# The Future Energy Landscape





Bring Energy to Life



#### **David Wright, National Grid**

Director Electricity Transmission & Chief Electricity Engineer September 2018

#### The energy revolution: to date

- Energy is critical to the safety and quality of life of people, and to the economy.
- We should be proud of the transformation we have already enabled

26 coal power station closures since 2010

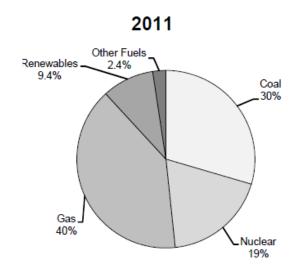
12 days without coal in June 2018

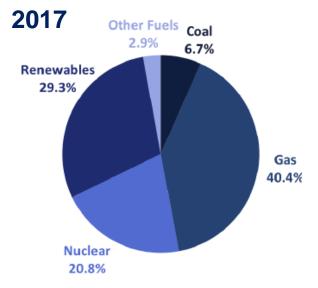
Over 50% energy from low-carbon sources

8 consecutive days with >8GW solar in summer 2018

Operated at Carbon Intensity below 2030 Targets in August

The rate and scale of change has been unprecedented







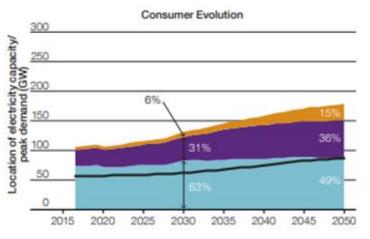
#### The energy revolution: the future

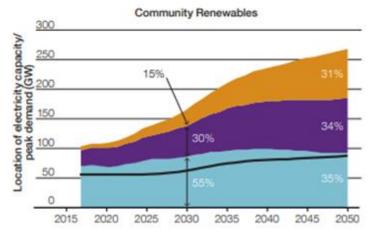
- If we try to predict the future, the only thing we know for certain is we will get it wrong!
- The Future Energy Scenarios produced by NGESO look to set out a range of credible futures.
- Heavily influenced by the trends of:
  - Decarbonisation
  - Decentralisation
  - Digitsation
- Cross-industry impacts are key, for example:
  - Heat decarbonisation
  - Transport

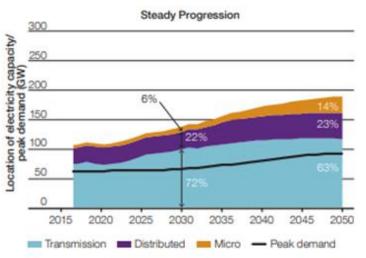
	xx 2050 carbon reduction target is not met		√2050 carbon reduction target is met	
	Consumer Evolution		Community Renewables	
Level of decentralisation	Electricity demand	Moderate-high demand: high for electric vehicles (EVs) and moderate efficiency gains	Electricity demand	Highest demand: high for EVs, high for heating and good efficiency gains
	Transport	Most cars are EVs by 2040; some gas used in commercial vehicles	_	Most cars are EVs by 2033; greatest use of gas in commercial vehicles but superseded from mid 2040s by hydrogen (from electrolysis)
	Heat	Gas boilers dominate; moderate levels of thermal efficiency		
	Electricity	Small scale renewables and gas; small modular reactors		Heat pumps dominate; high levels of thermal efficiency
	Gas	from 2030s Highest shale gas, developing		Highest solar and onshore wind
	supply	strongly from 2020s		Highest green gas development from 2030s
	Steady Progression		Two Degrees	
	Electricity demand	Moderate-high demand: high for EVs and moderate efficiency gains	Electricity demand	Lowest demand: high for EVs, low for heating and good efficiency gains
	Transport	Most cars are EVs by 2040; some gas used in commercial vehicles	Transport	Most cars are EVs by 2033; high level of gas used for commercial vehicles but superseded from
	Heat	Gas boilers dominate; moderate levels of thermal efficiency	Heat	mid 2040s by hydrogen  Hydrogen from steam methane reforming from 2030s, and some district heat; high levels of thermal efficiency
	Electricity supply	supply carbon capture utilisation and storage (CCUS) gas generation from late 2030s		
			Electricity	Offshore wind, nuclear, large scale
	Gas	LIK Continental Shelf still	supply	storage and interconnectors;
	Gas supply	UK Continental Shelf still producing in 2050; some shale gas	Gas	storage and interconnectors; CCUS gas generation from 2030 Some green gas, incl.

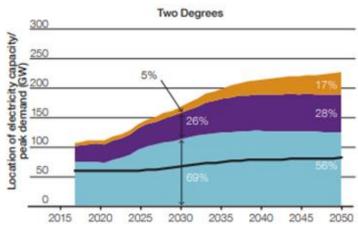
Speed of decarbonisation

#### What does this mean?







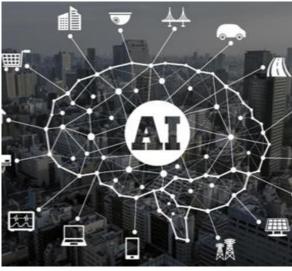


- Increase in capacity from 103GW today to between 189 and 268GW by 2050
- Up to 65% of generation could be local by 2050
- Electricity demand is expected to grow significantly by 2050
- Potentially 36m EVs on the road by 2040

### How do we need to respond?

- Effective collaboration across the industry is more critical now than ever
- Shape the debate
- Deliver critical infrastructure to maintain reliability of energy supply
- Develop agile, efficient and flexible working practices
- Drive innovation and creativity of thinking
- Embrace digital









### We need the right people to be successful...

- Engineering accounts for 20% of UK's Gross Value Added and half our exports
- Remains a shortage of Engineers and a lack of diversity:
  - 94% of the engineering workforce is white
  - 91% are male
- We need to combine knowledge with diversity and creativity of thinking
- The need for data & analytics capabilities will grow:
  - Cyber Security
  - Embrace opportunities for digitisation
  - May need to re-train and upskill
- We all have an obligation to work together to do more

# 1.8 million

new engineers required to be trained by 2025

Annual demand for at least 124,000 engineers and technicians with core engineering skills

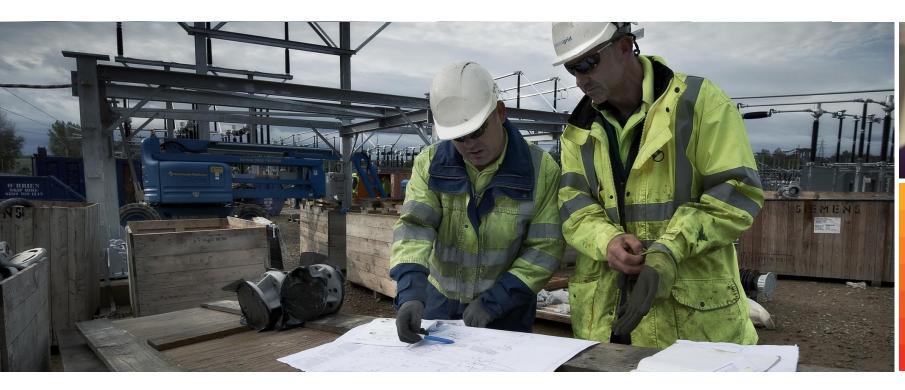
The skills shortage is costing the STEM sector £15bn

### **Summary**

- The energy revolution is already happening, and we should be proud of what we have achieved
- We will continue to see the sector evolve with changes associated with decarbonisation, decentralisation and digitisation
- These changes will impact how energy is supplied, generated, transmitted and consumed
- Energy infrastructure and transmission and distribution level will enable this change
- We need to continue to adapt, ensuring we are proactive and embracing the opportunities
  that change brings
- We need the right people, with the right skills to be successful in the long term we all have
  an obligation to do more and understand what skills we need in the future



## **Thank You**





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