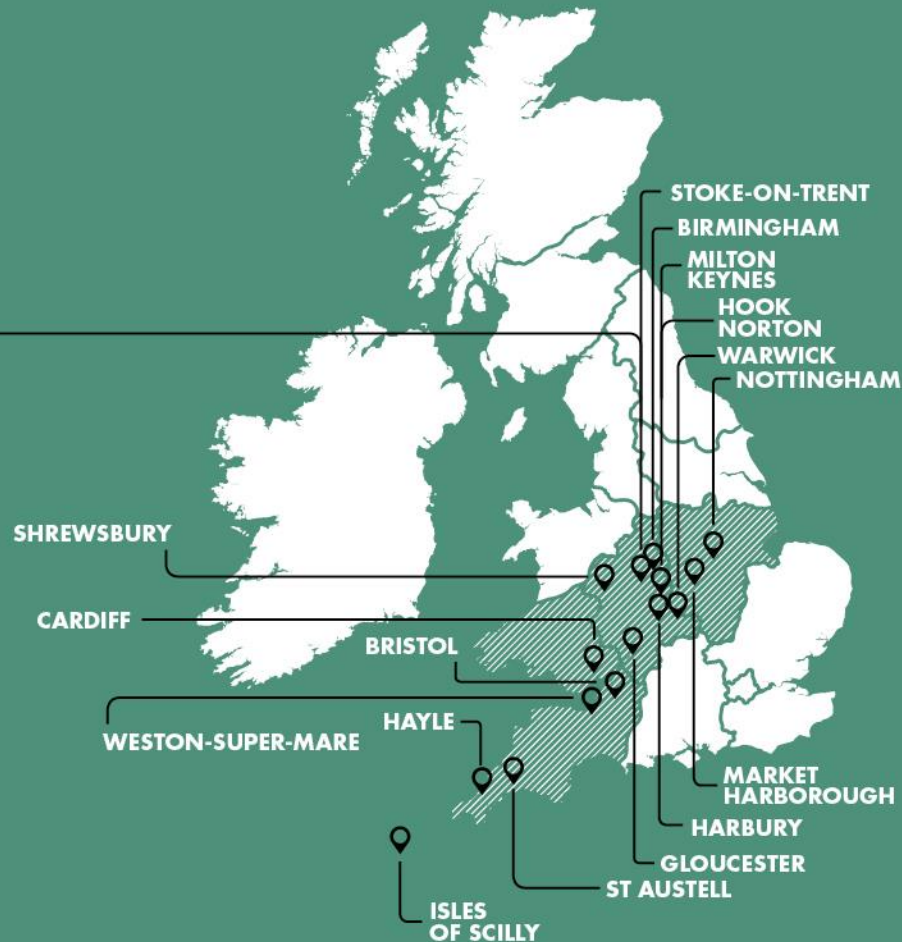


NEXT GENERATION NETWORKS

Transition to DSO
Balancing Act Event
8th September 2016

Steven Gough/James Bennett
Innovation and Low Carbon Networks Engineer



Workshop Format

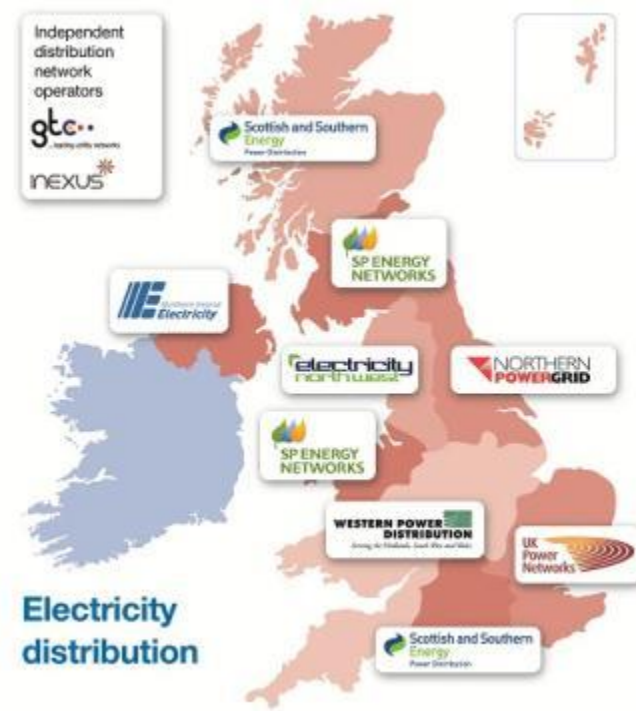
- Aim to be interactive
- Mixture of Presentation and questions/voting
 - Results of the questions/voting segment can be found on the WPD Innovation Website
- All participants should have a voting keypad

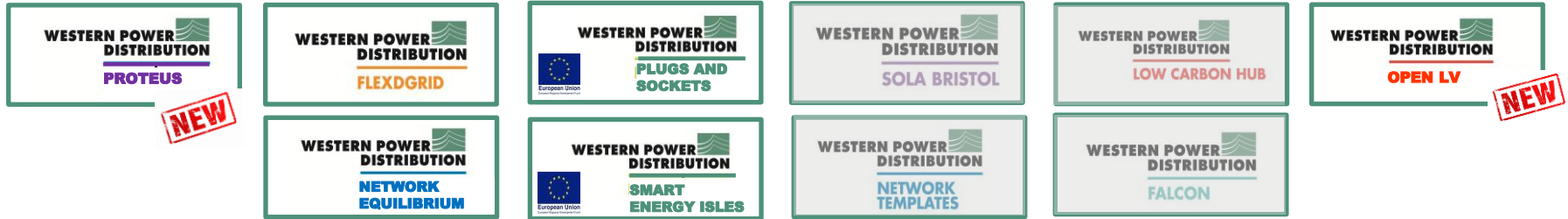
Agenda

1. Western Power Distribution – Who Are We?
2. Traditional Role of the DNO
3. Distribution Network Transformations
4. Role of DSO
5. WPD Innovation

Who Are We?

- 7.8 Million customers over a 55,300 sq kms service area
- Our network consists of 220,000 kms of overhead lines and underground cables, and 185,000 substations
- LV to 132kV Network ownership





Future Networks Programme

Assets

- Telemetry
- Decision support
- Improved assets
- New assets
- Flexibility
- Automation
- Incident response



Customers

- New connections
- Upgrades
- Information
- Self Serve
- Products/Service
- Tariffs
- Communities



Operations

- Reliability
- Forecasting
- DSO
- DSR
- GBSO Interface
- Efficiency
- SHE and Security



Network and Customer Data

- Airborne Inspections
- AIRSTART¹
- Telecoms Templates
- Superconducting Cable
- SF6 Alternatives
- MVDC Test Lab
- Smart Energy Laboratory
- Statistical Ratings
- Primary Network Power Quality Analysis

- Hybrid Heat Pump Demonstration
- Hydrogen Heat & Fleet
- Carbon Tracing
- HV Voltage Control
- Solar Storage
- LV Connect and Manage
- Sunshine Tariff
- CarConnect
- Industrial & Commercial Storage

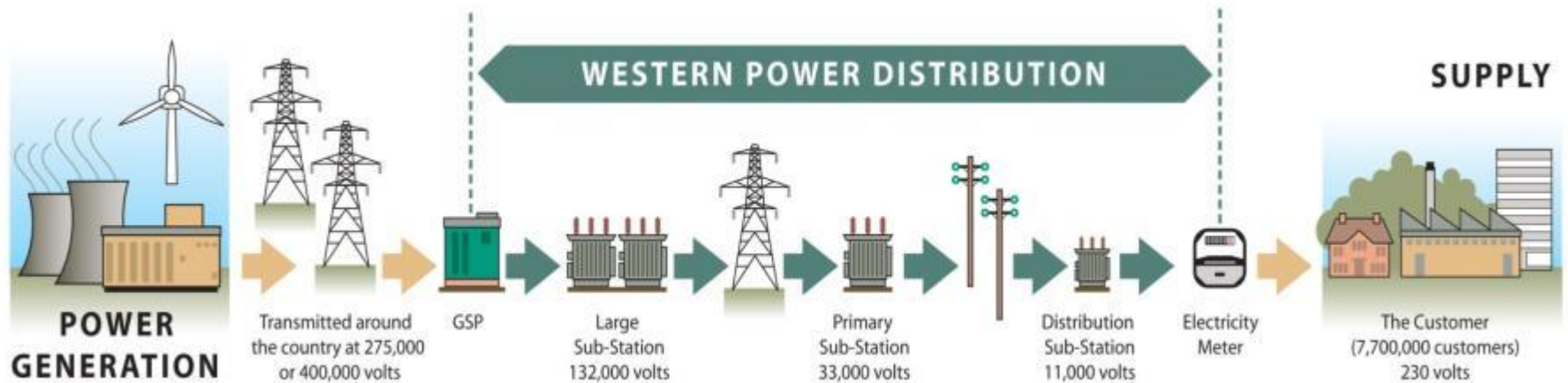
- DSO/SO Shared Services
- Project Sync
- Project Entire: Flexible Power
- Integrated Network Model
- Smart Meter Exploitation
- Distribution Operability Framework
- Data Analytics
- Voltage Level Assessment
- LV Connectivity
- Smart Systems and Heat²

Question 1

Who are you?

1.	WPD Customer/Developer
2.	WPD Supplier
3.	Academic
4.	Network operator/Government department
5.	Other

Traditional Role of the DNO



Network Changes - Drivers

- Climate change and international agreements on reducing carbon emissions
- EU and UK binding targets – delivered through renewable DG, EV, RHI
- Rapid changes in GB generation
 - Much more DG
 - Volatile market/incentives
 - Increased need for local and coincidental demand
- Consideration of whole system issues
 - Power
 - Energy
 - Also Gas, Heat and transport fuels
- Significant uncertainty over the pace of change
 - Risk of stranded assets
- Long lead time to build conventional capacity

Network Changes - Drivers

Intermittent renewable DG

- Summertime, daytime DG peaks
- Limited contribution to Winter demand peaks

Electrification of heat and transport

- Larger peaks
- Potentially volatile to external events

Storage – falling prices and mass production

- Potentially disruptive to existing customer profiles
- ...but to also be used to help

Building a passive grid to cater for unmanaged peaks is cost prohibitive

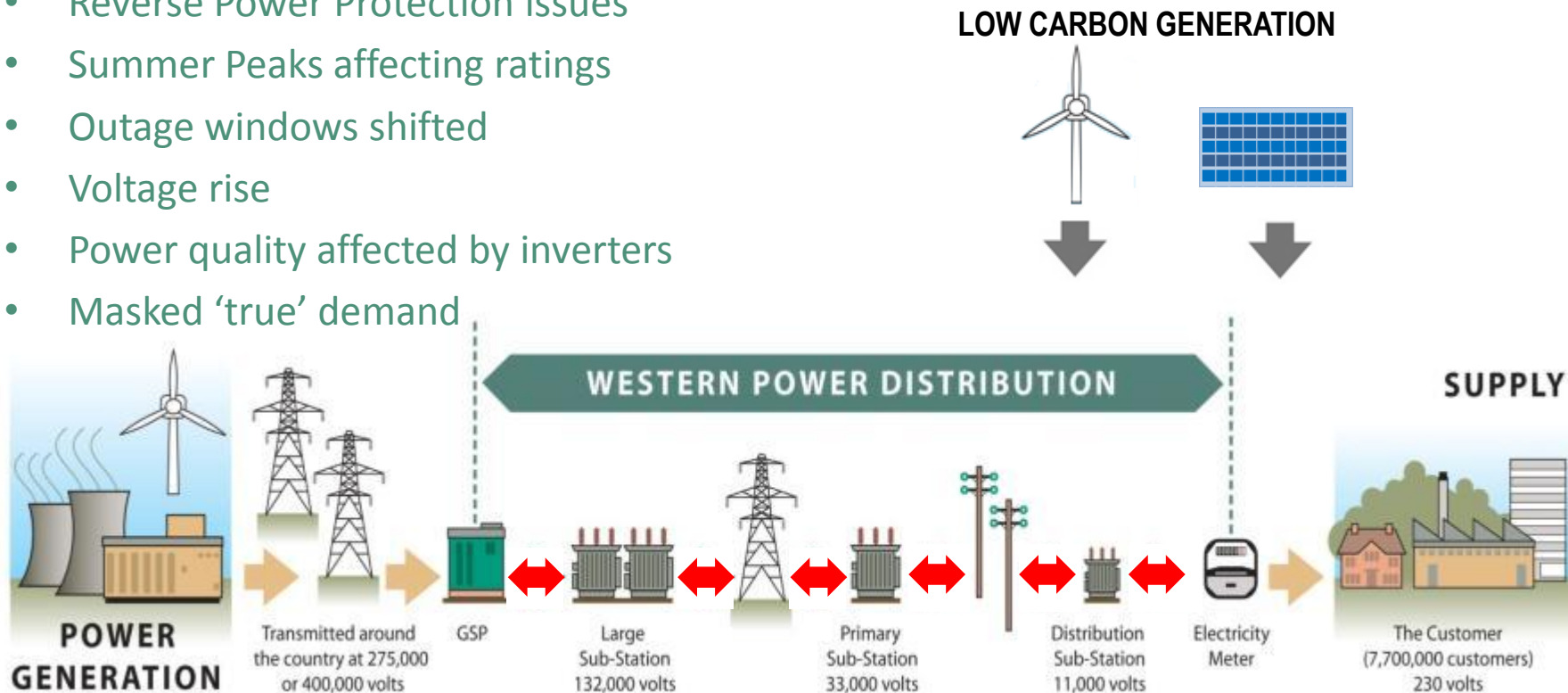
- Customer interest in managed connections (eg ANM)

Coordination with GBSO essential

- Avoid paying for conflicting services
- Distribution network compliance and customer service
- Facilitate residual balancing by the SO

Distribution Network Transformations

- Bi-directional power flow
- Exporting GSPs
- Potential increase in Fault Level
- Reverse Power Protection issues
- Summer Peaks affecting ratings
- Outage windows shifted
- Voltage rise
- Power quality affected by inverters
- Masked 'true' demand



Question 2

What does DSO stand for?

1.	Distribution Service Operator
2.	Distribution System Operator
3.	Dynamic Service Operator
4.	Dynamic System Operator

Question 3

What would you consider the role of the DSO to be?

Make up to 5 selections then press 'SEND'

1.	Balancing the network
2.	Managing energy flows
3.	Managing power flows
4.	Brokering ancillary services
5.	All of the above

Role of the DSO – WPD's view

- Understanding historic and real time energy flows
- Forecasting future energy volumes across the network (under different scenarios),
- Actively reconfiguring the system dependent on need (ranging from seasonal adjustments through to fine adjustments pre gate closure)
- Contracting/despaching DER through commercial arrangements
- Operation of storage and DG where no commercial provider exists, where technically needed or when more cost effective
- Coordinating DSO operations with the GBSO (and potentially providing some services to the SO)
- Maintaining a platform for energy suppliers, communities and other market participants to have visibility of network congestion (and to offer the DSO flexible demand or DG solutions)

WPD DSO Readiness

Data Integrity	Market Integration	IT Systems	Customer Propositions	Equipment
Alignment of Data – CIM	WPD regional energy scenarios	Power System Modelling	DSR products by customer segment	Telecommunications readiness
Time Series Data – MWh not MW	WPD Operability Framework	Energy Management and Settlement	DSM tariff structure	Transducers and measurement
Connectivity	DSR Shared Service	Time Series Data Stores	Alternative Connections	Settlement and metering data
	Visibility Platform	LV Connectivity / GIS	Managed Connections	Managed Connection Interface
	Charging Methodology	Settlement and Billing		Active Network Management

Question 4

What do you see as the most important ancillary services?

1.	Demand side response
2.	Generation response
3.	Demand and generation response
4.	Balancing

WPD Innovation Project Learning

- LV Templates – Energy profiling
- Low Carbon Hub – development of Alternative Connections/ ANM
- Low Carbon Hub – development of DG constraint panels
- FALCON – I&C DSR (with DG and Active Demand)
- FALCON – Energy Forecasting
- SoLa BRISTOL – domestic DSR and DSM (with batteries)
- Community Energy Action – Community based DSR
- ECHO – domestic DSR (smart plugs)
- Electric Boulevards – Smart EV charging
- Sunshine Tariff – Community DSR (Offsetting DG and Demand)
- SYNC – I&C DSR (demand shifting to summer DG peak)
- ENTIRE – Demand side response
- Solar Storage (DG output smoothing and ancillary services using battery storage)
- Hydrogen Heat and Fleet (demand control through electrolysis and cross vector hydrogen use)
- Plugs and Sockets – EU funded project

Question 5

What in your opinion are the main future challenges?

1.	Integration
2.	Interaction
3.	Data Sharing
4.	Data Management
5.	Regulation

Question 6

Who do you envisage will be the slowest to adapt to the DSO transition?

1.	National Grid
2.	Distribution Network Operators
3.	Electricity Suppliers
4.	Meter Operators
5.	Customers

WPD Innovation Strategy

- ANM rollout
 - 4 active zones
 - 9 zones due to roll out
 - By 2021 the entire network will be covered
- Focus on Demand Side Services
 - A number of demand projects covering domestic and commercial
 - Projects investigating control over electrification heat and transport
- Key focus on integration of systems and data
 - Several projects looking at the readiness of internal systems
 - Verification of data and enabling greater use

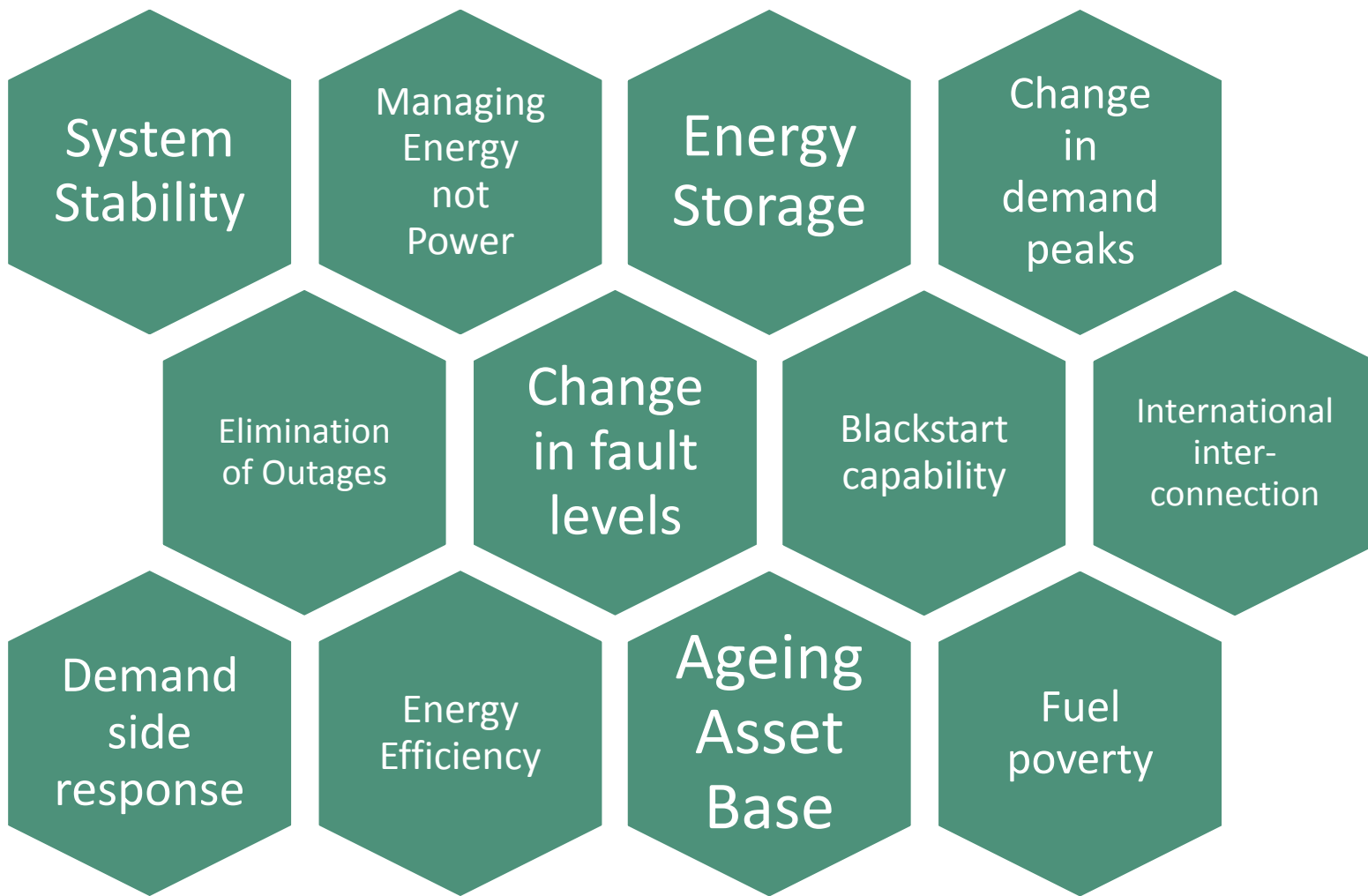
Question 7

What technologies are likely to be most important in the DSO transition?

Make up to 5 selections then press 'SEND'

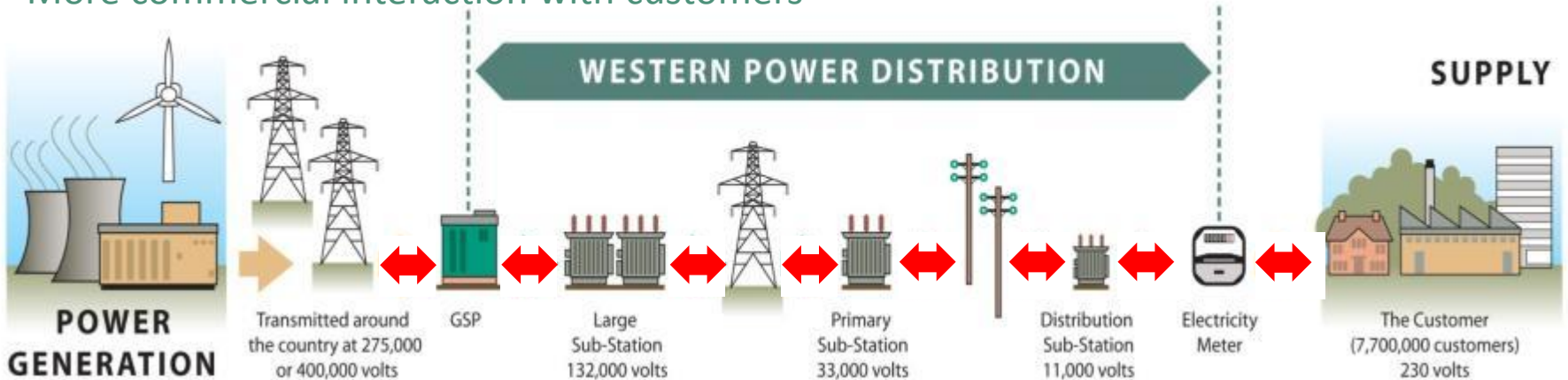
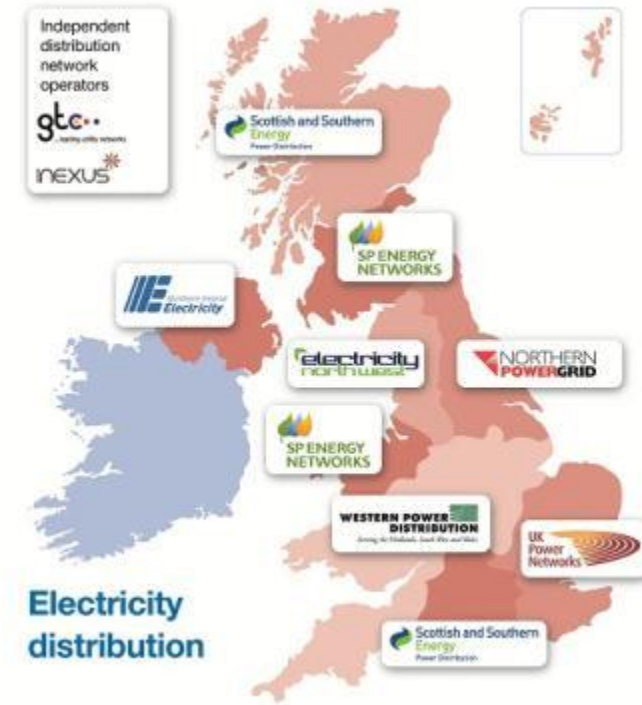
1.	DDSR (Domestic Demand Side Response)
2.	Storage
3.	Hydrogen
4.	Commercial DR
5.	Generation

Future Network Challenges



Who Are We? (Future)

- 7.8 Million customers over a 55,300 sq kms service area
- Our network consists of 220,000 kms of overhead lines and underground cables, and 185,000 substations
- LV to 132kV Network ownership
- Managing Energy not Power
- Demand response contracts
- Balancing & Settlement
- Enhanced connections
- More commercial interaction with customers



THANKS FOR LISTENING



Serving the Midlands, South West and Wales

James Bennett/Steven Gough

Western Power Distribution

Innovation and Low Carbon Networks Engineer

wpdinnovation@westernpower.co.uk

www.westernpowerinnovation.co.uk