

# Powering Towards 2020

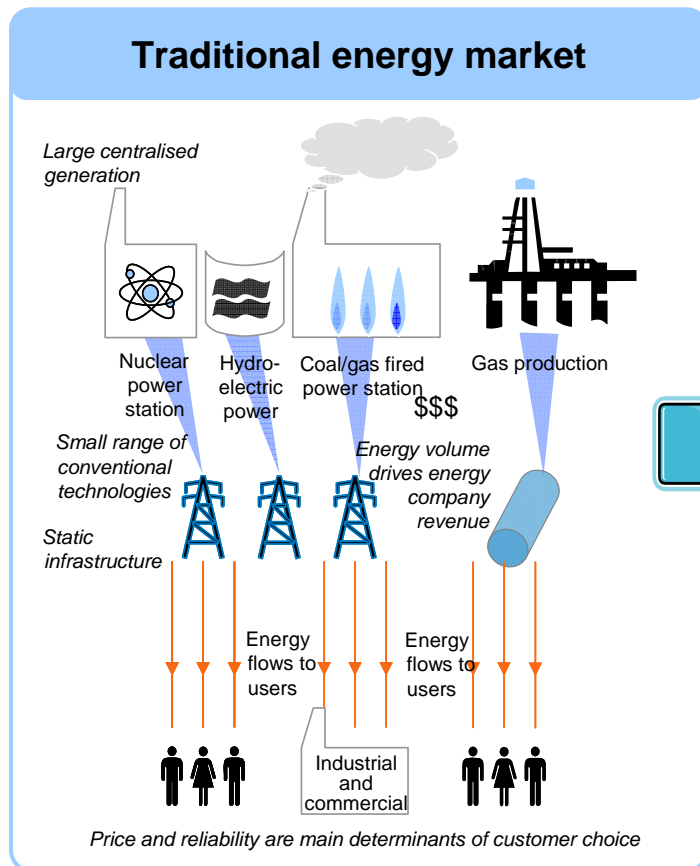
Chris J Murray. Director – UK Transmission  
19<sup>th</sup> November 2009



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# The energy world is changing – utilities playing a critical role in a sustainable future

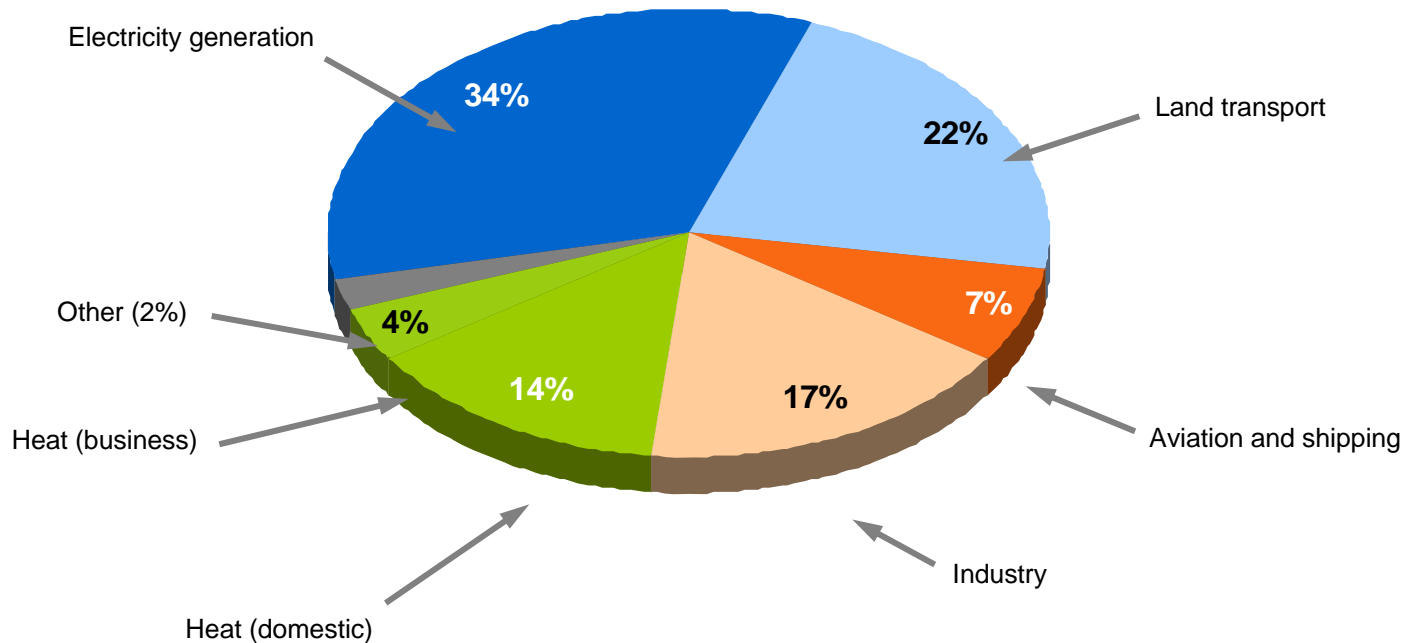


- ### Today's evolving market
- ◆ Distributed generation
  - ◆ Energy efficiency
  - ◆ Infrastructure enhancement
  - ◆ Smart grid
  - ◆ Demand management
  - ◆ Wind sources
  - ◆ Solar sources
  - ◆ Clean technology
  - ◆ Energy storage

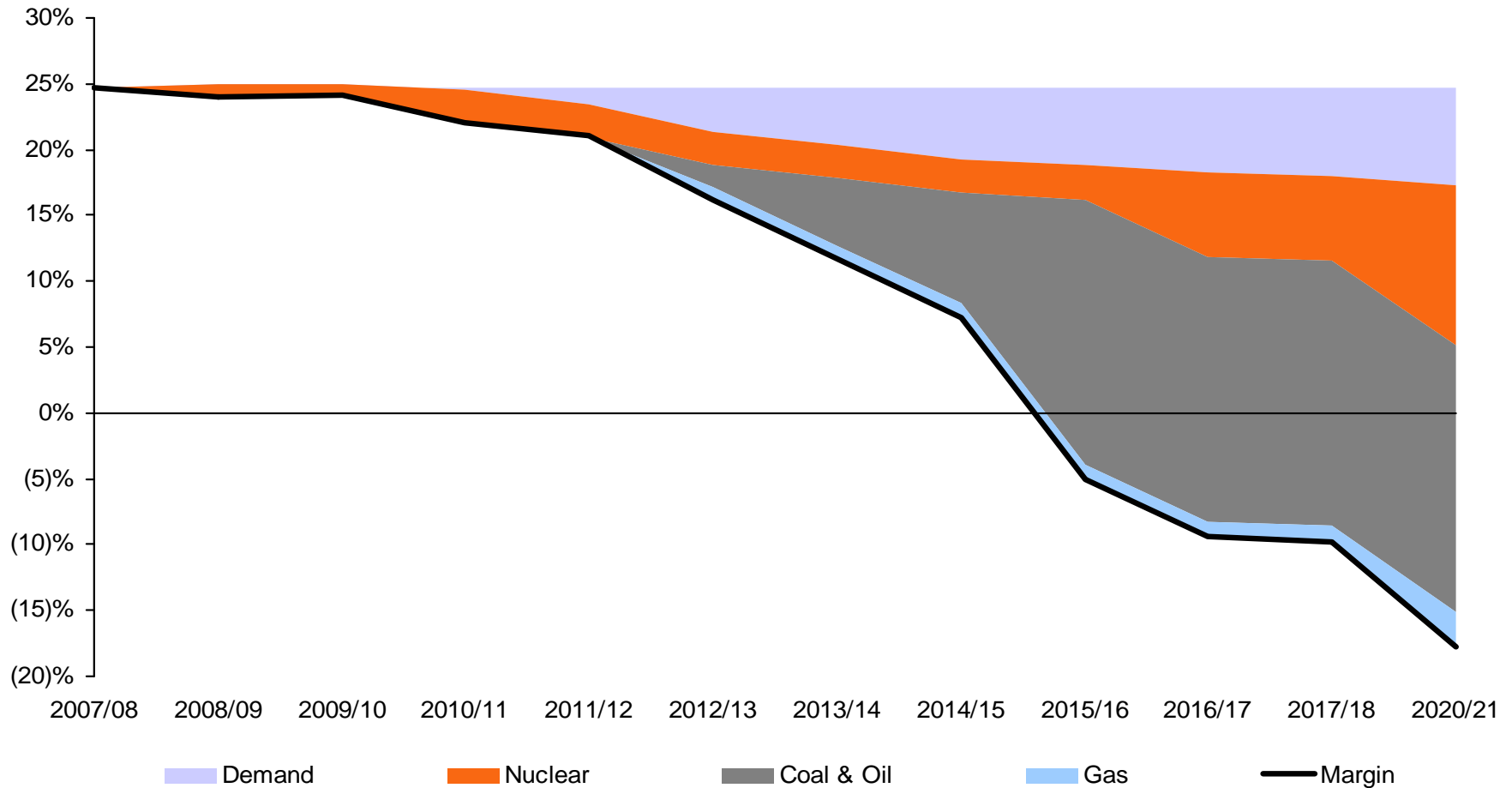
*Our role is being redefined*

# Future developments are driven by climate change

Heat, transport and electricity  
are major current CO2 polluters

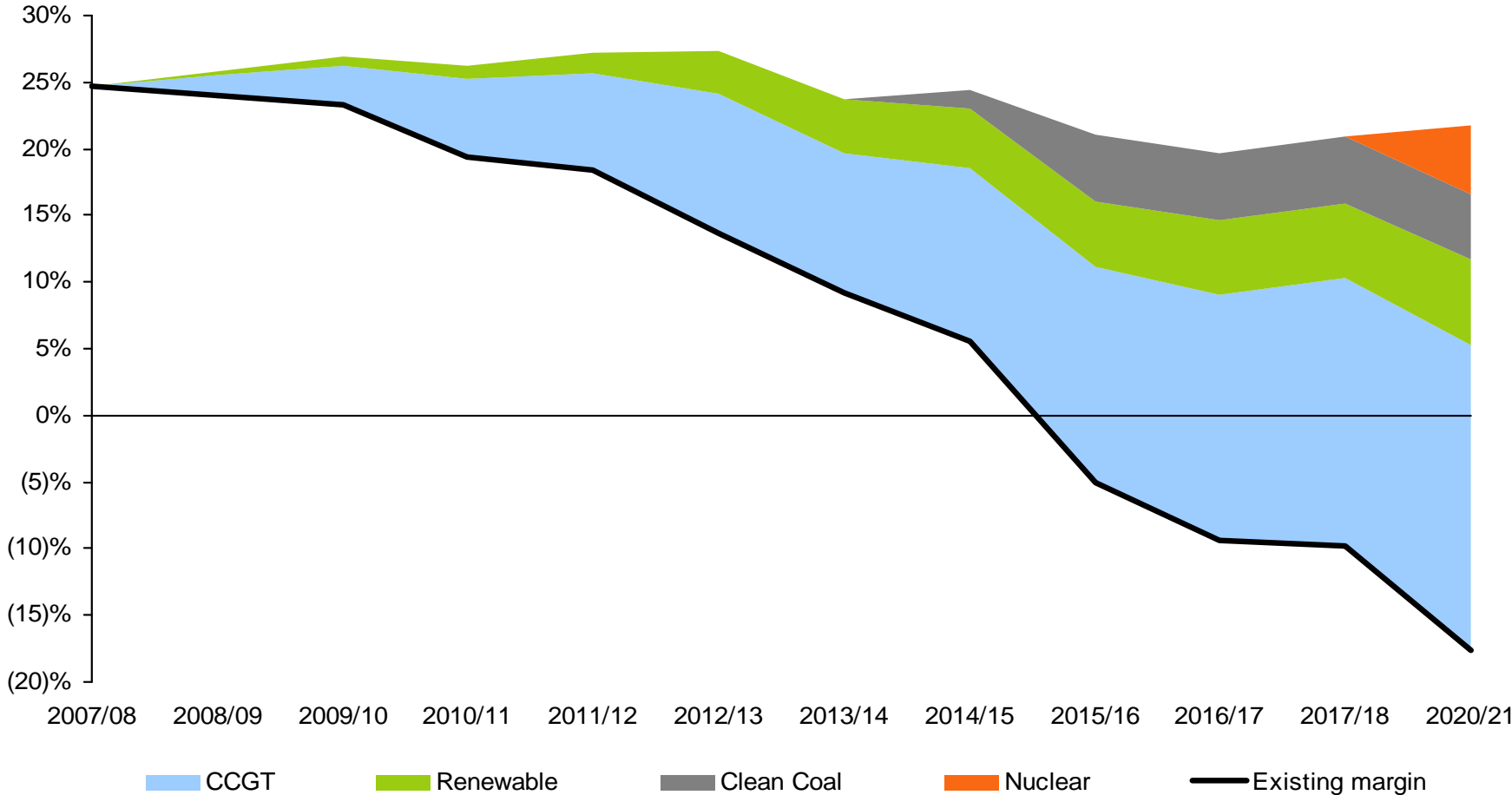


# Impact of UK generation closures on plant margin\*



\* Margin refers to the difference between the total generation capacity and total demand.

# Best view of new UK generation






\* Margin refers to the difference between the total generation capacity and total demand.

# A potential Electricity world.....

## One plausible scenario.....

- ◆ Significant Plant closures
  - ◆ 20 GW LCPD and Nuclear
- ◆ Significant new renewable
  - ◆ 32 GW intermittent wind (21GW offshore & 11GW onshore)
  - ◆ Some tidal, wave, biomass & solar PV
- ◆ Significant new non renewable build
  - ◆ 3GW of new nuclear
  - ◆ 3GW of new supercritical coal (some with CCS)
  - ◆ 11GW of new gas

**Renewable share of electricity generation grows from 5% to 36%**

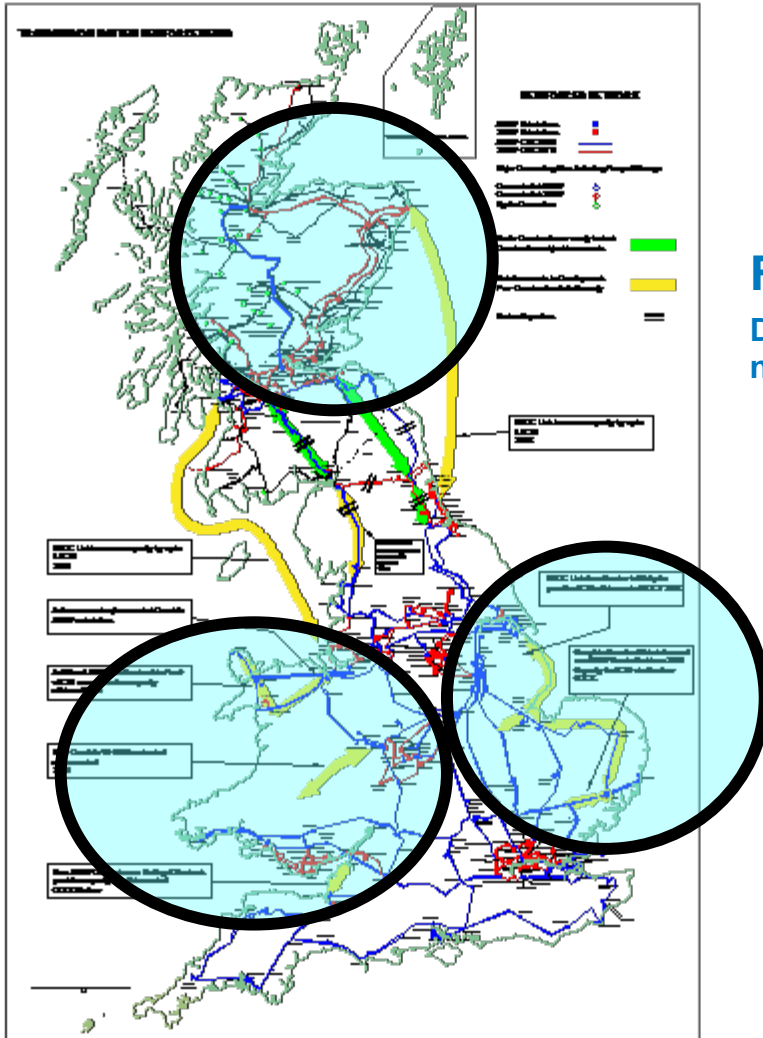
2020 Target Description	Progress
UK Renewable Energy Target 15% of final energy demand	
2050 CO <sub>2</sub> Target on correct 'flight path'	
Scottish Renewables Target	

### Summary

Generation gap caused by closures is filled with wind, augmented by gas & clean coal. Nuclear returns in 2020.  
395MtCO<sub>2</sub> (-33% on 1990)  
Target -29%

**Presents a challenge for the market and Network Owners  
& Operator's to overcome**

# UK Strategic Investment (electricity)



## Focus on Scotland

Driven by onshore renewables

## Focus on East Coast

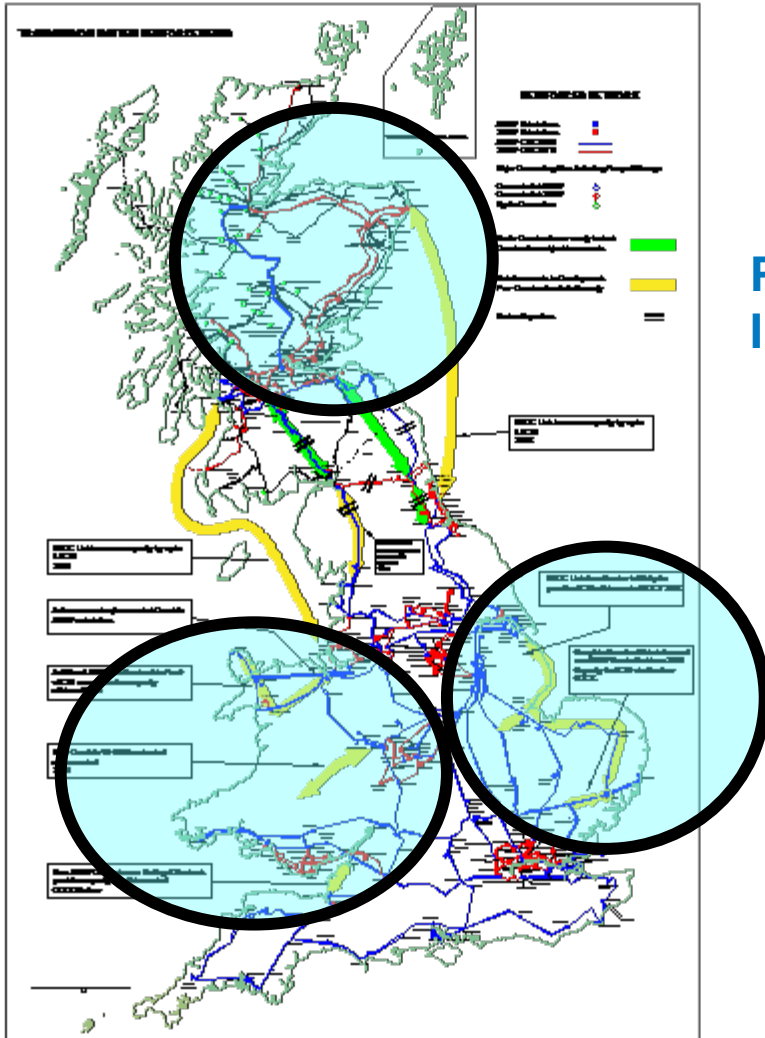
Driven by offshore renewables / nuclear

## Focus on South & West

Driven by nuclear/wind

**£4.7bn onshore investment identified**

# Other Investment (electricity)



**Offshore Networks -  
£15bn?**

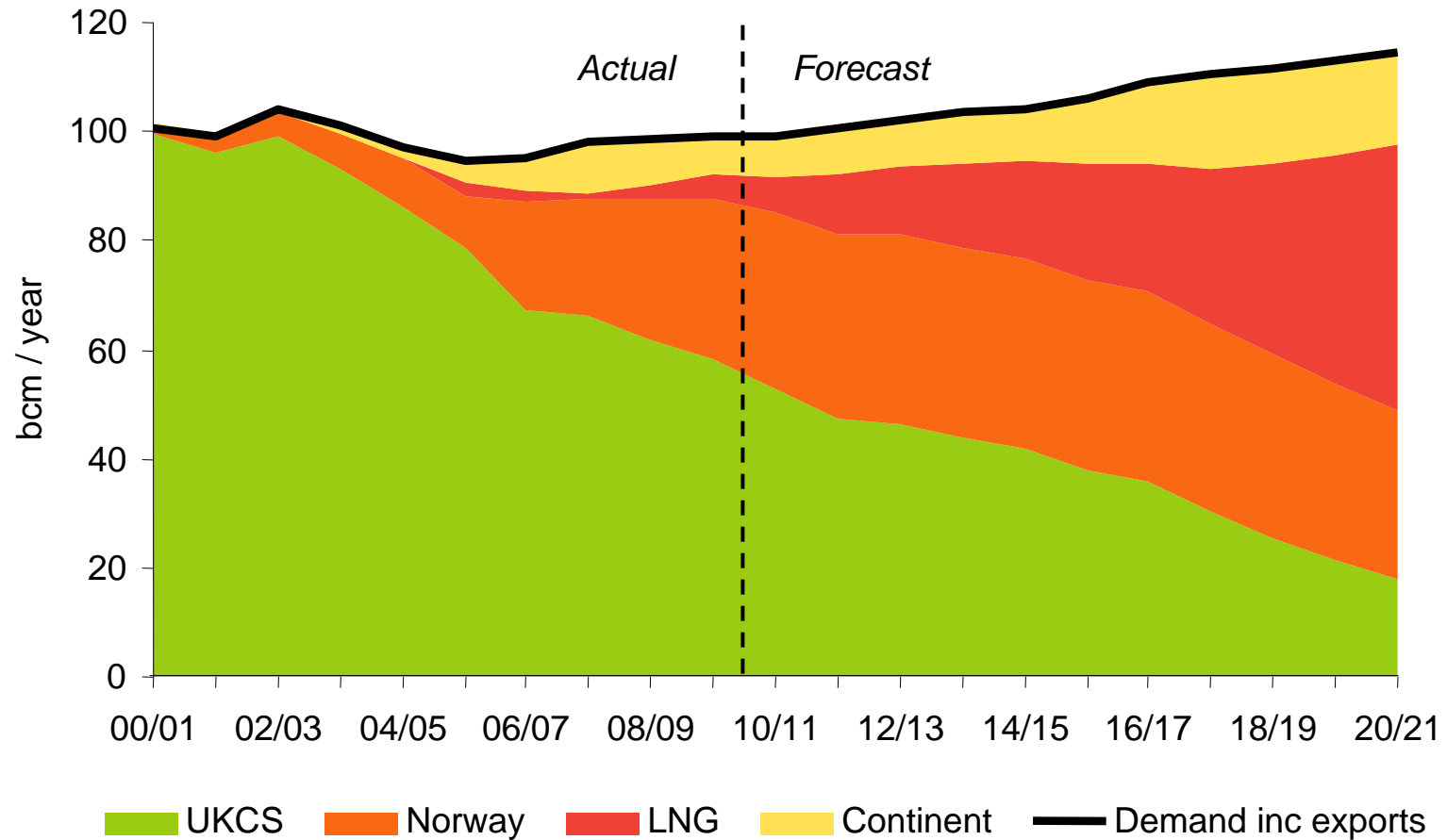
**Potentially 3 new  
Interconnectors - £xbn**

**Asset replacement  
volumes - £xbn**

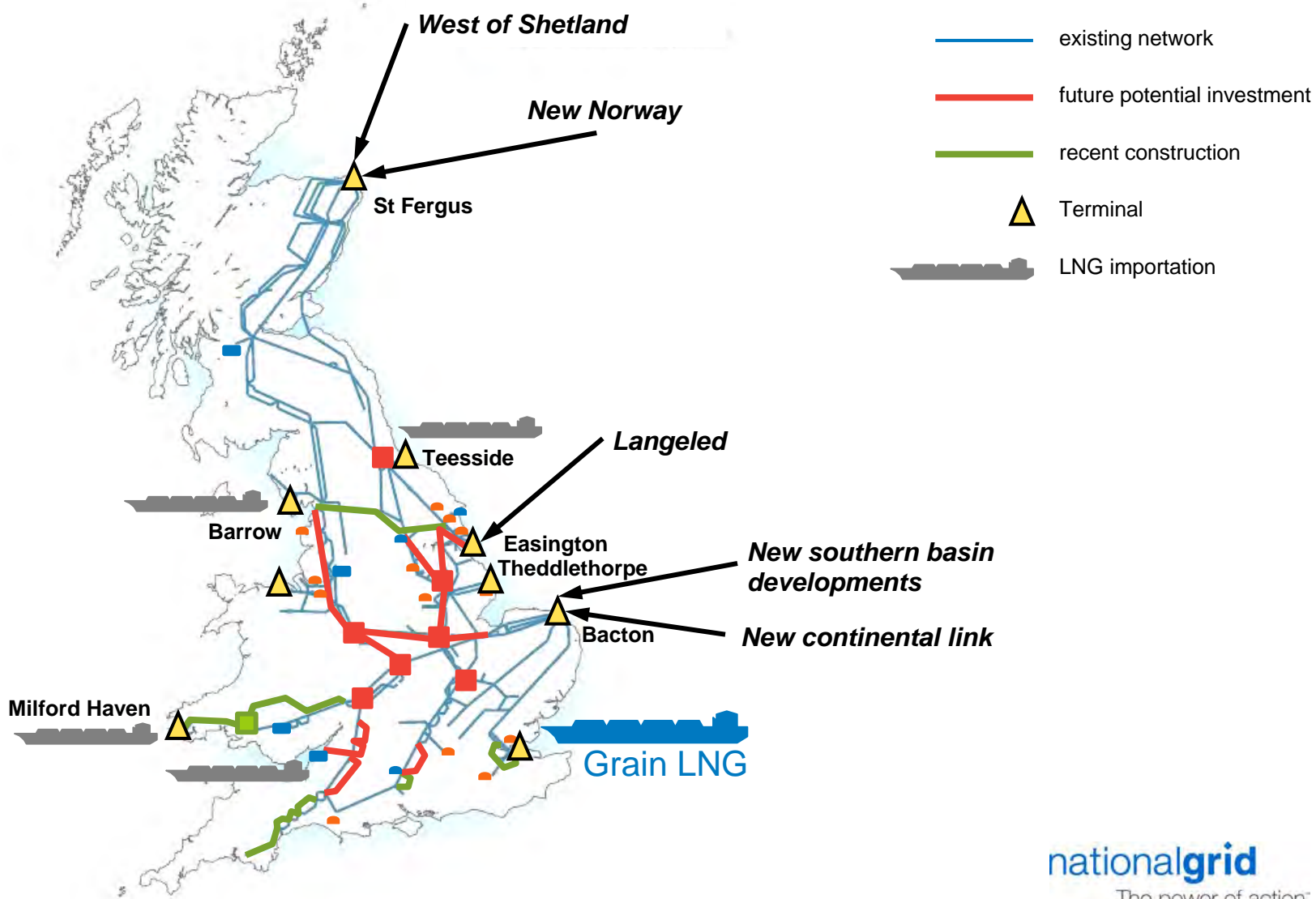
**Offshore supergrids?**

**Smart Grid Investments?**

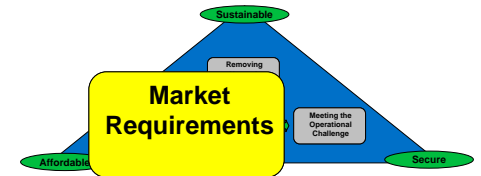
# Where's the UK's gas coming from?



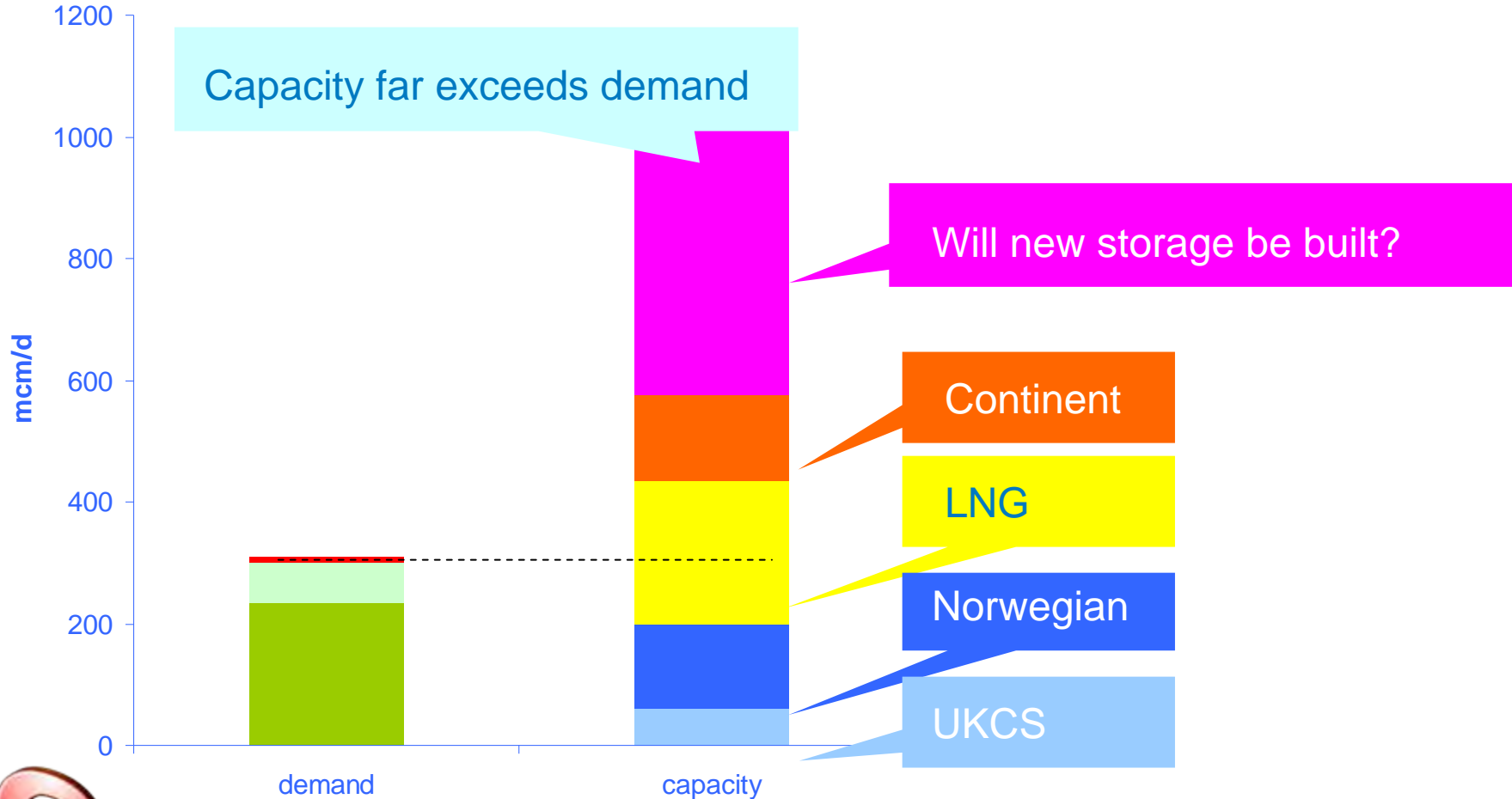
# UK gas transmission load related investment



# Potential Gas World.....



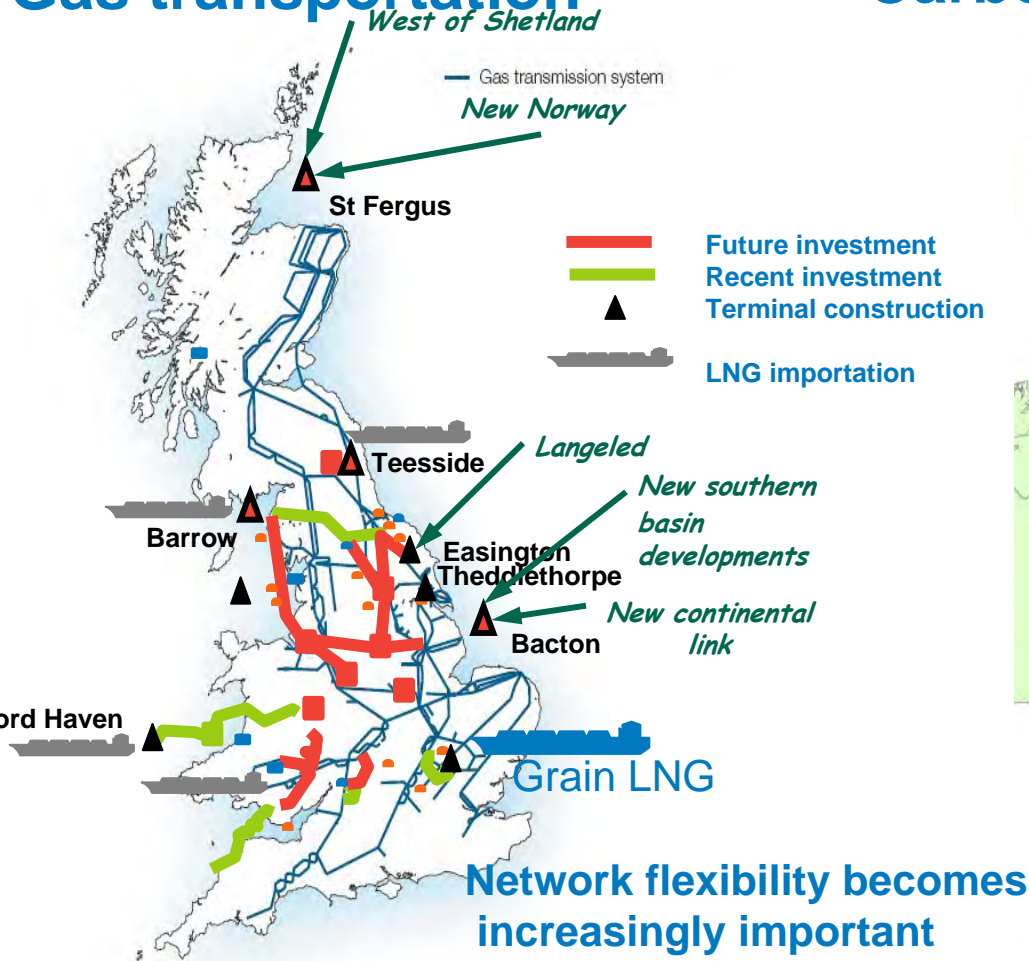
**In 2020 - 80% of gas is imported and over 50% of electricity relies on gas**



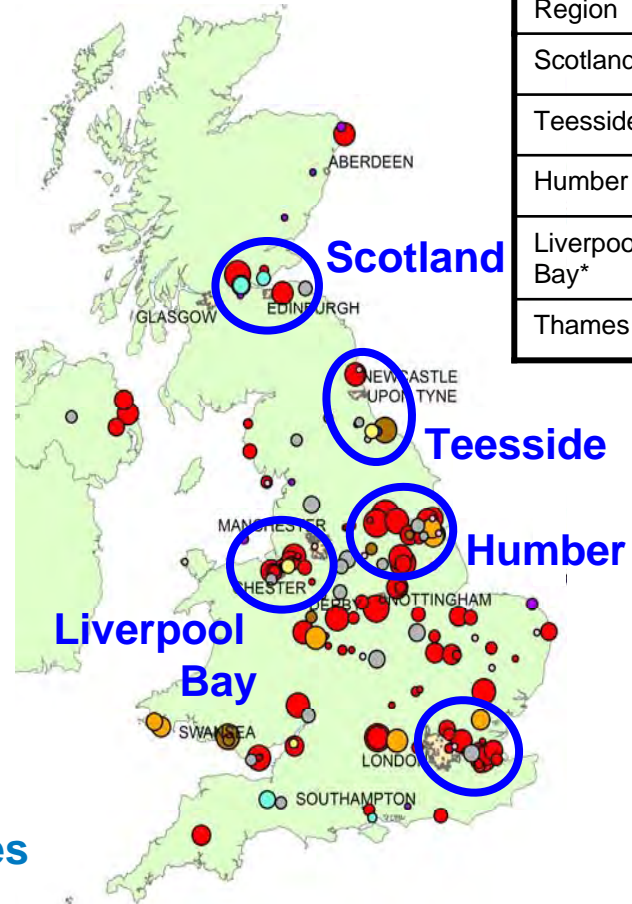
- **How confident are we that the molecules will turn up?**
- **What investment is required for security of supply**

# What does this mean for Gas Transmission?

## Gas transportation



## Carbon Cap Storage



Cluster Region	CO <sub>2</sub> volume
Scotland	18Mt
Teesside	11Mt
Humber	60Mt
Liverpool Bay*	10Mt
Thames	28Mt

**Its not just electricity investment...**

# Balancing the UK networks

## Electricity

### 2009

- ◆ Demand is a given
- ◆ Second by second balancing achieved by flexing generation

### Future

- ◆ Dynamic demand
- ◆ Smart meters
- ◆ Storage
- ◆ Flexing generation

## Gas

### 2009

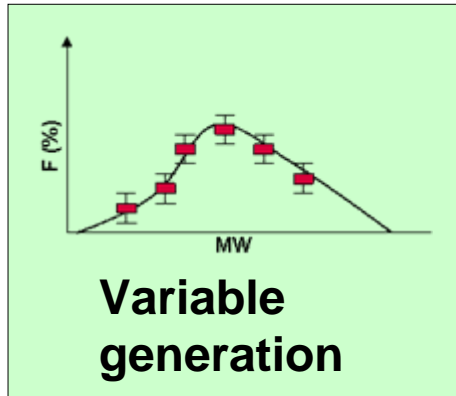
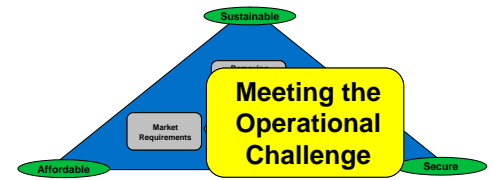
- ◆ Major flows from UKCS & Norway

### Future

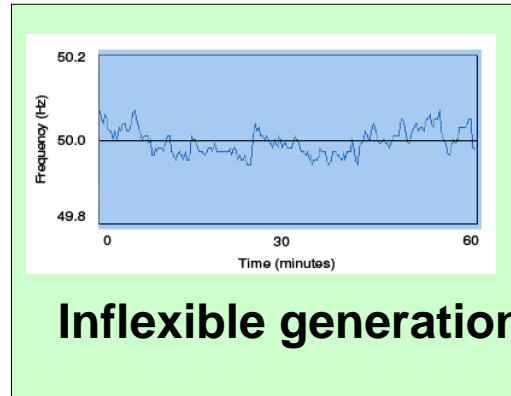
- ◆ Less UKCS
- ◆ Variable flows from Norway, European interconnectors & LNG



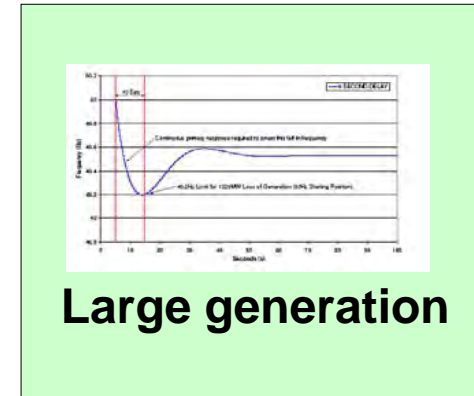
# The decarbonised generation mix poses operational challenges...



What operating reserve to hold in a world of variable renewable generation?



Can the new generation fleet of nuclear, wind and supercritical coal provide the full range of services?






How do we cope with larger plant >1320 MW when it 'falls off' the system?




**How to meet these challenges in the most economic and sustainable way whilst maintaining security?**

# Future challenges

## UK Low Carbon transition Plan

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
<b>Power</b>	<p>Wind onshore and offshore produces over 43GW of power</p> <p>Government publishes a high level vision for a future smart grid</p> <p>Third round of leases for 25GW offshore wind sites awarded</p> <p>Shortlist of possible Severn Tidal schemes published</p> <p>Play as you save pilots start</p>	<p>New planning regime under Infrastructure Planning Commission begins</p> <p>Anticipated first deployment of wave and tidal energy demonstration projects under the Marine Renewables Deployment Fund</p> <p>Reforms to the Renewables Obligation are introduced</p> <p>Government makes a decision on Severn Tidal scheme</p> <p>Government introduces new long-term grid access rules</p>	<p>Lay on electricity suppliers to fund CCS demonstration projects in place</p> <p>Commissioning of Wave Hub energy testing centre in Cornwall and first deployment of wave energy devices</p> <p>Expansion of wave and tidal energy testing sites in Northumbria and Orkney completed</p>		<p>The cap for the EU Emissions Trading System starts to be tightened every year from now</p> <p>The power sector starts paying for every tonne of carbon emitted by purchasing allowances in EU Emissions Trading System auctions</p> <p>Construction of first new nuclear power stations expected to be underway</p>	<p>First UK commercial scale carbon capture and storage demonstration intended to be operational</p> <p>Larger-scale wave and tidal energy generation (&gt;10MW) starts to be deployed</p>	<p>The EU will have selected 12 carbon capture and storage demonstration projects for support across the EU</p> 			<p>Plans show first new nuclear power station operational</p> 			<p>Around 30% of electricity is generated from renewable sources</p> <p>Up to four carbon capture and storage demonstration projects operational in the UK</p>



Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
<b>Homes and communities</b>	<p>Community Energy Saving Programme starts trialling "whole house" treatments in low income areas</p>	<p>About 95% of social housing stock in England meets improved Decent Homes standard</p> <p>Clean energy cash back for electricity starts (Feed in Tariffs)</p> <p>Building Regulations improve energy efficiency by 25% compared to 2006 regulations</p>	<p>Energy wasting traditional light bulbs are no longer sold</p> <p>6 million homes will have been insulated under the Carbon Emissions Reduction Target, Decent Homes, the Community Energy Saving Programme and Warm Front</p> <p>Clean energy cash back for renewable heat starts in April (the Renewable Heat Incentive)</p>	<p>The Community Energy Savings Programme will have helped 90,000 homes to improve their energy efficiency in 100 areas around Great Britain</p>	<p>Building Regulations improve energy efficiency by 44% compared to 2006 regulations</p> 		<p>All lofts and cavity walls in Great Britain insulated where practical</p> <p>400,000 homes will benefit from "whole house" packages of energy efficiency and low carbon energy per annum</p>	<p>All new homes zero carbon</p>					<p>By end of 2020 every home in Great Britain will have a smart meter</p> <p>1.6 million homes will benefit from "whole house" packages of energy efficiency and low carbon per annum</p> <p>Around 12% of heat is generated from renewable sources, equivalent to supplying 4 million households based on current heating demand</p>

**Thank you**