

# The implications of the IED for a Power Generator

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European Industrial Emissions Directive seminar, Imperial College, 22<sup>nd</sup> September 2011



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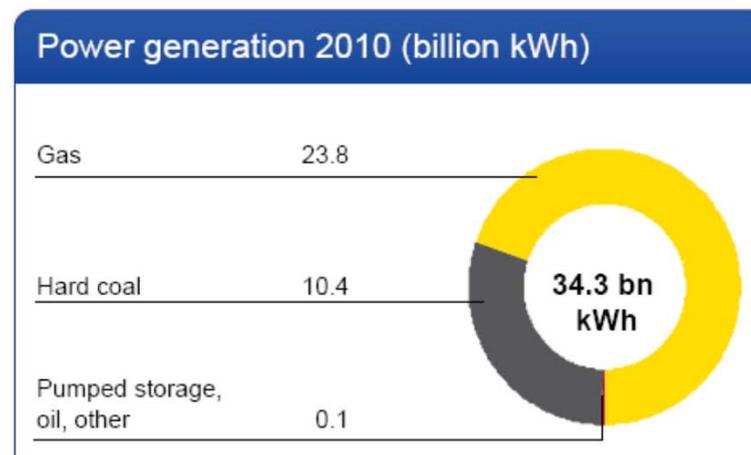
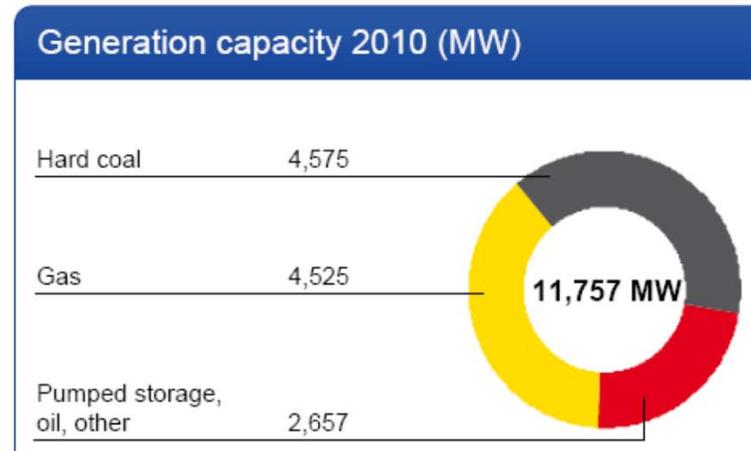
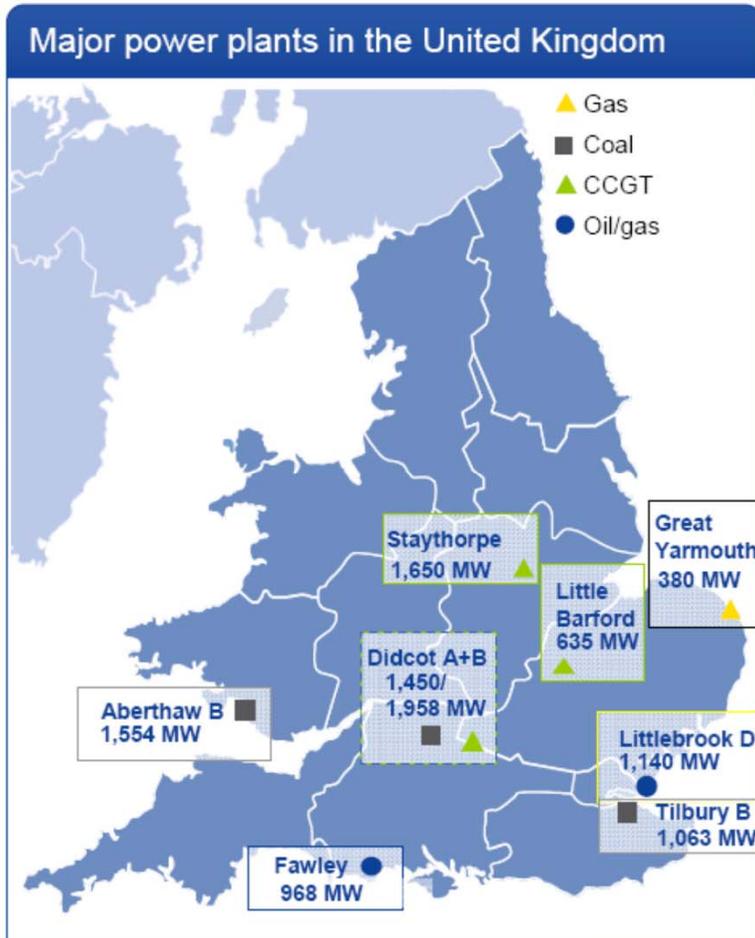
PAGE 1

# Outline

- RWE npower – a quick introduction
- Climate change as the driver of investment
- How does the IED change things?
- How has the process worked to date?
- What remains to be resolved?



# RWE npower generation portfolio



In addition RWE Innogy operates 580MW wind & hydro in the UK



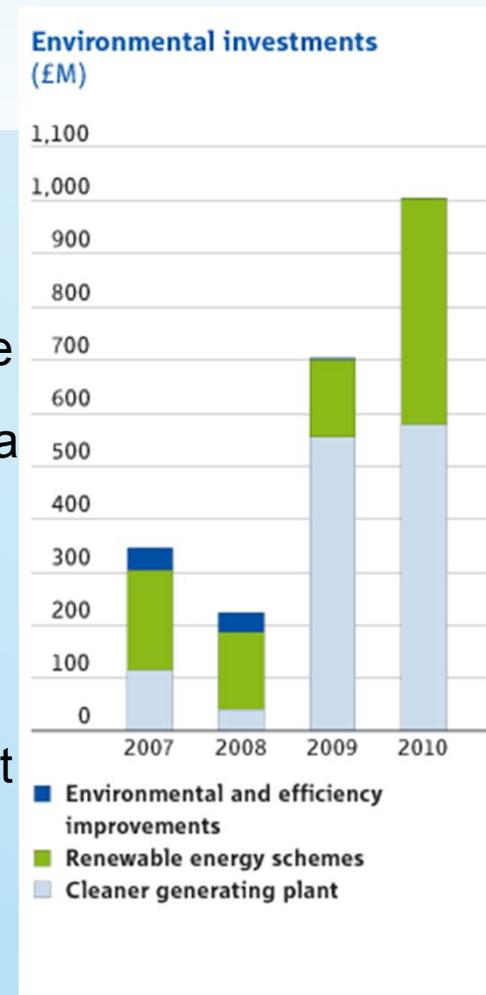
# We are entering a transition period in the UK generation sector

- The UK has binding and ambitious climate change targets – 20% of the UK's total energy use must come from renewable sources by 2020 and the UK's greenhouse gas emissions must reduce by 32% by 2020 and 80% by 2050.
- Government estimates that around £110 billion will be needed for new low carbon electricity infrastructure in the period to 2020
- Up to a third of the UK's existing electricity generation capacity will close over the next decade, either as they come to the end of their operational lives or are unable to meet stricter environmental standards



# Transforming our generation portfolio

- In 2007, we set ourselves a target of halving our carbon intensity by 2015 from 1990 levels
- Over the past three years RWE has invested over £1 billion a year in the UK, building new, low-carbon energy infrastructure and improving the environmental performance of our existing assets.
- In 2011, our Tilbury B power station will be converted from a coal-fired power station to run on 100% biomass fuel, using sustainably-sourced renewable wood pellets.
- In 2010, our new gas-fired power station in Staythorpe, Nottingham, came into operation. Construction is also underway at Pembroke CCGT Power Station in Wales
- New nuclear power has a key part to play in the move to a low-carbon economy; Horizon Nuclear Power is RWE's joint venture with E.ON UK and is aiming to build new nuclear power stations in the UK. Horizon Nuclear Power plans to build up to 6GW of new nuclear technology by 2025.



# Large Combustion Plant Directive has already required significant decisions

- **'Opt in'** and invest to comply with LCPD requirements
  - Flue Gas Desulphurisation or equivalent for SO<sub>2</sub>
  - Low NOx burners and OFA or equivalent for NOx (SCR retrofit not considered economic)
- **'Opt out'** (limited life – 20,000 hours then close, by 31/12/2105 at the latest)
  - Not considered economic to fit FGD
  - Over fire air or equivalent for NOx
- RWE npower opted in Aberthaw power station, opted out Didcot A, Fawley, Littlebrook and Tilbury B power station

LCPD opt out: 8.3GWe coal plant + 3.2 GWe oil plant will close by end 2015



# Some new challenges introduced by IED

- Defined ELVs for older existing gas turbines, related to plant efficiency
- Tighter SO<sub>2</sub> and dust ELVs for coal plant
- Removal of the provision for plant burning low volatile coal
- Tightened integration with BAT reference document conclusions
- Options ...

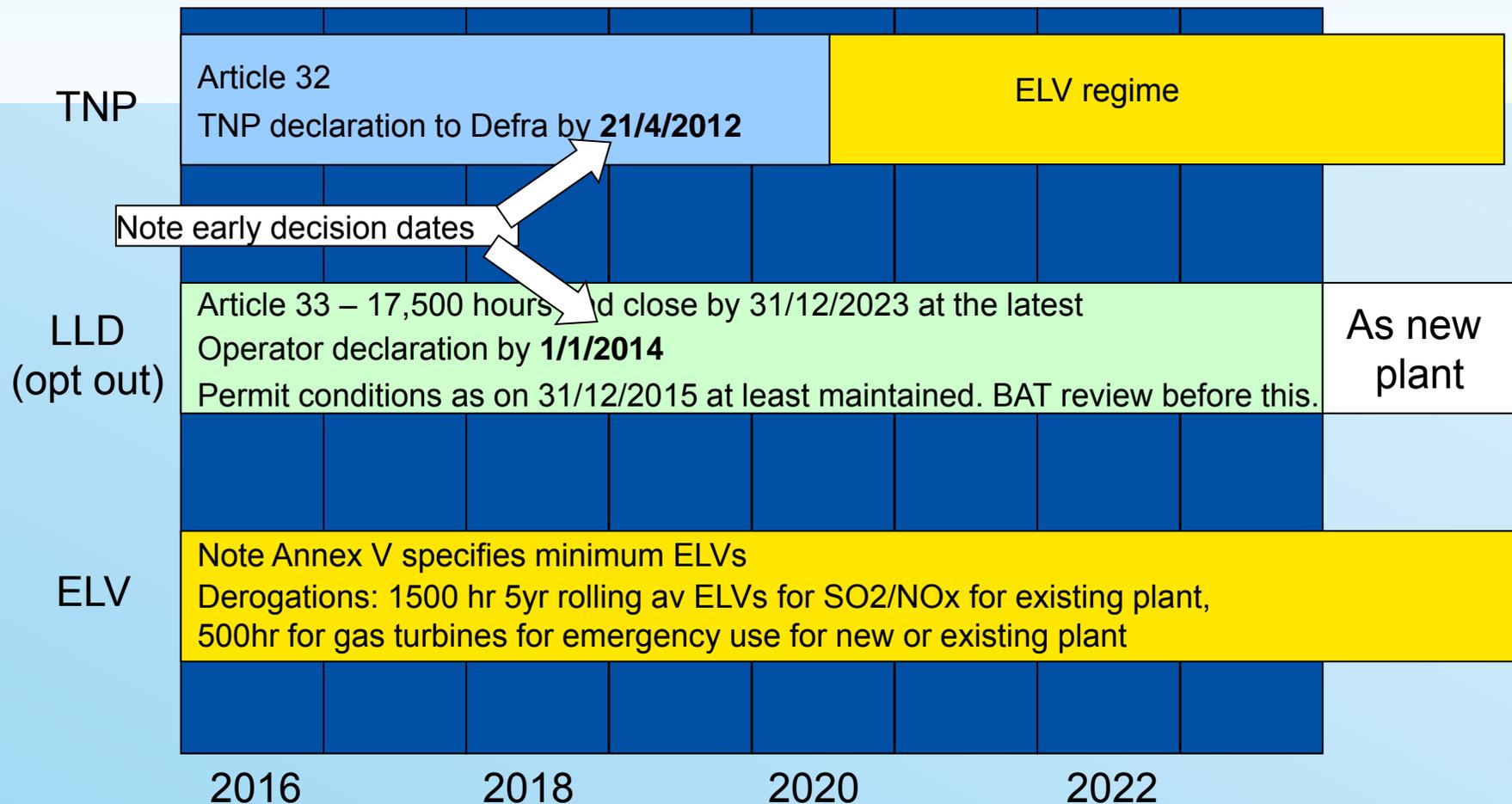
# The decisions facing power plant operators under IED

Primary requirement is that regulators apply BAT to minimise emissions:  
Annex V provides “back stop” emission limit values

- Compliance with ELVs (including Low load factor derogation <1500 hrs pa)
- Transitional National Plan (only for plant operating by 27/11/2003)
- Limited life opt out
- Plant for emergency use (<500 hrs pa, gas turbines only)



# IED options and timeline



# Emission Limit Values applicable under high load factor ELV and LLD choices for existing power plant

Pollutant	Plant category	IED ELV
SO <sub>2</sub>	Annex V – existing base load coal/biomass	200 mg/Nm <sup>3</sup> (50% of LCPD)
	LLD	(permit limit as at 31/12/2015 shall at least be maintained)
NO <sub>x</sub>	Annex V – existing base load coal/biomass	200 mg/Nm <sup>3</sup>
	LLD – coal	(permit limit as at 31/12/2015 shall at least be maintained)
	Annex V – CCGT	50 mg/Nm <sup>3</sup> (75 if $\eta > 55\%$ )
	LLD - CCGT	(permit limit as at 31/12/2015 shall at least be maintained)
dust	Annex V – existing base load coal/biomass	20 mg/Nm <sup>3</sup> (40% of LCPD)
	LLD – coal	(permit limit as at 31/12/2015 shall at least be maintained)

# Retrofitting abatement measures – what are the principal sources of risk?

Power sector is characterised by large scale investments with long lead times and 10-15+ year payback requiring 10-15+ year regulatory clarity, stability and internal consistency

- Electricity Market Reform
- Renewables Obligation changes
- The efficiency and condition of the station & the expected remaining life of key components,
- Future electricity price and volume demands
- Future fuel prices
- Future carbon market and prices
- Future environmental constraints

Impact on  
plant  
load factor



## Relationship between IED and review of the Large Combustion Plant BAT Reference document

- BAT conclusions shall be the reference for setting the permit conditions
- Within four years of publication of decisions on BAT conclusions, the competent authority shall ensure that all the permit conditions for the installation concerned are reconsidered and, if necessary, updated to ensure compliance with IED
- Derogations that  $ELV > BAT$  only where costs and benefits justify the use of less stringent ELVs with reasons for such derogations publicly available.

Further measures on existing plant need to account for the way such plant will operate in the future. Would take plant rapidly up the rising cost curve as fossil plant operate at lower load factors



# Fitting Air Quality-related legislation together



## Industrial Emissions Directive

Defines plant-level emission rates, requires BAT

## Large Combustion Plant BREF

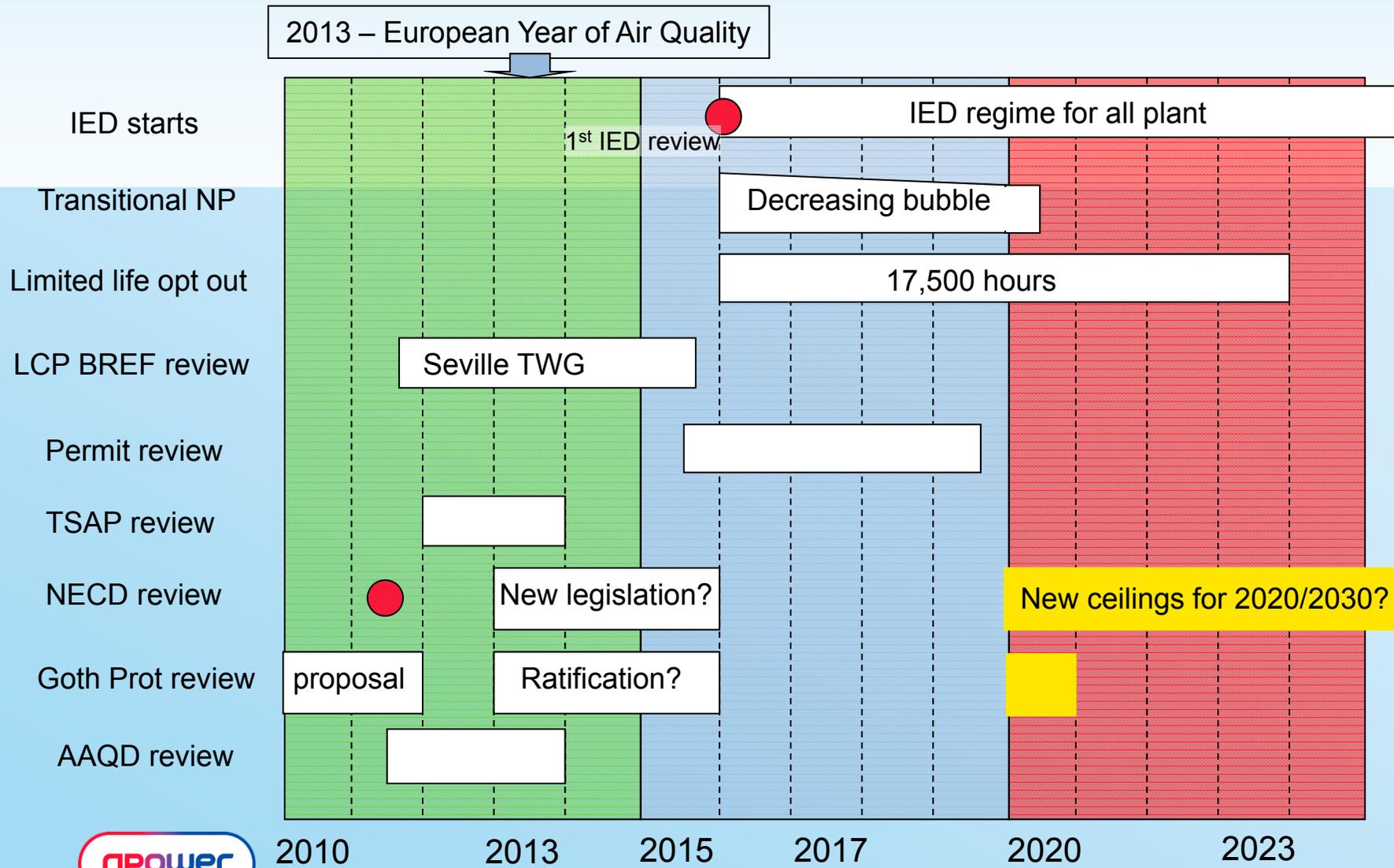
Defines Best Available Techniques

## National Emission Ceilings Directive

Sets legally-binding UK total emissions

(SO<sub>2</sub>, NO<sub>x</sub>, VOCs, NH<sub>3</sub>, ?PM)

# Role of IED in the context of other air quality policy initiatives – an active period



2010

2013

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2017

2020

2023

# NECD/Gothenburg Protocol introduce risks and costs during transition period

- NECD process aims to identify ceilings which meet Thematic Strategy targets cost-effectively
- Emission ceilings based on energy projections to 2020/2030 in a rapidly changing & highly uncertain market
  - Uncertainties in renewable generation a particular source of risk
- Original NECD proposal indicated substantial reductions in emissions of SO<sub>2</sub> and NO<sub>x</sub>
- Major impact on fossil plant which will be already reducing in load and emissions
- ‘invest and close’ risk



# How has the process worked to date?

- ✓ Final version of the IED is a improvement on the original proposal, recognising the need for flexibilities and transitional arrangements
- ✓ Flexibilities introduced help the more ordered transition to a low-carbon sector (but only out to 2023)
- ✓ It does seek to follow the principles of better regulation to simplify legislation and reduce administrative burdens
- ✗ It did however rewrite the Large Combustion Plant Directive, rather than incorporate the existing Directive
- ✓ Government interaction with stakeholders has been a well managed process

# Detailed IED issues to resolve

- TNP and start-up and shut down rules (EU Cion proposals July 2011, resolution 30 Nov 2011)
- Option switching rules (DEFRA Sept 2011)
- Conditions for exiting options
- Approach to “mixed techniques” within a plant
- Implementing protocols to be expanded to cover gas and biomass plant
- CCGT efficiency for NOx ELV's
- 1500hr derogation operation
- Arrangements for single or multiple pollutant TNP

**+ BREF review process outcomes**  
**+ NECD review outcomes**



# Final thoughts

- Climate change is the key driver for investments in the power sector; decarbonisation of electricity generation will result in a significant reduction in AQ emissions
- The IED presents several courses of action that operators may choose and in a competitive market all the decisions will be made independently based on each company's strategic approach to the UK electricity market and emerging Government energy policies
- Flexibilities in the final IED Directive are welcome as an aid to managing the transition to a low-carbon sector
- Provided that change is signalled well enough in advance the market has a good track record of responding to the signals and providing the right capacity at the right time – the existing LCPD opt-out closures is a good example
- The broad picture of energy and environmental policy against which significant investment decisions must be made is however currently very unclear : IED compliance decisions will need to be made before many of the key risk factors are clarified



# The implications of the IED for a Power Generator

Thank you for listening!

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PAGE 19