WESTERN POWER DISTRIBUTION

Serving the Midlands, South West and Wales

Distributed Generation

Stakeholder Workshop

November 2015

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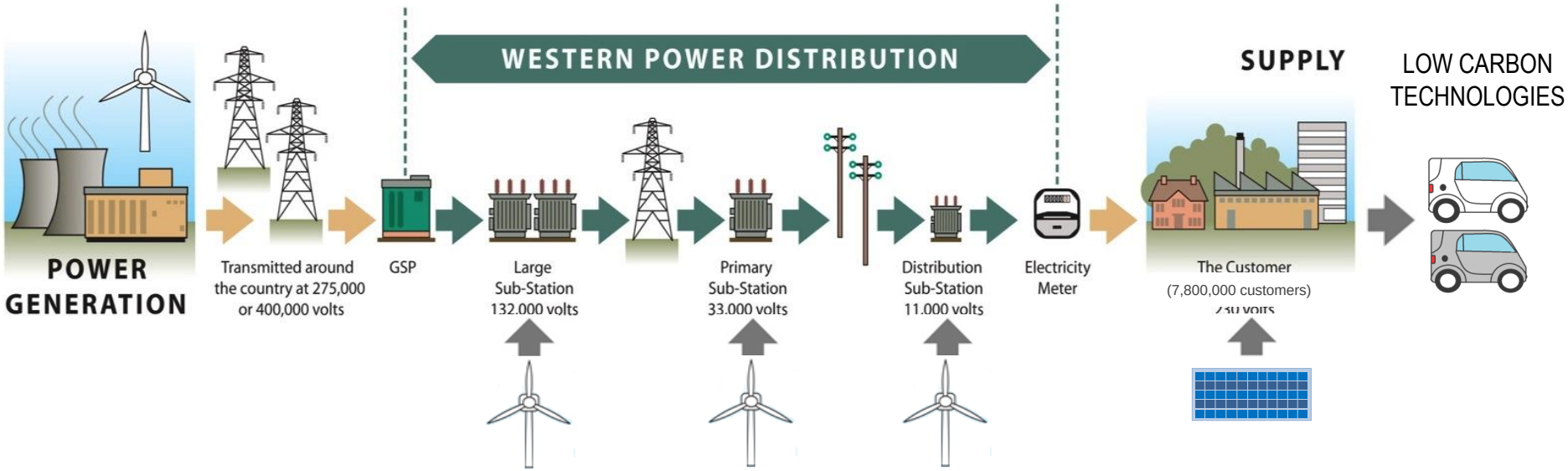
Housekeeping

- Building Evacuation
- Facilities
- Introductions

What we do



Our role is simple:

- We operate our network assets effectively to ‘keep the lights on’
- We maintain the network so it remains in reliable condition and safe
- We fix our assets if they get damaged or are faulty
- We upgrade and expand the network to provide additional supplies and capacity

We do all of this with high levels of both operational and public safety

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Our service territory and customer base

- WPD is a Distribution Network Operator (DNO)
- We distribute electricity to 7.8 million customers
- We operate 4 of 14 distribution licence areas in the UK

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Scale of our business

	West Midlands	East Midlands	South Wales	South West	WPD Total	WPD total as a percentage of all DNOs
Licenced Area (sq.km)	13,300	16,000	11,800	14,400	**55,500**	**24%**
Customer Numbers	2,470,000	2,619,000	1,108,000	1,561,000	**7,758,000**	**28%**
Network Assets						
Overhead Lines (km)	24,000	22,000	18,000	28,000	**92,000**	**33%**
Poles	372,000	291,000	283,000	442,000	**1,388,000**	**34%**
Towers (Pylons)	4,000	6,000	3,000	4,000	**17,000**	**34%**
Underground Cable (km)	40,000	50,000	17,000	22,000	**129,000**	**24%**
Switchgear	87,000	98,000	35,000	76,000	**296,000**	**25%**
Transformers	50,000	43,000	40,000	52,000	**185,000**	**31%**
'Composite' asset count	577,000	510,000	396,000	624,000	**2,107,000**	**31%**

Agenda

Welcome & WPD overview	10:00 – 10:10
DG Connections Overview	10:10 – 10:25
Challenges and Key areas of focus for 2015	10:25 - 10:45
Workshop 1 –	10:50 – 11:25
Coffee Break	11:40 – 11:55
Quicker, more efficient connections – our improvement plan in detail	11:55 - 12:15
Workshop 2 –	12:15 – 12:55
Summary & Lunch	
Workshop 3 – Choice of: **1. Statement of Works (Tony Berndes)** **2. Alternative Connections (Ben Godfrey)** **3. Consents and Legals (Bruce Pollard)** **4. Competition in Connection (Paul Jewell)** **5. Consortium Connection Schemes (Richard Allcock)**	14:05 – 15:00
Close	

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DG Connections Overview

Phil Swift

Operations Director

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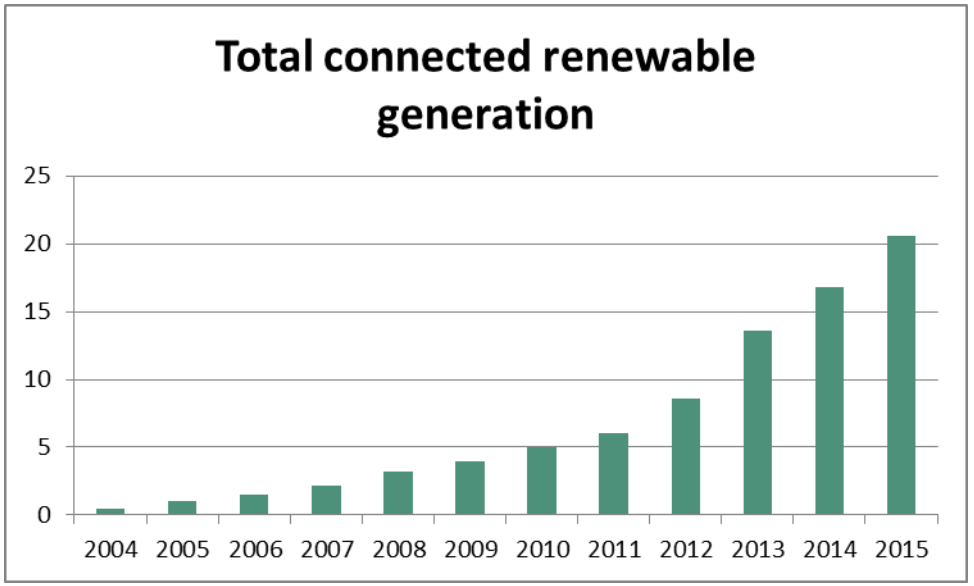
Our objectives for today

- Set the scene for where we are now
- Be honest about some of the challenges we face
- Provide an opportunity to give feedback
- Shaping our plans for the future

Background – the growth of renewables

- The growth in renewables particularly solar has been rapid
- The UK has connected 16GW of renewables since 2010 and in 2014 they accounted for 19% of electricity generated



- In WPD we have connected a total of 6.5GW of generation including over 1GW connected this year so far
- This includes 7,400 commercial (G59) and 217,107 domestic (G83) sites
- We have a further 1,500 projects in the pipeline totalling a further 8.5GW

Scale of the challenge

Connected generation (MVA)

West Midlands	East Midlands	South Wales	South West	Combined
944	2,531	1,233	1,833	**6,541**

Accepted generation (MVA)

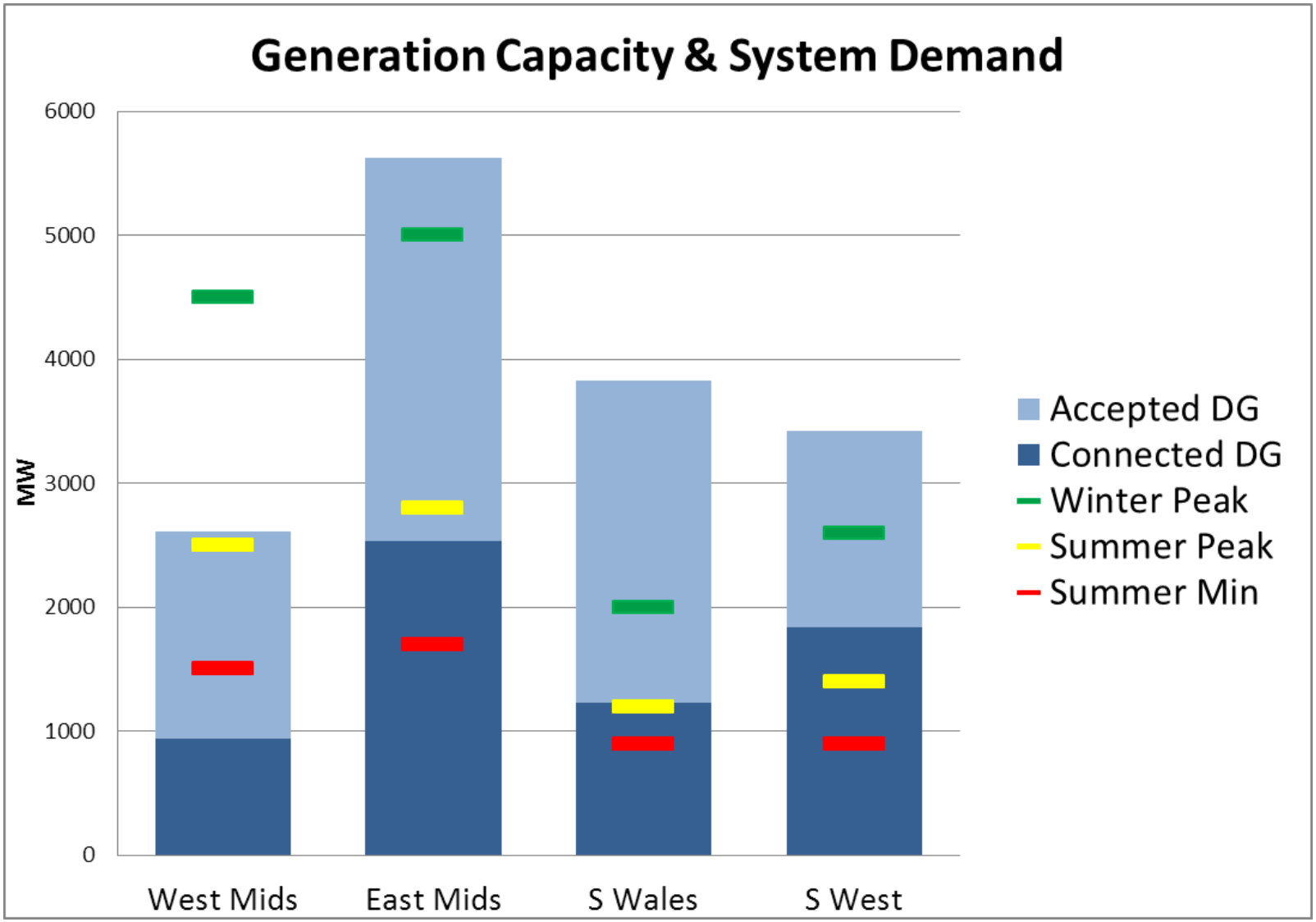
West Midlands	East Midlands	South Wales	South West	Combined
1,599	2,993	2,327	1,543	**8,462**

Under offer generation (MVA)

West Midlands	East Midlands	South Wales	South West	Combined
1,595	2,038	857	1,015	**5,505**

Network details

West Midlands	East Midlands	South Wales	South West	
4.5	5.0	2.0	2.6	**Winter Max GW**
2.5	2.8	1.2	1.4	**Summer Max GW**
1.5	1.7	0.9	0.9	**Summer Min GW**



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How WPD's approach has evolved

- WPD's Business Plan commenced in April 2015 with 10 connection commitments
- ICE improvement plan trial in 2014 and 2015/16 plan currently available online containing
  - Actions to improve the information provided prior to a connection application
  - Actions to make the application process easier
  - Actions to improve the speed of the connection
- Ofgem consultations on Competition in Connections / Quicker more efficient connections
- Our plans evolve based on feedback and changing circumstances but are always driven by customer requirements

Rising to the challenge

How do you connect 6.5GW of generation on a network originally designed for demand ?

- WPD promoting ‘alternative’ connection schemes as standard - Active monitoring of constraint limits and curtailment as necessary (active, timed, intertrip). We have:
  - 127 schemes already accepted (a further 112 offered)
  - 342MW of additional connections facilitated
- Rolling out zones that are fully automated (‘Active Network Management’ zones)
- Demand Side Response - discussions with major utilities and other large I&C customers “Project Sync”

Rising to the challenge

WESTERN POWER DISTRIBUTION SOLA BRISTOL

WESTERN POWER DISTRIBUTION FALCON

WESTERN POWER DISTRIBUTION FLEXDGRID

WESTERN POWER DISTRIBUTION NETWORK EQUILIBRIUM

WESTERN POWER DISTRIBUTION CLEAN ENERGY BALANCE H2

WESTERN POWER DISTRIBUTION 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

WESTERN POWER DISTRIBUTION LOW CARBON HUB

WESTERN POWER DISTRIBUTION NETWORK TEMPLATES

WESTERN POWER DISTRIBUTION energy technologies institute POWER & HEAT

WESTERN POWER DISTRIBUTION LV PLUS Innovate UK

WESTERN POWER DISTRIBUTION WIRELESS Innovate UK HIGHWAYS

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

WESTERN POWER DISTRIBUTION AIRBORNE INSPECTIONS

WESTERN POWER DISTRIBUTION VOLTAGE LEVEL ASSESSMENT

WESTERN POWER DISTRIBUTION DS2030

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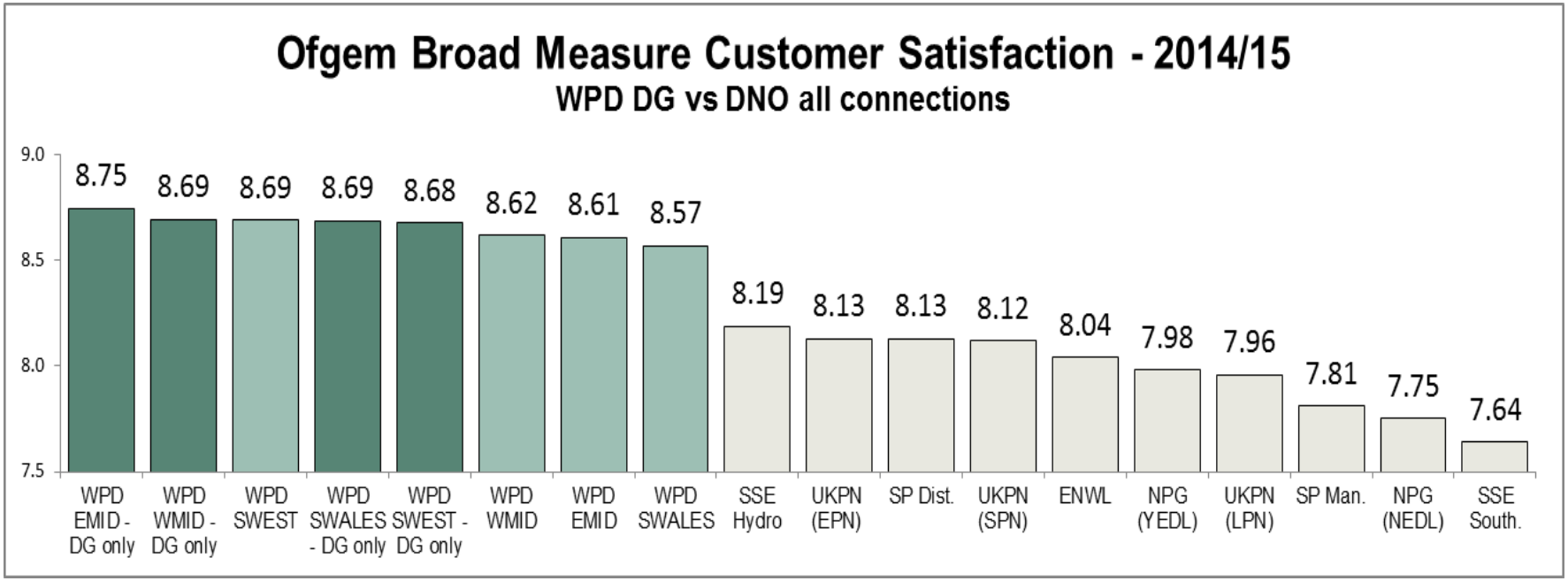
How are we doing ?



- We have improved the consistency of the process – 88% customers with previous service experience said the most recent was the same or better

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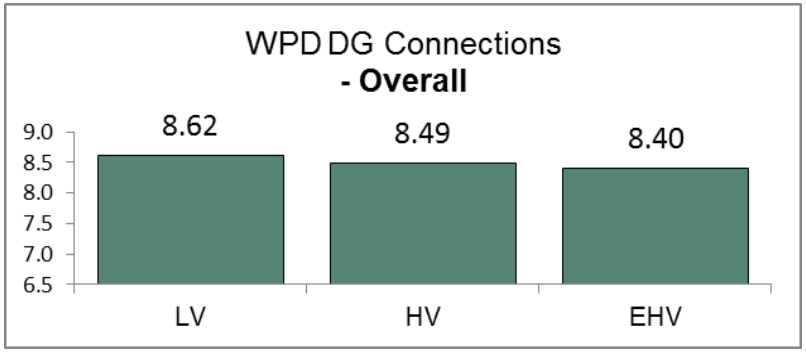
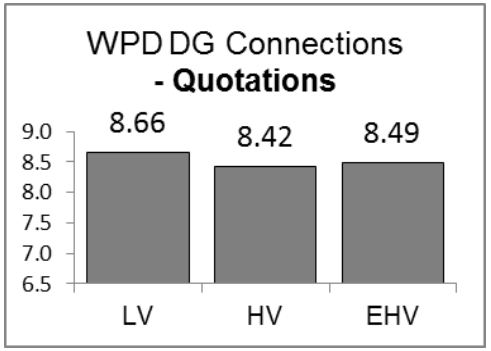
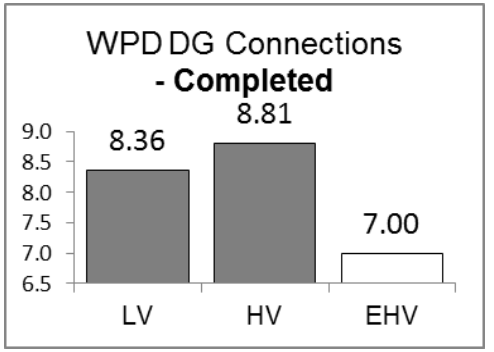
How are we doing ?







- Despite the challenges faced, satisfaction remains high in some areas:

Ease of initial contact (to get a quotation)	**8.92**
Understanding the customer's requirements (during quotation process)	**9.06**
Clarity of explanation of the connections process	**8.74**
Clarity of explanation of the likely charge	**8.98**

- But we are getting a clear message for improvement in other areas:

	2014:	*2015:*
Time taken to provide a quotation	8.53	**7.88**
Amount of communication throughout the process	9.03	**8.57**
Promptness of contact to agree dates for work	9.08	**8.00**
Arrangements made before work started	9.30	**8.46**

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NOTE: Sample size too small on EHV completed connections (5 customers) to be statistically robust

Key issues

- With rapid growth we have seen the following impacts on the network
  - A network built to handle demand could become net export
  - The “quick wins” have been exhausted and distribution/transmission constraints are becoming more severe

- We have made real progress but the key issues that arise are:
  - Queue management
  - Dealing with network constraints and alternative connection offers
  - Transmission and distribution interface
  - Future forecasting

- We will cover these in more detail in the following session - please use today as an opportunity to give us your feedback and priorities

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Challenges and Key Areas of focus for 2015

Nigel Turvey

Design & Development Manager

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Generation Context
Currently Connected and Accepted Capacity

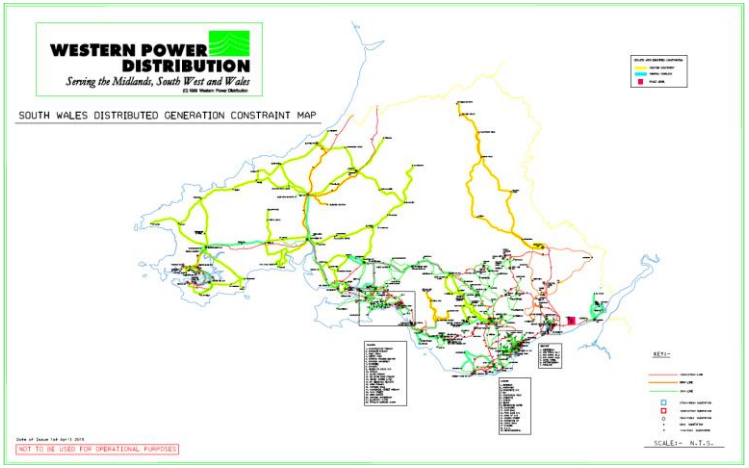
Connected Capacity (MW)	West Midlands	East Midlands	South Wales	South West	Grand Total
Photovoltaic	372.0	823.1	384.0	1,044.6	2,623.6
Wind	4.6	446.4	153.1	213.1	817.1
Landfill Gas, Sewage Gas, Biogas, Waste Incineration	302.9	288.9	41.1	81.8	714.7
CHP	26.2	141.0	1.9	23.3	192.4
Biomass & Energy Crops	20.8	70.6	1.5	0.2	93.0
Hydro, Tidal & Wave Power	0.6	2.9	16.4	2.5	22.4
Other Generation	217.0	758.1	635.0	468.0	2,078.1
Grand Total	944.1	2,530.9	1,232.9	1,833.4	6,541.4

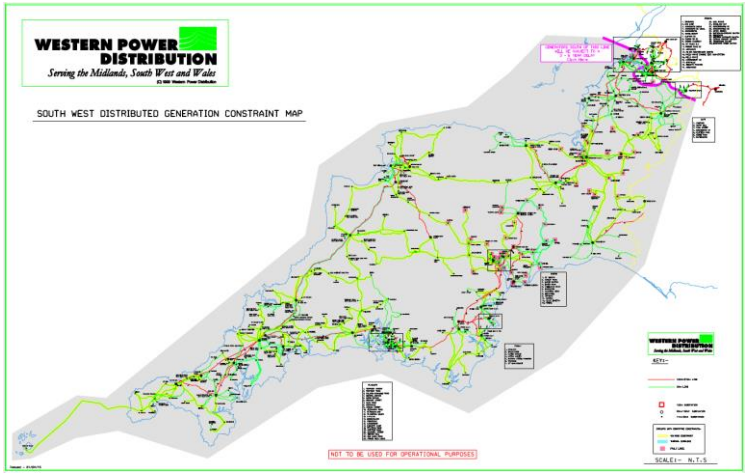
Accepted Capacity (MW)	West Midlands	East Midlands	South Wales	South West	Grand Total
Photovoltaic	1,298.6	2,162.9	1,071.8	951.0	5,484.3
Wind	41.0	431.7	665.8	230.9	1,369.3
Landfill Gas, Sewage Gas, Biogas, Waste Incineration	55.0	96.3	26.4	111.2	288.9
CHP	16.2	6.0	17.5	2.3	42.0
Biomass & Energy Crops	23.4	71.3	71.9	2.4	168.9
Hydro, Tidal & Wave Power	0.5	-	16.5	3.0	20.0
Other Generation	164.1	224.7	457.3	242.3	1,088.4
Grand Total	1,598.8	2,993.0	2,327.0	1,543.1	8,461.9

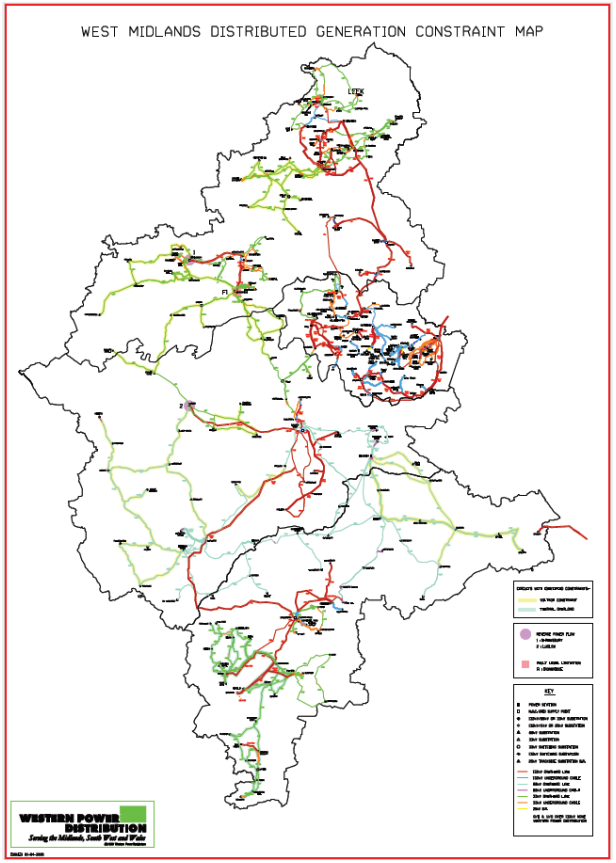
As at end September 2015

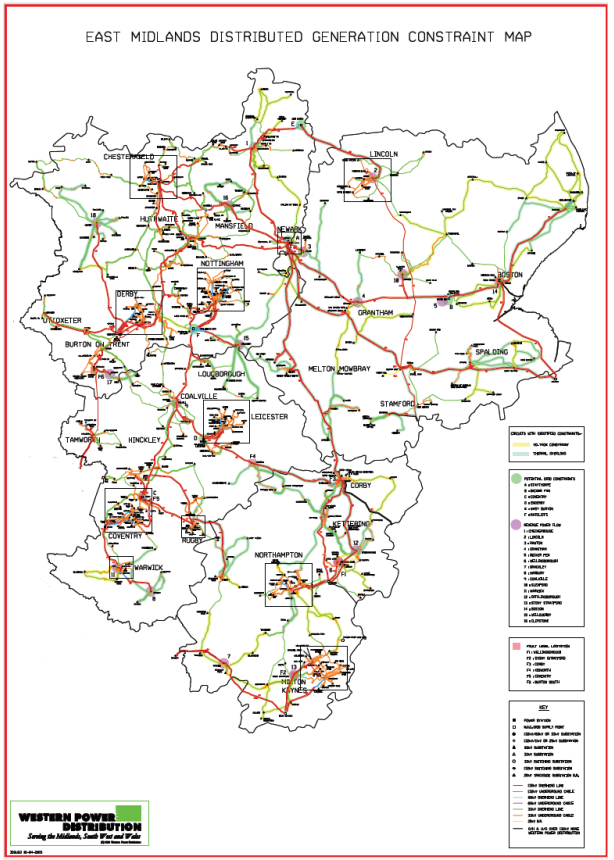
Context - constraints across WPD

- There are now many constraints across WPD – maps published on our website









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Network constraint mitigation and solutions

- Current
  - Queue management capacity recovery
  - Alternative connection offers (including intertrips and reactive power requirements)
  - Active Network Management
  - Distribution/transmission interface
  - Future forecasting
- Currently available but commercial/regulatory constraints
  - Strategic investment
- Future or being trialled/developed
  - Consortia/grid collaboration
  - Other smart solutions e.g. Demand side response (sunshine tariff or commercial demand turn up)
  - New demand e.g. electric vehicles and heating loads
  - Energy storage solutions
  - DSO – ANM rapidly evolving into this

Queue management - form of offers made

- HV Connection offers are made containing the following milestones:
  - Planning consent shall have been granted within 6 months of the date of acceptance
  - Connection Works are commenced within 12 months of the date of acceptance (unless due an act or omission by WPD); and
  - Connection Works are completed within 18 months of the date of acceptance (unless due to an act or omission by WPD)

  For EHV Connection Offers these are all 6 months longer

- Enforcement of these is balanced against customer service requirements and hence where there is evidence that delays are outside the customer's control they are considered on a case by case basis

Queue management - recovering committed capacity

- DG Developers are required to demonstrate that their scheme is progressing
- Where evidence of progression is not provided to our reasonable satisfaction we will terminate the Offer
- Relinquished capacity will be made available to other applicants in strict order
- When a DG developer does not install their full offered capacity, the unutilised capacity will be recovered unless it can be demonstrated that the capacity will be utilised within 18 months

Alternative connections available

TIMED

- **Generation curtailed within specific times**
- Sub 1MVA
- Modelled seasonal capacity variations
- Localised control only
- No comms
- May have for voltage constraint
- Non-optimised

SOFT-INTERTRIP

- **Releases pre-fault capacity with trip facility**
- 11kV and 33kV
- Real-time monitored values
- Small clusters of generation or simple pinch points
- Existing monitoring with localised control

ACTIVE NETWORK MANAGEMENT

- **Fully optimises capacity based on all constraints**
- Management of generation using LIFO principles
- Real-time granular control of output
- Requires new Active Network Management control and monitoring systems

Costs, Complexity & Network Optimisation

Estimating curtailment

- WPD use historic load and generation data, together with the assumed profiles of future generation in the area to estimate the level of curtailment a new alternative application will receive – future impact of storage could be significant
- The curtailment tools can provide a generation developer an indication of the level of constraints a site will experience and the associated risk
- We would expect developers to also undertake their own estimates as part of due diligence before committing to an investment
- Non regularly recurring outages for asset replacement, reinforcement or the connection of other new DG causes significant issues as these are usually during peak output times for PV and difficult to forecast
- The interaction between ‘conventional’ DG connection offers queue and ‘alternative’ DG connection offers queue is becoming complex

Current plan for ANM roll out

- Areas currently accepting alternative connections for generation are listed below:

Timed	Soft-Intertrip	ANM
Entire Network	All non-complex networks	Skegness

GSP Group	Active BSP Group	Quoting from	Building during
Bicker fen	Skegness	Active	Active
Grendon	Corby Northampton	Active April 2016	April 2015 April 2017
Bridgwater	Bridgwater Street	Active	November 2015 November 2015
West Burton	Horncastle	April 2015	April 2016
Indian Queens	Truro	November 2015	November 2016
Swansea North	Swansea Pembroke	November 2016 November 2016	November 2017 November 2017

Grid related issues

- Issues with Statement of Works process
  - single large scale power station
  - national group review underway

- WPD are moving to an individual Statement of Works process for sites more than 1MW

- Grid constraint issues in South West are requiring various interventions
  - DG power factor ‘range’ and ‘leading’
  - emergency disconnection facility
  - intertrip and/or constrain off for outages
  - NGET investment (4 GSPs & Hinkley to Melksham circuits)

Progress with National Grid

- WPD is working with NGET on a range of options to ensure the Transmission and Distribution Systems operate within their design parameters:
  - trialling the reduction of the 132kV network voltage to reduce Transmission System impact
  - reviewing the use of, and need for, existing reactive compensation equipment
  - assessing the potential for reactive compensation through transformer tap operation
  - assessing the potential for further reactive compensation equipment
  - assessing further compensation that embedded generation can provide to the system

Strategic investment – full study for South West drivers of the need for this project

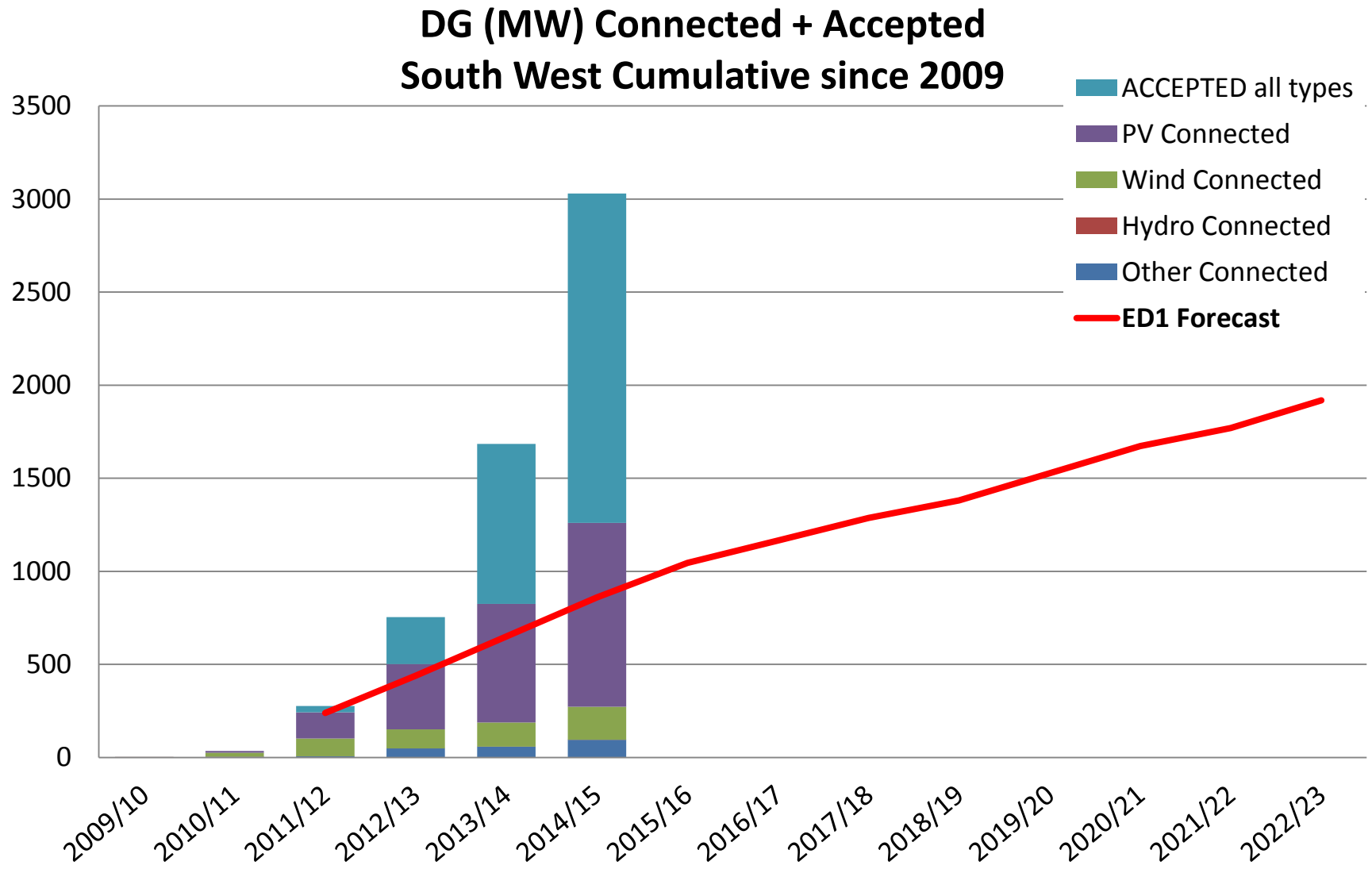
- Significant and rapid growth in distributed generation leading to long delays and high costs for further connections
- Uncertainty in future path of both the growth in DG and demand usage
- Ofgem consultation on ‘quicker and more efficient connections’ raises questions on the role of strategic reinforcement funded by the wider customer base

> *“Earlier this year, Ofgem through its Quicker and Efficient Connections consultation, set out options for enabling more anticipatory investment, which could help speed up connection times by creating capacity earlier and sought views on other ways of improving the connection process.”*
>
> Amber Rudd to ECC Select Committee September 2015

Strategic investment – full study for South West drivers of the need for this project

- Need to understand whether there are ‘no/low regret’ investment options
- Given the last IPCC report and rapidly approaching Paris Conference where the objective is a new climate change agreement, there is an element of when rather than if there will be further growth in renewable DG

WPD – South West experience



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Aim of study

- Assessing the potential growth in DG by type, general location and year against potential demand changes
- Identifying thermal, voltage and fault level constraints that result
- Assessing options for reinforcement
- Providing recommendations for ‘low regret’ investment and identifying the cost and timescale of these
- Use this to understand the economic potential for demand side response and/or generation constraint to avoid reinforcement

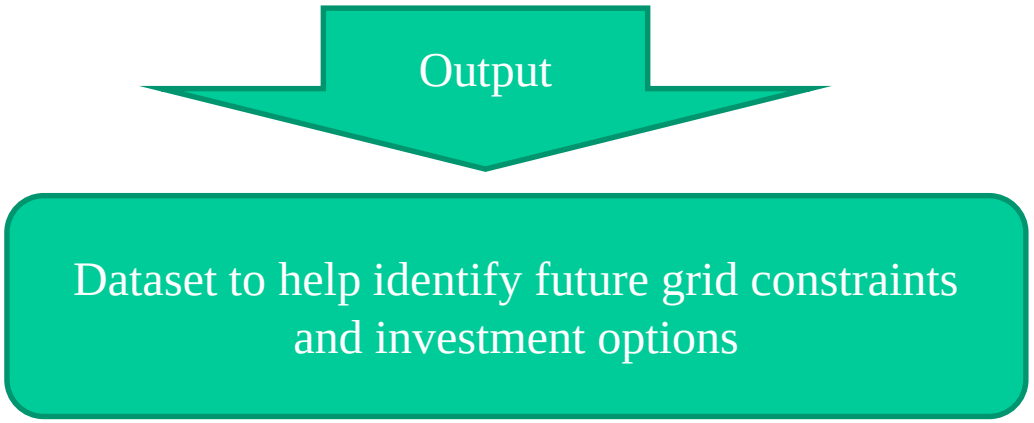
- RegenSW are assisting us with the scenario development

Methodology to assess future DG and demand growth scenarios

WPD has asked Regen SW to develop a methodology to assess and evidence future distributed generation and demand growth scenarios over the longer term

This would provide a scenario-based analysis of:

- Annual growth projections over the period 2015 - 2030
- By technology type/group
- Mapped to 132kV/33kV Bulk Supply Point “areas”
- Tool/model to enable sensitivity analysis and progress tracking



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Assessment Methodology Overview – 3 stage approach: Current, Near Term and Long

Stage 1
Current baseline

Current data
Use and validate existing DG capacity and demand data to set baseline

Analysis by:
1) Technology type
2) BSP Areas
3) GIS mapping
4) Historic growth trend

Stage 2
Pipeline Projection
Near term (to 2020)

Pipeline Projection
DG projects w/connection agreement and in planning system
Growth estimate for small scale FIT and new projects
Demand projection

Constraints/ factors:
1) Grid constraints
2) Policy - RO/CFD/FIT Cap and subsidy
3) Planning system
4) Technology (TRL)

Stage 3
Growth scenarios
Longer term (to 2030)

Long Term Energy Potential
- Resource Assessment
- Viable resource
- Geographic/Spatial Constraints
- Demographics
- New technology potential

Apply Future Energy Growth Scenarios factors:
1) Gone Green
2) Low Carbon Life
3) Low Progression
4) No Progression

Timetable

- Initial stakeholder workshop to get stakeholder input to approach and scenarios to be considered – September 2015
- Develop detailed demand and generation scenarios – October/November 2015
- Undertake network studies and identify solutions with costs – November 2015 to January 2016
- Sensitivity work – i.e. how much ‘headroom’ do the potential solutions give – February 2016
- Assess potential for demand response/generation constraint – March 2016
- Complete and publish report – April 2016
- Dissemination event – late April 2016

Conclusions

- Growth in DG has greatly exceeded expectations
- Significant uncertainty over future growth in both DG and demand
- Low/no investment options help, but do not create significant capacity
- Strategic reinforcement essential part of mix
- Proposing trial on funding initial reinforcement and recovering this from connection customers
- Transmission system has significant issues at present and the interface between DNOs and NGET needs further development
- Need for a DSO role is likely to emerge more quickly than has been expected to date (i.e. before an ED2 settlement) and there is no regulatory framework to support this
- Our strategic investment study should help identify low regret investment options that can be considered by DECC/Ofgem

Workshop 1 – Discussion questions

1. What has your experience of applying for a connection with WPD been like?

2. Do you think that WPD have correctly identified the key emerging issues?

3. How rigidly should the rules be enforced and when is it appropriate to terminate an offer?

4. What has been your experience of the SoW process?

5. Do you have any comments on WPD's approach to future forecasting?

COFFEE BREAK

Please remember to sign up for afternoon surgeries

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Our connections improvement plan in detail

Alison Sleightholm

Regulation & Government Affairs Manager

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What is the ICE Incentive ?

Incentive on Connections Engagement	
Builds on DG approach	Trial – 2014 Incentive - 2015

‘Looking Forward’ Report
Engagement, work plan & key performance outputs for the forthcoming year

‘Looking Back’ Report
Performance against ‘Looking Forward’ plan that the DNO set itself

What have we delivered for DG customers so far ?

As part of the trial run we delivered over 50 actions to improve connections performance including;

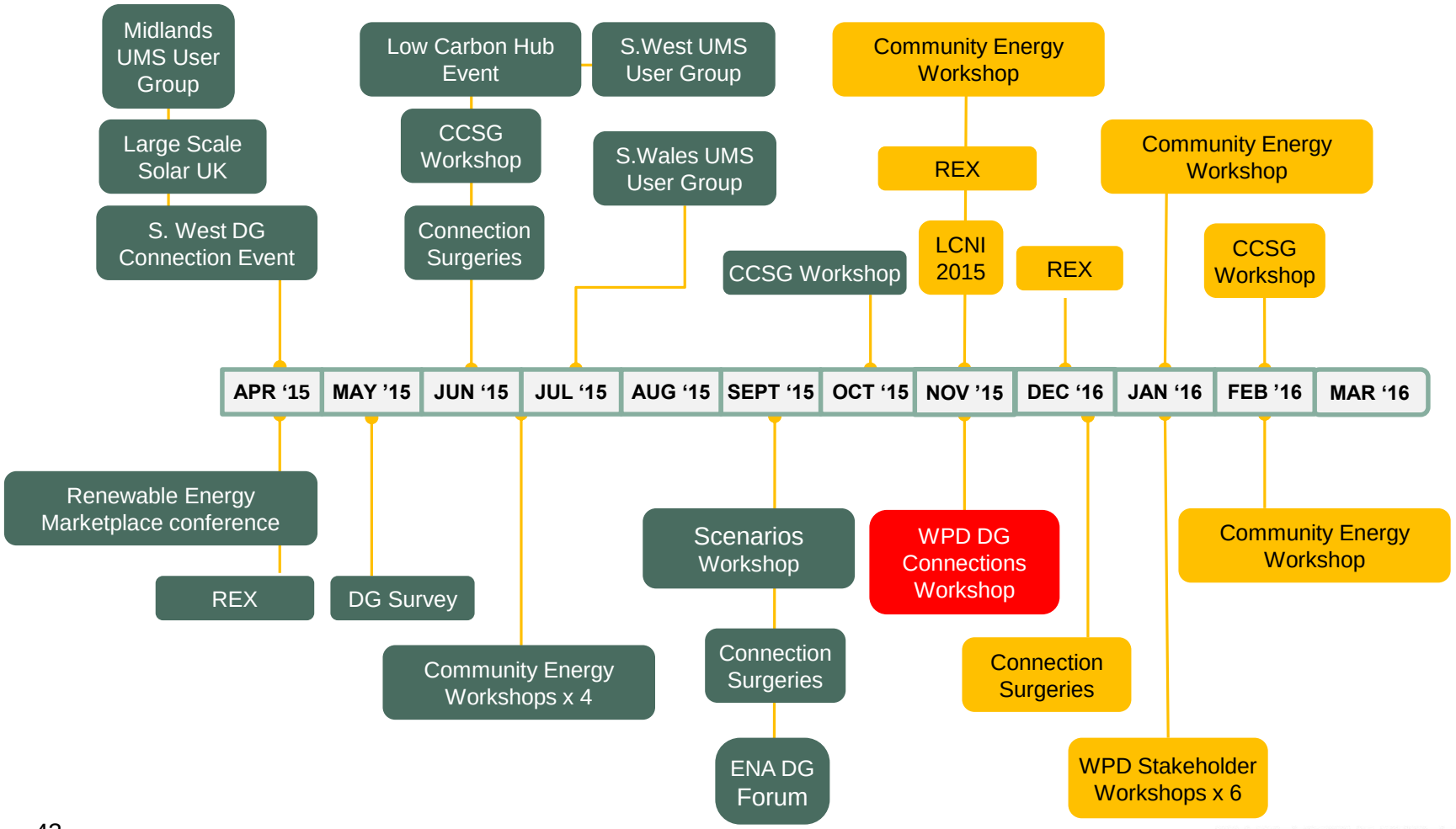
- Improved the availability of network information including capacity maps/registers and asset information
- Rolled out alternative connection offers across WPD
- Consulted on the process for interactivity, acceptance validity, and reservation of capacity
- Improved the process of legal and consents
- Implemented the Code of Practice in Competition in full

What does our current plan look like ?

- Covers 6 key areas
  - Communication and engagement
  - Availability of information and online services
  - Service provided post connection offer acceptance
  - Extension of contestability
  - Offers and agreements
  - Innovation

Communication and Engagement

- The timetable below shows the various engagement events we have undertaken and have planned into next year:



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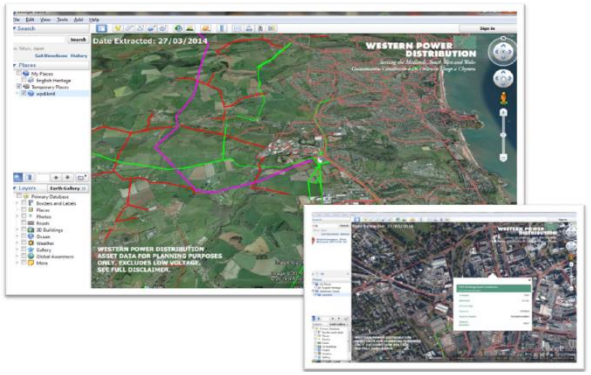
Communication and Engagement

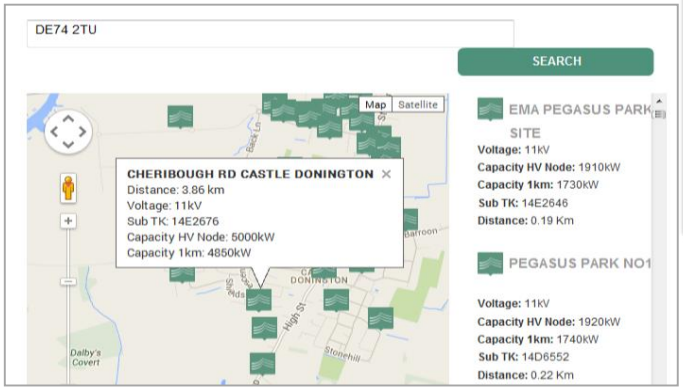
- We have a range of methods for engaging with DG customers
  - Survey
  - Connection surgeries
  - National and WPD DG fora
  - Specific initiatives for community energy groups

- Feedback is supportive of our approach with a challenge that we incorporate more innovation and future networks into the plan

Availability of information

- Our current plan includes
  - Network mapping and capacity information
  - A technical information website for ICPs
  - An online register for ICPs active in our area





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Availability of information

- Feedback from stakeholders indicated:
  - Update constraint maps and capacity registers regularly and provide information on changes
  - Community Energy groups have requested more commonality / a best practice review of heat maps

- We have also been asked to provide better links from the plan to different stakeholder groups ,“where to find out more” and more specific KPIs

Connections delivery

- Our current plan includes initiatives to improve the service post acceptance
  - including staff training to ensure a consistent approach
  - better communication with customers post acceptance

- Feedback indicates that there is more to do in this area and that we should focus particularly on the legals and consents process

Extension of contestability

- A new licence condition (SLC52) on Competition in Connections came into effect on 30th October
- This requires WPD facilitate competition in the connections market by:
  - Removing barriers to entry
  - Operating to an Ofgem-approved Code of Practice (CoP) setting out a common set of rules to enable competitors to access the market
- Ofgem has conditionally approved a joint DNO Code of Practice, with further development of processes, governance and reporting required by 15th January 2016
- WPD implemented our individual actions at the end of September 2015
- Further work at national level via the Code of Practice Panel

Offers and agreements

For a typical DG connection the following agreements are required:

- Formal Offer – the contract between you and us to pay for the specified connection
- Connection Agreement – the enduring agreement for the connection once energised
- Adoption Agreement – where the connection works are carried out by an independent connection provider - this is the agreement for WPD to adopt the assets constructed
- Agreements associated with acquiring land rights

- Feedback tells us that management of accepted offers and the queue is the priority issue

Innovation

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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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Innovation

- We have a substantial number of innovation projects
- Feedback tells us that we should be better at incorporating actions from innovation initiatives into our plan

Workshop 2 – Discussion questions

Do you have any comments on the actions for the following sections of the ICE workplan ?

1. Communication and engagement
2. Availability of information and online services
3. Service provided post connection offer acceptance
4. Extension of contestability
5. Offers and agreements
6. Innovation

Workshop 3 – this afternoon

A choice of four sessions:

Table 1: Statement of Works

Table 2: Alternative Connections

Table 3: Consents and Legals

Table 4: Competition in Connection

Table 5: Consortium Connection Schemes

Information for Stakeholders

Thank you for attending

- Slides and feedback will be posted on the website www.westernpower.co.uk

- We would appreciate feedback on any of the areas discussed today. Please contact:

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