



# The Low Carbon Transition & the Challenge for Distribution Grids

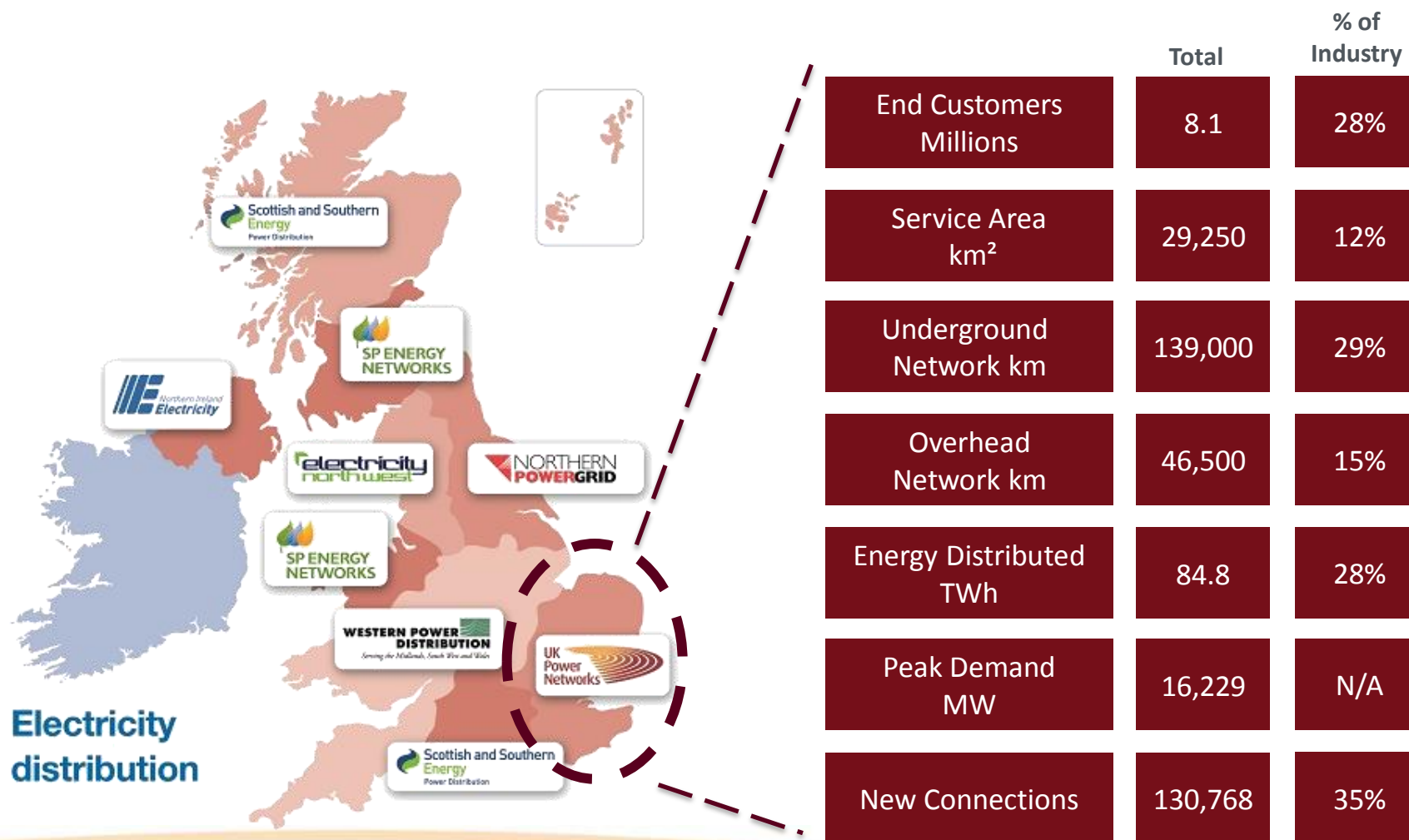
19 September 2013



**UTILITY OF  
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# UK Power Networks – an introduction



One of the largest electricity distributors in the UK

# How electricity distribution is financed

## OUR COSTS

### Opex

- Faults
- Trees
- I&M

### Capex

- Condition
- Load
- Non-operational

### Indirects

- Office based costs

## OUR REVENUES

**Return on RAV** (slow money):  
over 20 – 45 years and covers  
interest and dividends

**Depreciation** (slow money):  
over 20 – 45 years

**Fast Money** (recovered in year)

**Pensions**

**Tax**

**Incentives and Penalties**

## Allowed Revenue

Difference between  
spend and  
depreciation is  
capitalised in the  
regulated asset  
value

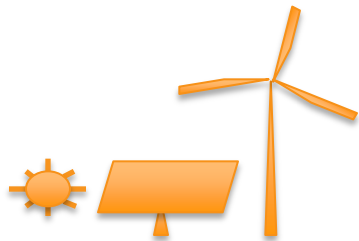
Stable regulation allows us to borrow cheaply and for the long term

# Our cost of capital has fallen

## UK 10 year Bond Yields<sup>1</sup> vs. Vanilla WACC



# Low carbon transition challenges



Variable and decentralised low carbon electricity generation



Electrification of heat and transport



Transition to smart grids

## CHALLENGES

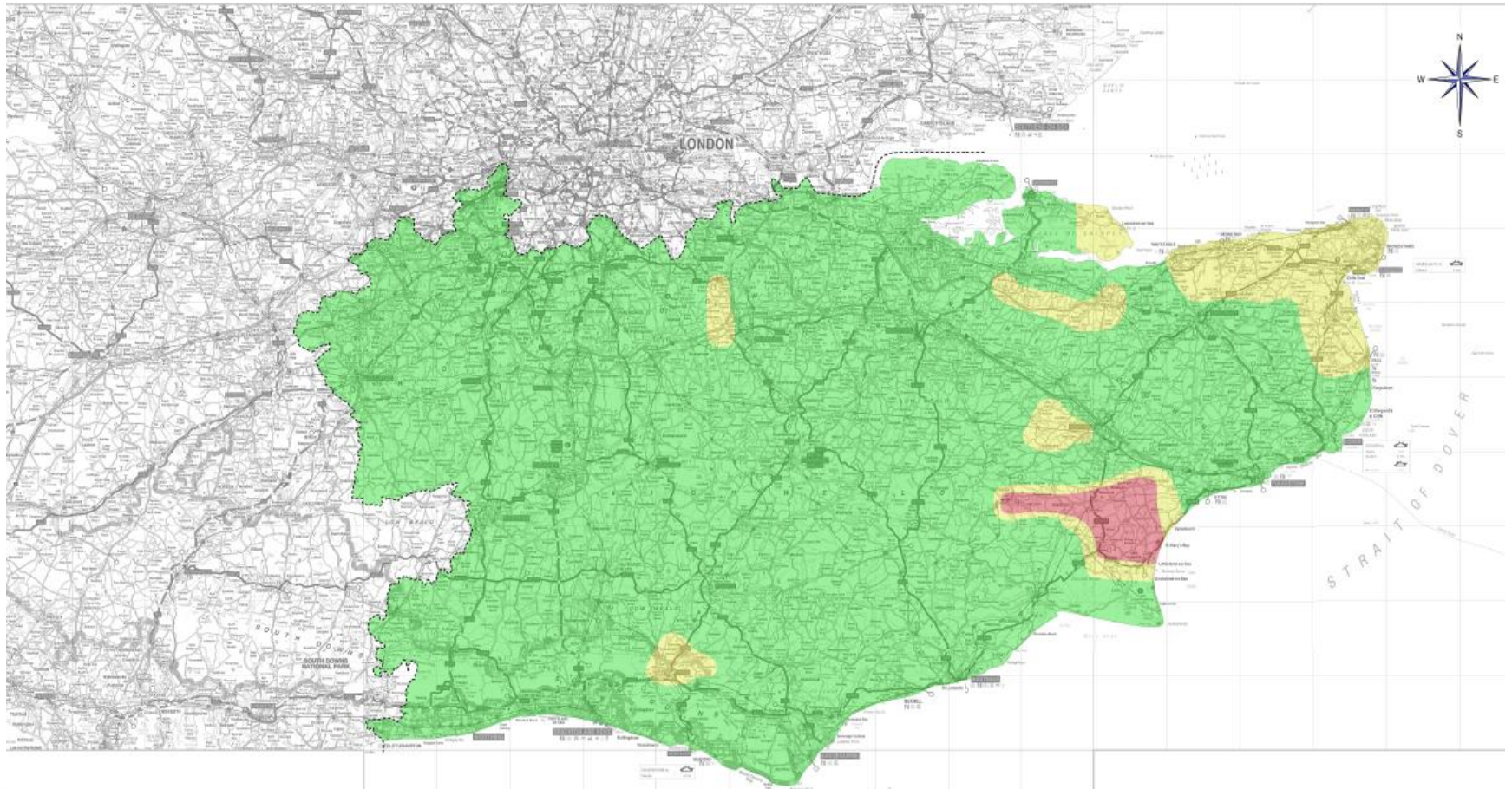
- ❖ Challenges for real-time system balancing and frequency control
- ❖ Reverse power flow, voltage and fault level issues on distribution networks
- ❖ Potential for low carbon technologies to increase peak demand disproportionately
- ❖ Increased network reinforcement required
- ❖ New skills required, new risks faced

## POTENTIAL

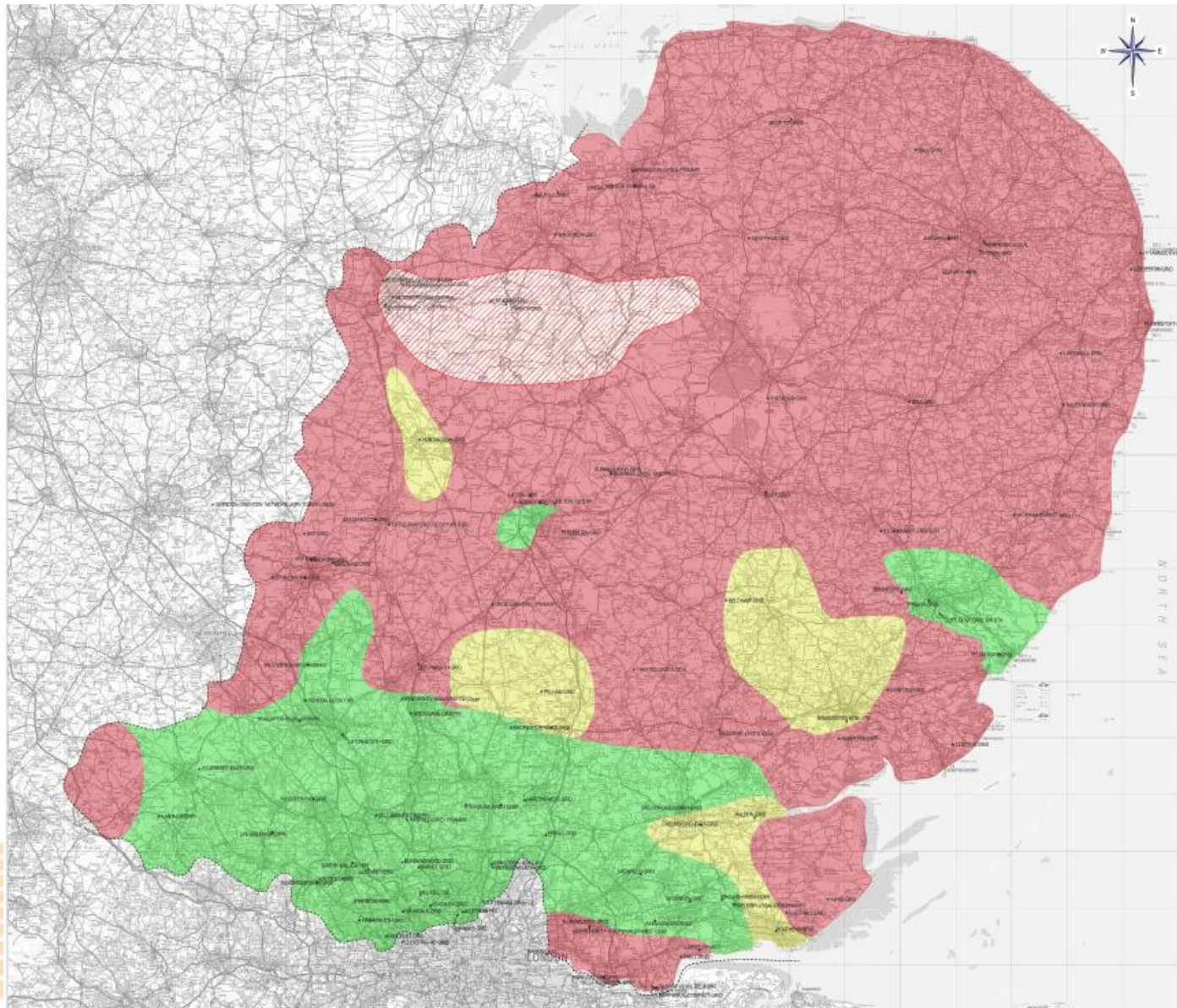
- ✓ Greater network visibility and control
- ✓ Better asset utilisation
- ✓ Improved reliability from remote control and automation
- ✓ Potential for Time of Use price signals (through smart meters) to engage customers
- ✓ Potential for external control over distributed generation, low carbon appliances, and demand



# DG heat map – South East

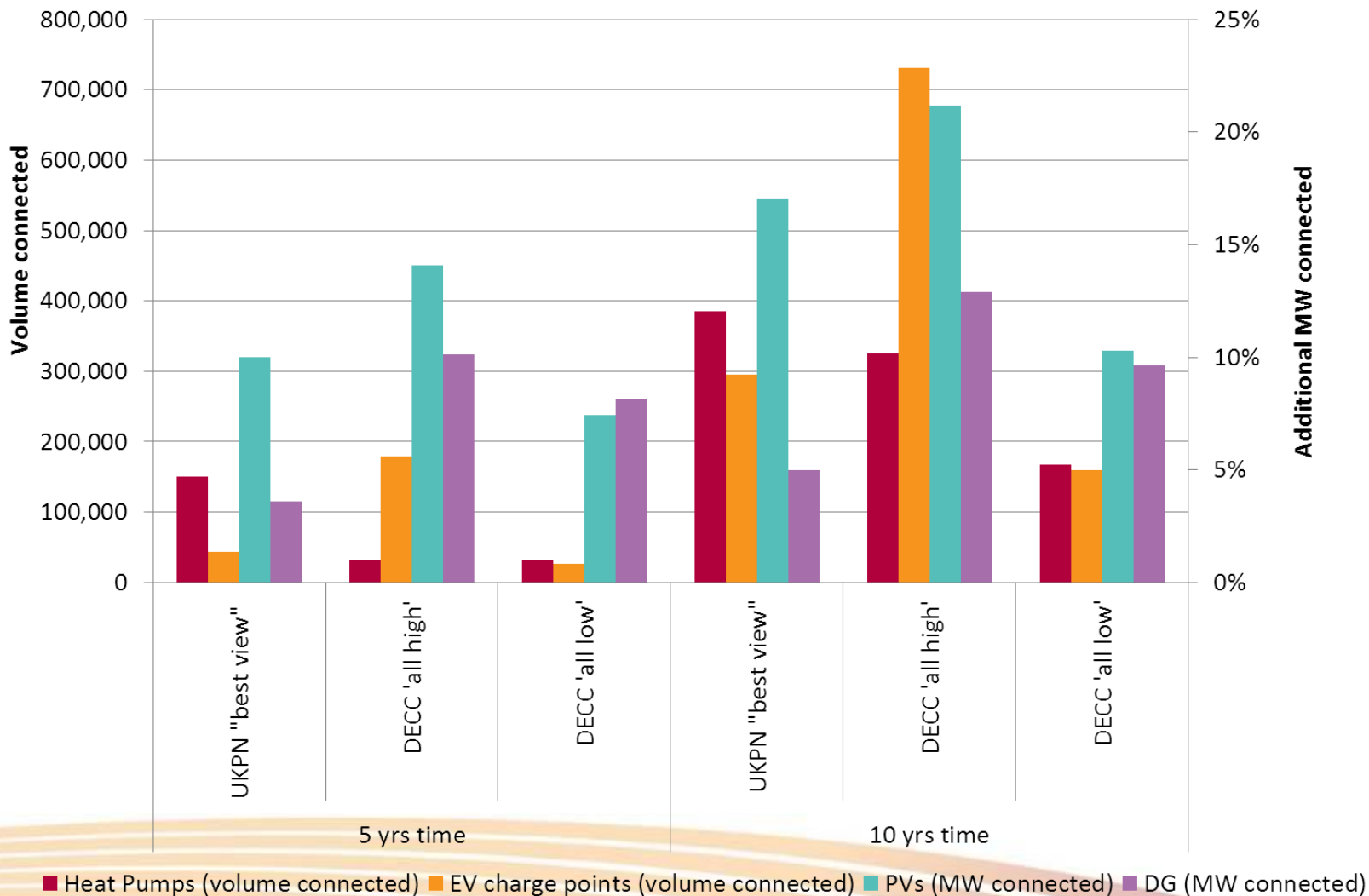


# DG heat map – East





# DECC forecasts for low carbon technologies





# Our business plan deals effectively with uncertainty

- Developed UKPN specific low carbon technology penetration scenarios with Element Energy
- Developed with Imperial College industry leading load forecasting model to better predict the impact of these scenarios
- Worked with Smart Grid Forum Workstream 3 to produce industry forecasting model
- Our business plan contains £135m of smart solutions savings to mitigate this uncertainty
  - £16m of smart metering savings
- Decarbonisation of the economy has a manageable impact in ED1 in all scenarios
  - ED2 may present more of a challenge

Smart Grid solution (£m)	UKPN
Benefit from existing Smart Grid network designs and practices	30
Savings in LV reinforcement compared to forecast volumes	34
Saving from Demand Side Response schemes	38
Savings in overhead line reinforcements	9
Savings from Dynamic Transformer ratings	15
Savings from Partial Discharge monitoring of switchgear	9
<b>Total Smart Grid savings</b>	<b>135</b>

Smart metering benefit (£m)	UKPN
Improved investment planning	1
Reduced customer visits due to accurate energisation status	11
Improved fault information and customer service	4
<b>Total Smart Metering savings</b>	<b>16</b>

# Innovation helps us keep costs down

“The most reliable, most innovative, lowest price network group”

Rank(*)	Group	Average customer minutes lost		Average revenues per domestic customer		Innovation funding
		CML 2012	CML 2023	£ p.a. 2012	£ p.a. 2023	£ million
1	UKPN	40.5	33	82	84	44
2	WPD	41.7	38	105	102	39
3	SP	46.0	39	111	101	11
4	ENW	47.6	38	108	81	16
5	NPG	66.5	49	92	85	27
6	SSE	68.7	55	124	123	27

## Delivering for customers in DPCR5 and ED1

\* By CMLs in 11/12. UKPN ranks first in all columns except price in 22/23 (2<sup>nd</sup> to ENW)

# Non-recourse financing of smart meters: challenges

- Smart meters in the UK are a new asset class, requiring lender education
- New technical specifications that have not been manufactured or trialled at scale
- Technical interoperability between communications hub, in home display (IHD), smart appliances and smart gas / electricity meters
- Commercial interoperability with new industry roles and processes that have not been tested e.g. customer churn, fault allocation
- Risk of meters being removed early due to commercial reasons e.g. gaining energy supplier may have a more commercially advantageous contract with another meter asset provider (MAP)
- Technology / specification obsolescence (10 years is a long time in technology and communications)
- Asset failure / asset life is an unknown quantity
- Construction risk associated with a new installation workforce

# Conclusion

- The low carbon and smart transitions pose major challenges for distribution networks
- UKPN and the other network groups have detailed plans
- Distribution prices will be broadly flat in real terms
- Regulatory continuity and stability is key to cost and availability of finance





Thank you



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