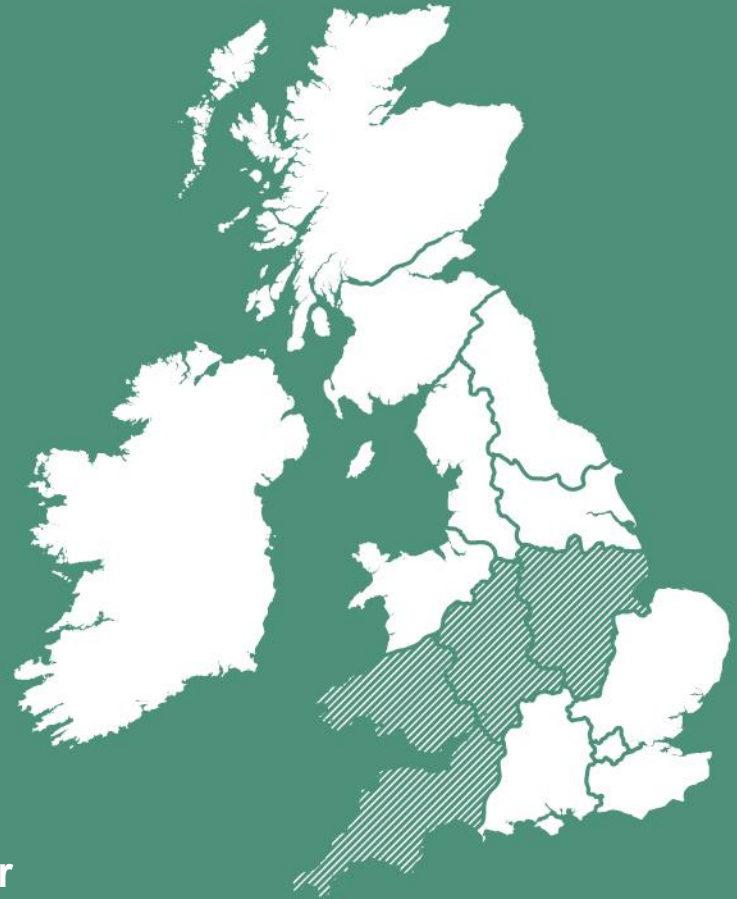


NEXT GENERATION NETWORKS

The transition from DNO to DSO

Matt Watson
Innovation and Low Carbon Networks Engineer
Western Power Distribution



Outline

- Western Power Distribution – Who we are
- How our role is changing
- Impact on Local Energy

Who We are



Keep the lights on

by operating our network assets effectively



Maintain equipment

so that the network is in a condition to remain reliable



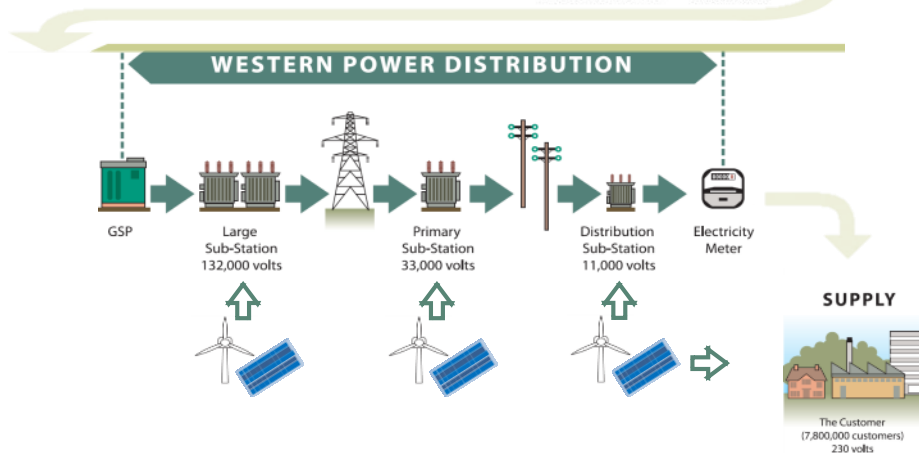
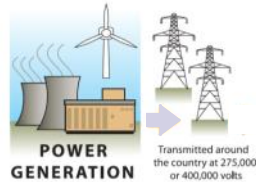
Fix the network

if equipment gets damaged or is faulty



Connect customers

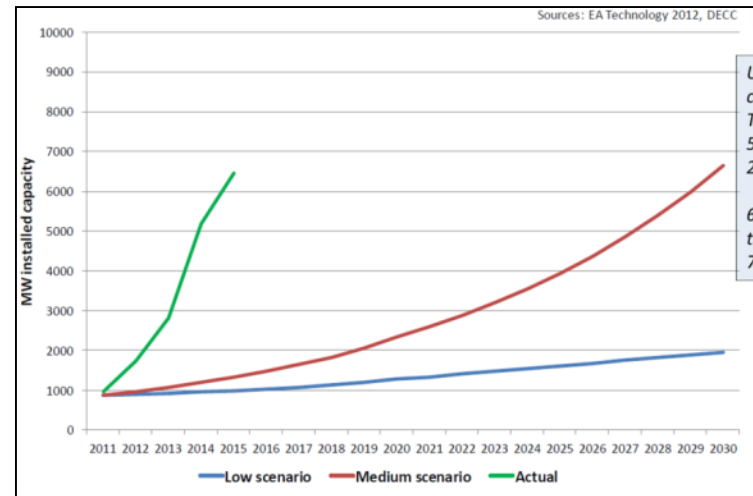
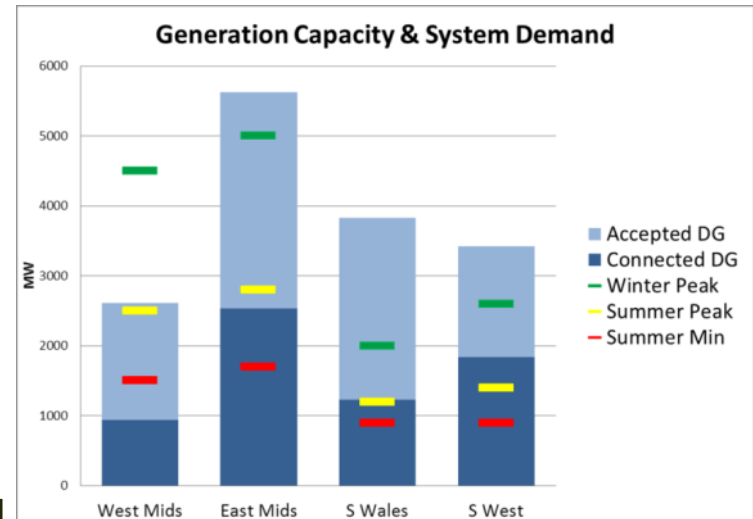
by upgrading existing networks or building new ones



7.8 million CUSTOMERS	6,500 STAFF
55,000² KILOMETRES COVERED	220,000 km OVERHEAD LINES & UNDERGROUND CABLES
185,000 SUBSTATIONS	REGULATED BY OFGEM
16% (c.£100) OF AN AVERAGE DOMESTIC ELECTRICITY BILL	

Changing Energy, Changing Networks

- International and UK binding Climate targets – delivered through renewable distributed generation, Low Carbon Heat and Transport
- Distributed Energy Resources (DER)
 - much more DG (14GW Winter Peak; 20GW DG, 12% of Energy)
 - Behind the meter impact is unknown; volatile market/incentives
 - 8GW of Energy Storage applications
 - Growing ancillary services market - DSR at a national level
- ICT revolution and ubiquitous telecommunications
- Significant uncertainty over the pace of change
 - Electrification of Transport and Heating
 - Risk of stranded assets
 - Long lead times and planning restrictions to build conventional



We are changing from DNO to DSO

- A Distribution Network Operator (DNO) provides a network sized to support times of maximum demand and/or generation output. It is sufficiently large to enable the GB Market to consider it having infinite capacity.
- A Distribution System Operator (DSO) exploits ICT to deliver a network that makes optimal use of capacity:
 - Smarter network solutions (including new grid technologies)
 - Non-network solutions (flexibility provided by customers)

Distribution
Network
Operator

Passive networks managing
maximum power flows



Distribution
System
Operator

Active networks managing
real-time energy flows

Network Operators are Changing

As WPD moves from being a **Distribution Network Operator** to a **Distribution System Operator**, it will carry out its existing functions and take on some new ones so as to:

Existing

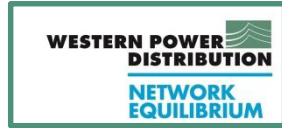
- develop and maintain an efficient, co-ordinated and economical system of electricity distribution;
- facilitate competition in electricity supply, electricity generation

New Roles

- facilitate flexibility services;
- improve the resilience and security of the electricity system at a local level;
- facilitate neutral markets for more efficient whole system outcomes;
- drive competition and efficiency across all aspects of the system; and
- promote innovation, flexibility and non-network solutions.

Impact on Local Energy

- Depends on definitions. These range from:
 - Local markets for flexibility services
 - Local supply matching
 - Local pricing
 - Full local energy markets
- WPD's role
 - Facilitate connections of associated technology
 - Neutral Market facilitation
 - Seeking non-network solutions where appropriate
 - Consideration of whole system impact



Future Networks Programme

Assets

- Management of distribution assets
- Exploitation of asset & network information
- Developing Smart Grid Technology



Customers

- Distributed Generation
- Connecting Electric Vehicles
- Adopting Battery Storage
- Facilitating Flexibility



Operations

- Maintaining Reliability
- Strategic Forecasting
- Transitioning to DSO
- Operational Efficiency



Network and Customer Data

Network Improvements and System Operability

- Improved Statistical Ratings for OHL
- DEDUCE
- Primary Networks Power Quality Analysis
- Stochastic Load Flow
- LCT Detection
- Network Islanding
- Common Information Model
- Harmonic Mitigation
- Virtual STATCOM

Transition to a Low Carbon Future

- Virtual Telemetry
- Feeder Fault Level
- Solar Storage
- LV Connect & Manage
- FREEDOM
- Electric Nation (formerly CarConnect)
- Industrial & Commercial Storage
- Hydrogen Heat & Fleet

New technologies and commercial evolution

- MVDC
- 5G Design
- OHL Director
- Entire
- LV Fault Location
- On-street EV Charging

Customer and Stakeholder Focus

- Power Electronic FLM
- Power Electronic FCL
- Self System Design
- New Build Standards
- LCT Response
- Carbon Portal

Safety, Health and Environment

- Simulated Training
- SF6 Alternatives
- Robot Trades
- LV Sensitive Earth Fault Protection
- Wildlife Protection
- Losses Investigation
- Advanced Vegetation Management
- Visual Data Processing

A few examples

- Flexible Power: Purchasing of flexibility services
- Cornwall Local Energy Market: A platform for the coordination of procurement
- OpenLV: Increased access network data for third parties
- Carbon Portal: Increased information on carbon intensity of network
- Virtual Private Wires: understanding what is and isn't possible
- Electric Nation and Freedom: highlighting the potential impacts of Electric Vehicles and Heat Pumps as well as potential flexibility

Wider changes

- ENA Open Networks project
 - Coordination of DSO transition
 - Developed models for Future Worlds
- RIIO review
 - Understanding the future regulatory environment for network operators
- Charging
 - Targeted Charging Review: Looking at residual charging. Ofgem have a minded to position
 - Significant Code Review: Looking at access and forward looking charges

THANKS FOR LISTENING



Serving the Midlands, South West and Wales

Any Questions?

wpdinnovation@westernpower.co.uk

www.westernpowerinnovation.co.uk