing interruptions and durations of outages
- Improving network security
- Avoiding or deferring capital investment costs
- Increasing existing asset utilisation
- Enhancing our knowledge of network assets
- Increasing our understanding of customer needs

Leading to overall improvements for customers

Distribution Network Challenges

- Electrification of transport
- Electrification of heating
- Energy efficiency measures
- Businesses moving or growing
- Time of use supply tariffs
- Increased numbers of distributed generation
- Smarter home technologies
- Domestic smart metering rollout

Distribution Network Challenges



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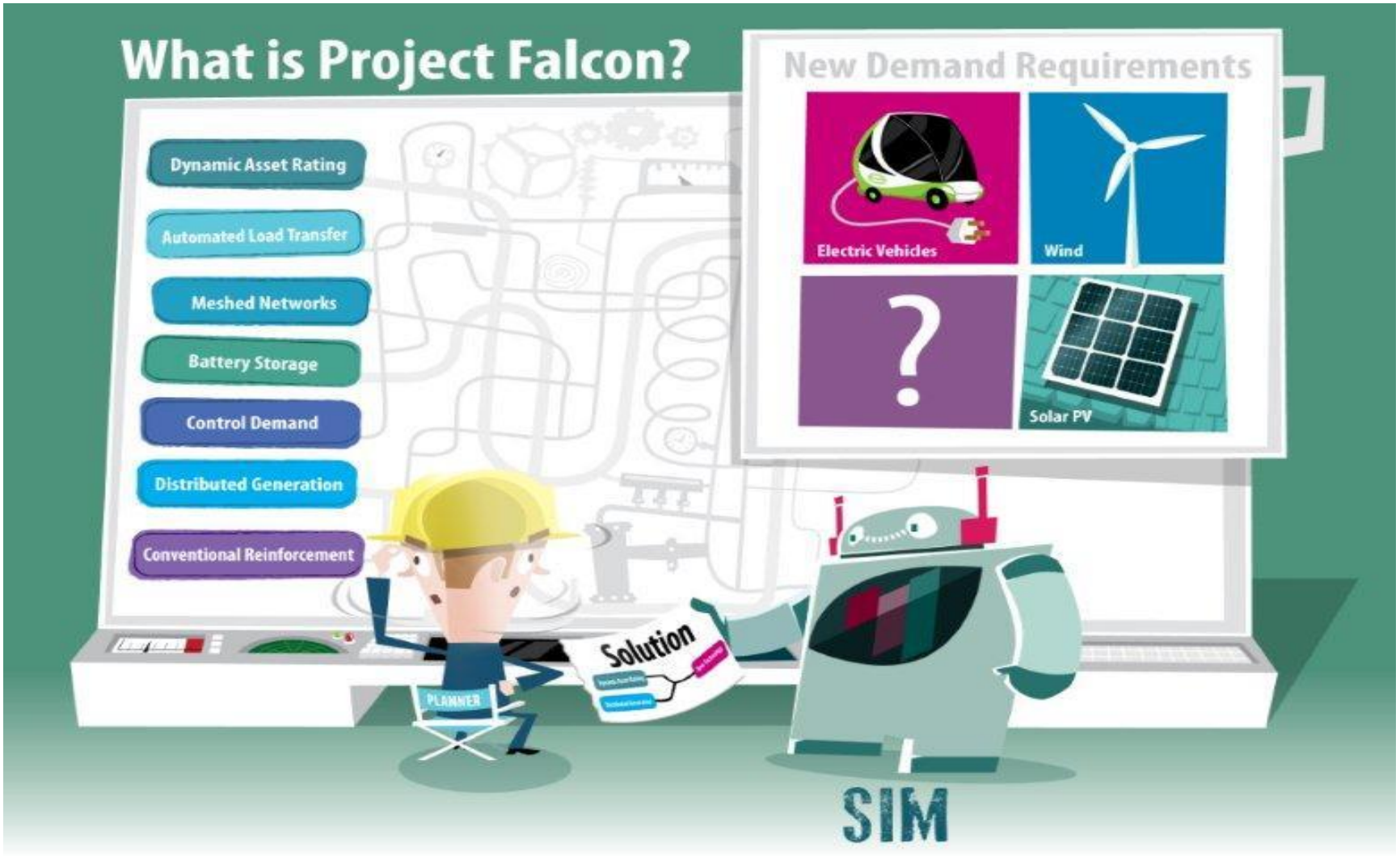
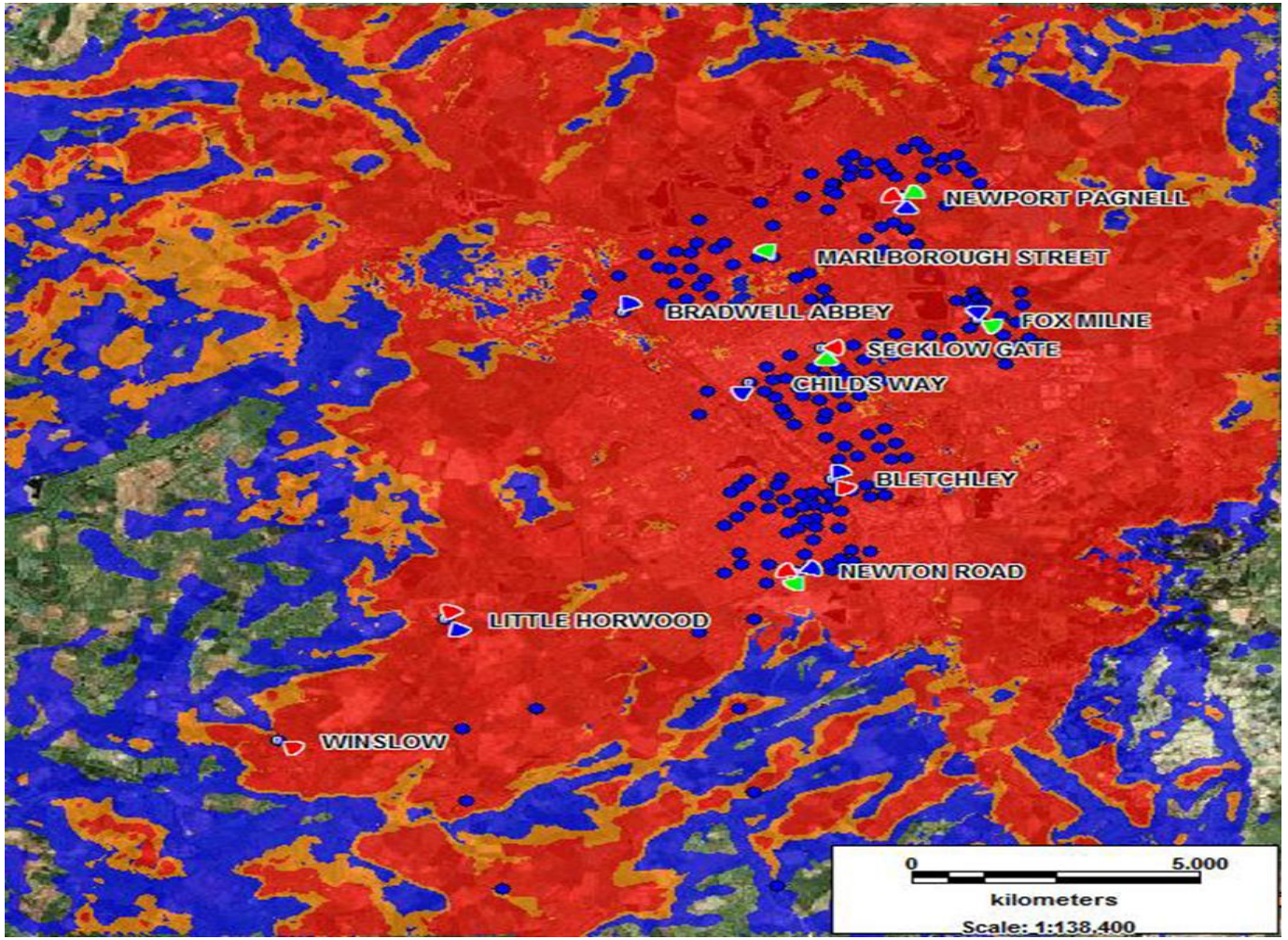
Flexible Approaches to Low Carbon Optimised Networks



Telecoms Infrastructure and Rollout



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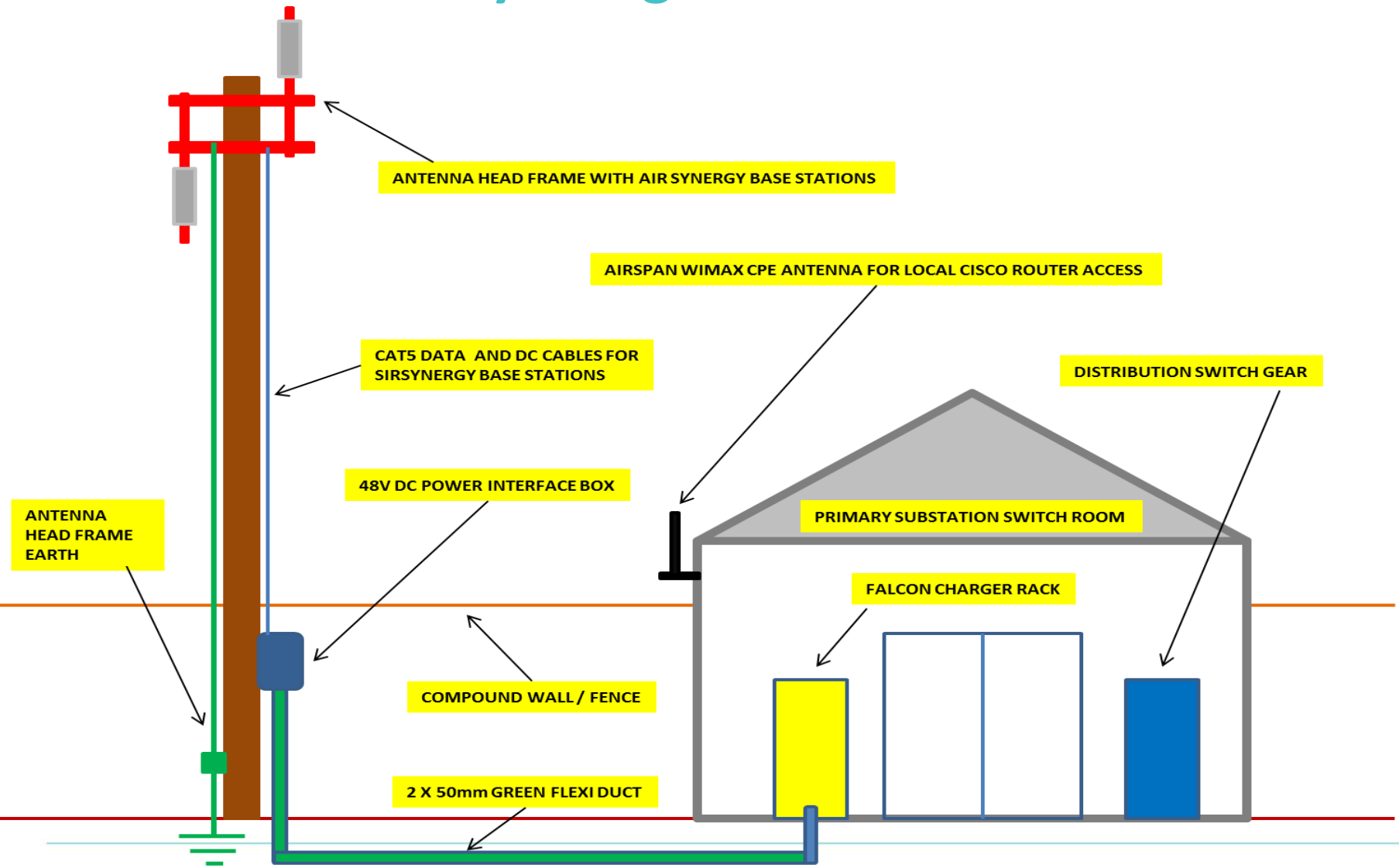
Telecoms Primary Design



Q&A?

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DEVELOPING FUTURE POWER NETWORKS

Demand Response

Gary Swandells

Commercial Trials Lead

LCN Fund Low Carbon Networks ALSTOM Aston University Birmingham CGI CISCO Cranfield UNIVERSITY

Project FALCON – Commercial 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

Project FALCON

Commercial trials Nov 2013 to Feb 2015

- Operated trials over two winter seasons (Nov-Feb)
- Target Capacity 10MW
- Majority of DSR offered from assorted generation types
- Direct and aggregated
- Up to 20 events expected

Project FALCON

Commercial trials season 1 results

- 18 Events called between 27th November & 28th February
- Approximately ¼ GWh of generation for purposes of trial
- Number of incidents of delivery failure
- DNO DSR programme conflicts with National Grid Balancing Service

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Project FALCON

Commercial trials season 1 results

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)
- Delivery failures reduced event reliability to 76.1%
- **Overall reliability 50.5%**

Project FALCON - Season 2

Parameters

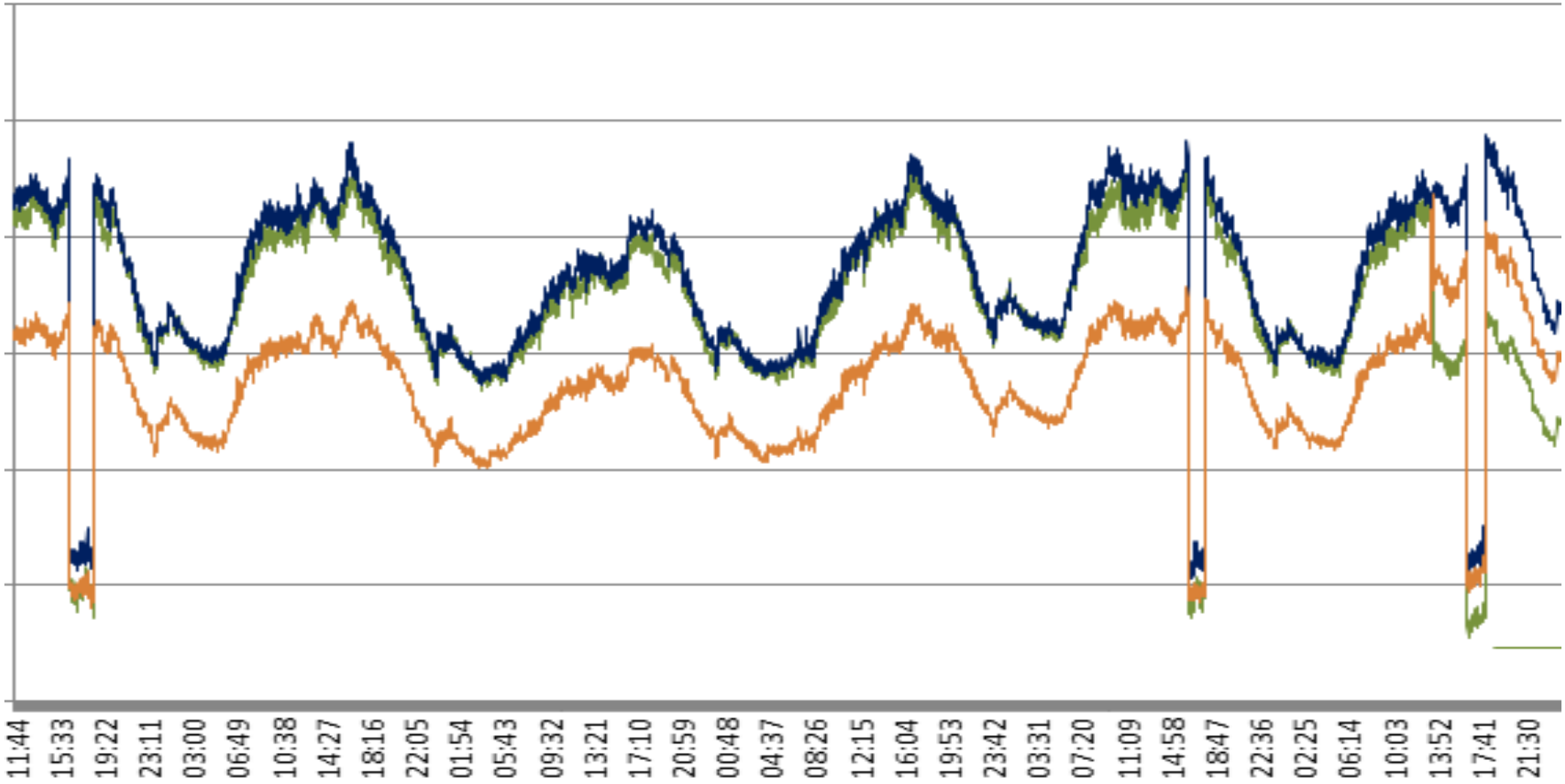
- Week ahead notification of operating schedule
- Capped consumption target based on previous year's peaks
- New back office systems
- Increased incentive for load reduction
- Additional aggregator involvement
- Data from new Smart Meter solution

Season 2 Results

- Trials completed on time & budget
  - We have trialled load reduction alongside generation
- Reliability improved
  - Week ahead declarations improved site reliability from **66.3%** to **100%**
  - Operational reliability up from **76.1%** to **96.3%**
  - Forecasting 7-12 days ahead provided predictable results probably adequate for DNO peak avoidance use.
- Processes proven
  - Capped consumption resulted in predictable response behaviour.
  - Smart metering was effective with no lost files and excellent data integrity
- Systems proven
  - Back office version 2 far easier to operate and quicker due to batch processing
  - Statements process was concluded almost 3 weeks ahead of schedule.

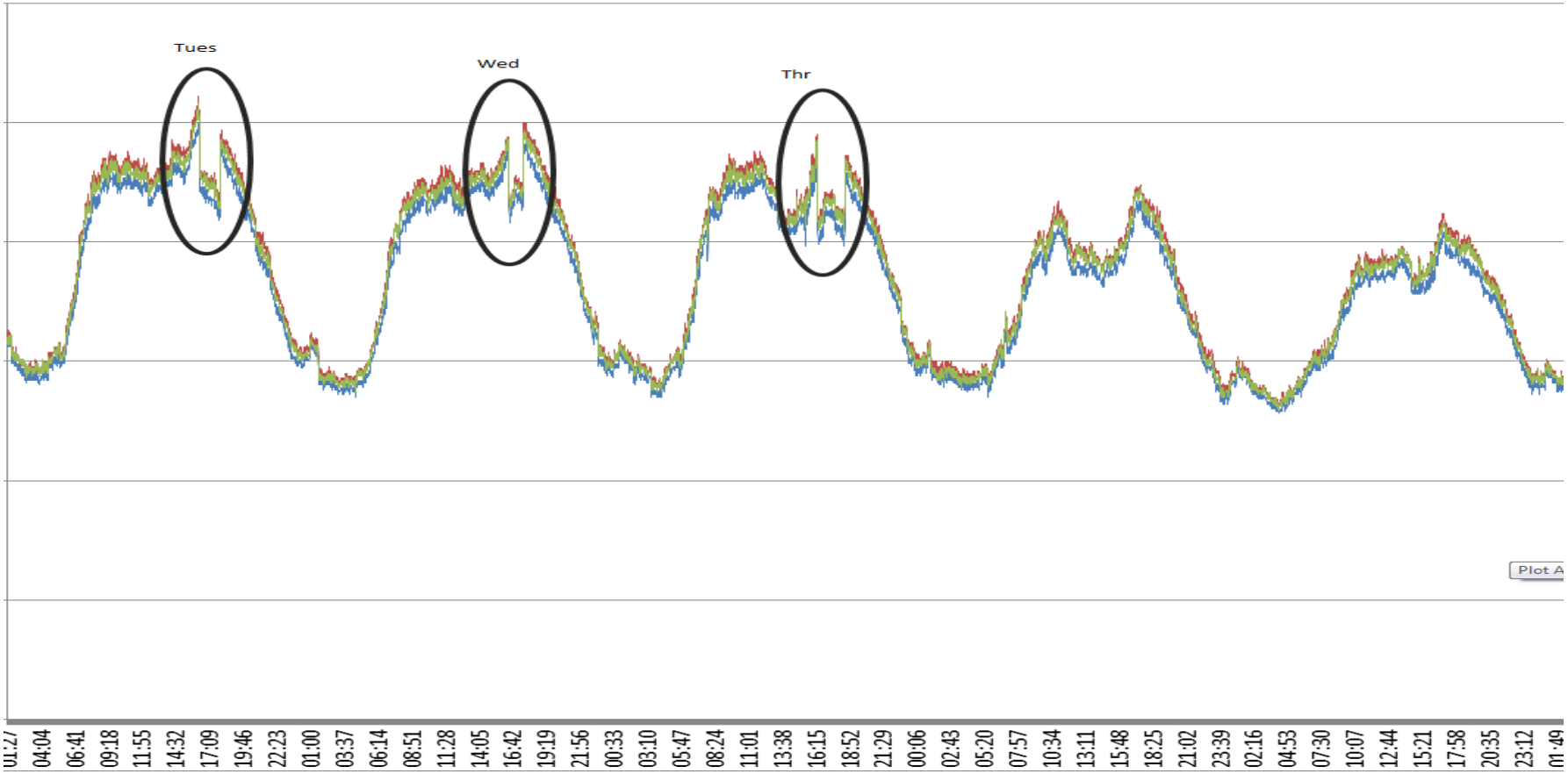
Project FALCON - Season 2

11kV Transformer Impact



Project FALCON - Season 2

33kV Transformer Impact



Q&A?

What's next?

- DSR projects to support renewable integration and demand growth
- Data harmonisation for modelling
  - SIM 1.0 commercialisation activities
  - Energy forecasting and network modelling
- Energy Scenario methodology development
- Technology evaluation
  - New High Voltage equipment
  - Telecommunications testing
- FALCON Legacy
  - Continued monitoring and testing in the trials areas
  - Council, community and schools engagement

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