

Particulate Control in the Power Industry

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Agenda

- > Introduction to RWE
- > Sources of Particulates and the Importance of Control
- > Operational Case Study: Aberthaw Power Station
 - Approach to particulate control
 - Operational Challenges
- > Future Challenges in Particulate Control for LCP
- > Summary

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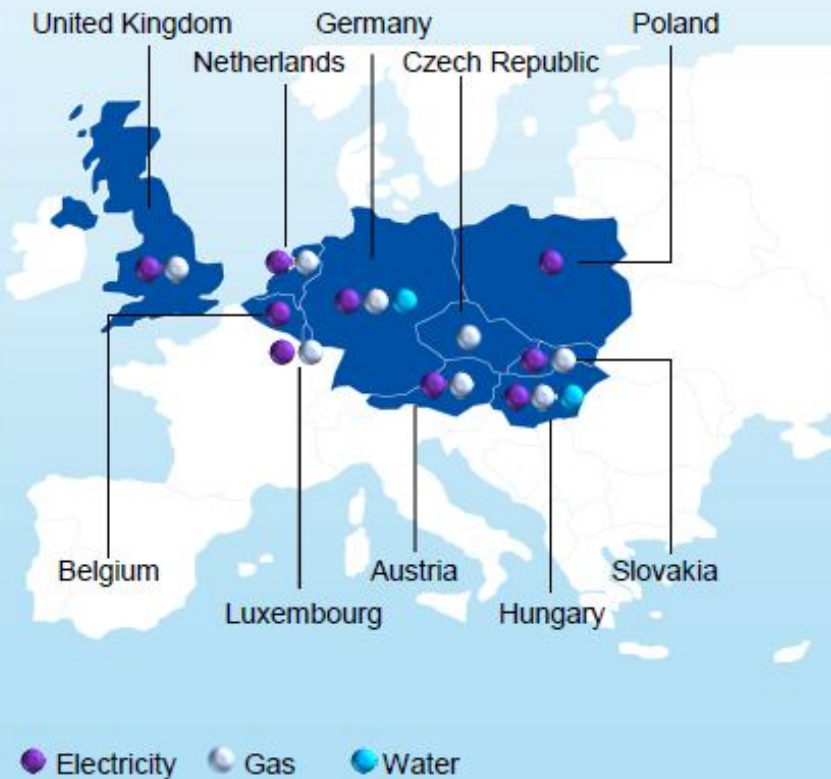
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RWE Group – Key Facts and Figures

- > RWE is one of Europe's five leading electricity and gas companies
- > RWE is active in the generation, trading, transmission and supply of electricity and gas
- > RWE's core markets are Germany, the UK, the Netherlands, Central and South Eastern Europe
- > The RWE Group has over 70,000 employees supplying over 16 million customers with electricity and approximately 8 million customers with gas
- > RWE is the number one power producer in Germany
- > In 2011 RWE recorded over €51.6 billion in revenue

RWE – One of Europe’s five leading Electricity and Gas Companies

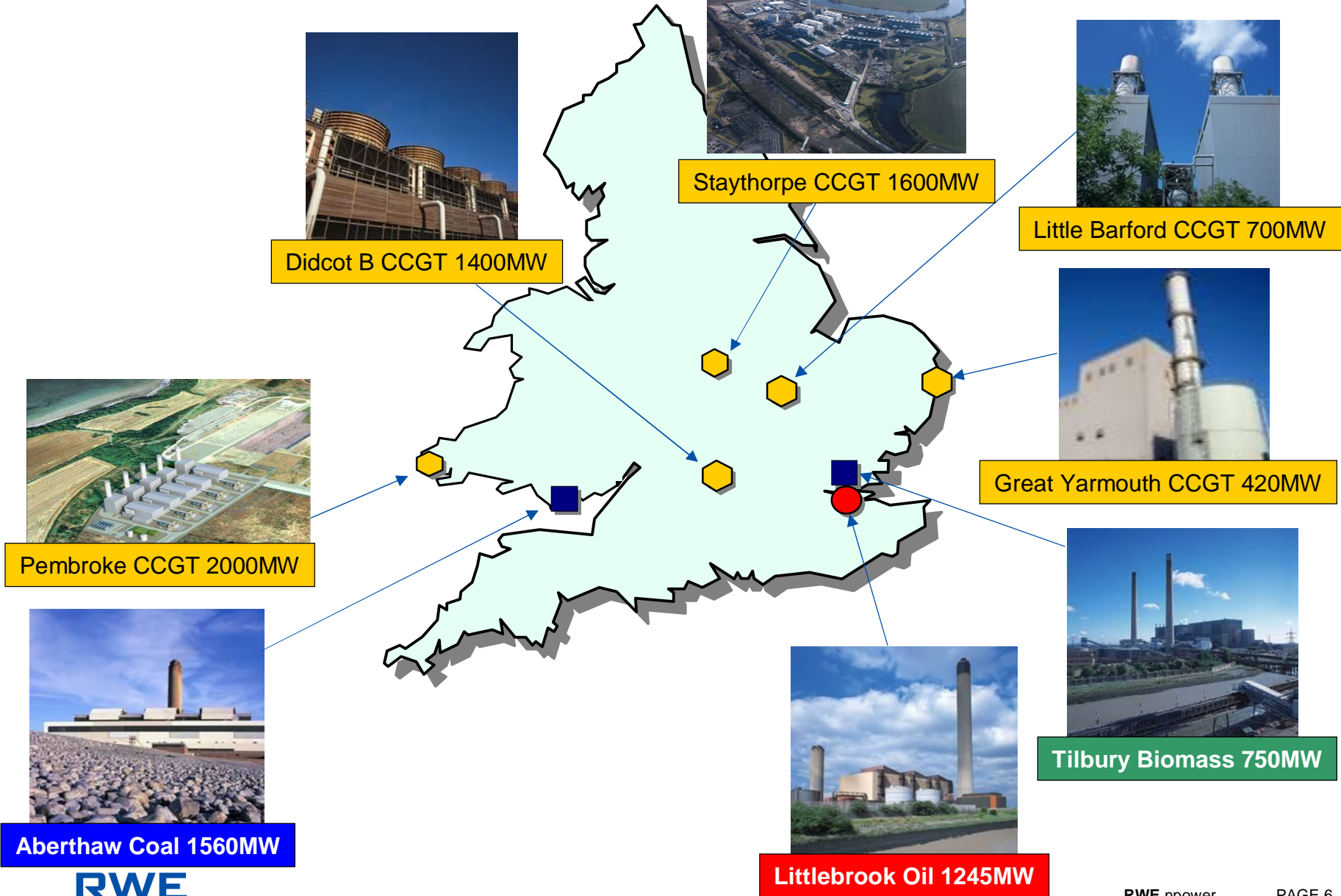
RWE Core Markets



Leading Positions in Core Markets

	Electricity	Gas
Germany	No. 2	No. 3
UK	No. 4	No. 4
Netherlands	No. 2	No. 1
Eastern Europe	No. 2 in Hungary No. 3 in Slovakia Presence in the Czech Republic No. 6 in Poland	Leading position in Hungary No. 2 in Slovakia No. 1 in the Czech Republic
Total Europe	No. 3	No. 6

RWE Generation UK Plant Portfolio



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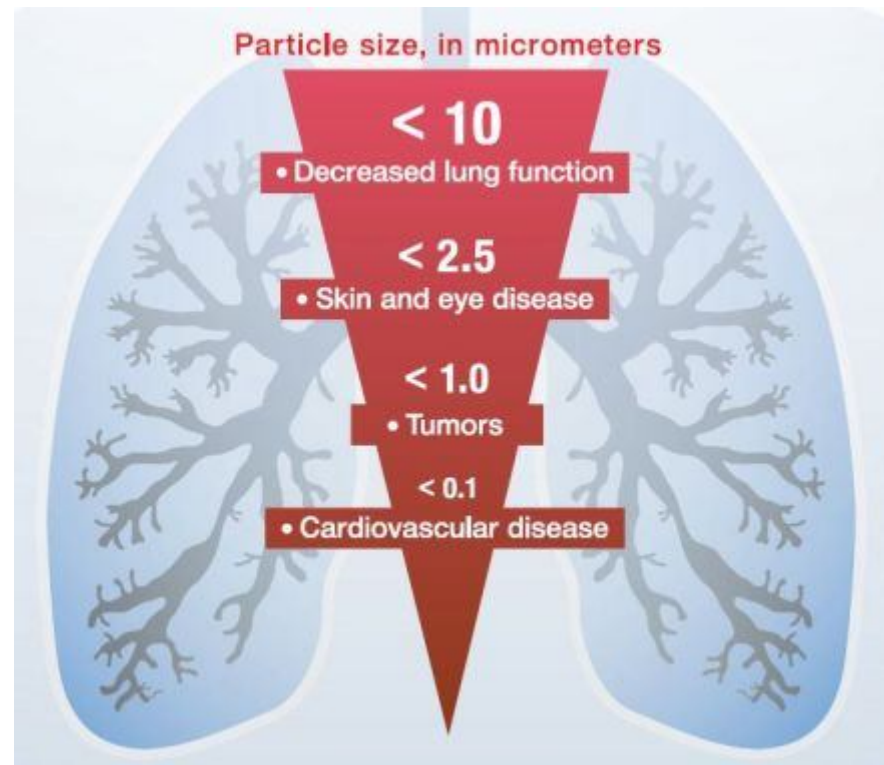
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Sources of Particulates

- > Typically Coal has ~15% ash - can be up to 50% - Even fuel oil has enough ash for 50mg/Nm³
- > Rust spalling - cold starts
- > Incomplete combustion - CinA
- > Alternative Fuels:-
 - Biomass
 - Ash re-firing

The Importance of Particulate Control

- > Health Effects:-
 - Asthma
 - Decreased lung function
- > Visibility Impairment
- > Environmental Damage
- > Aesthetic damage

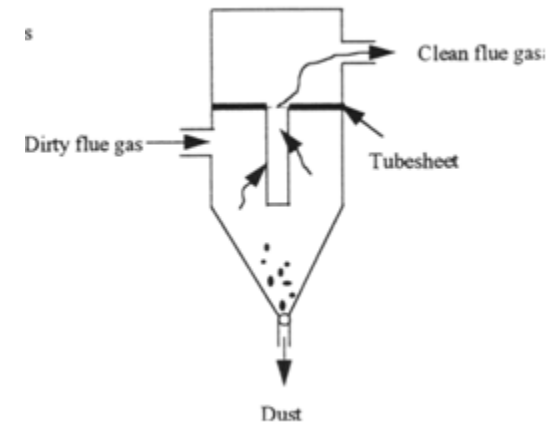
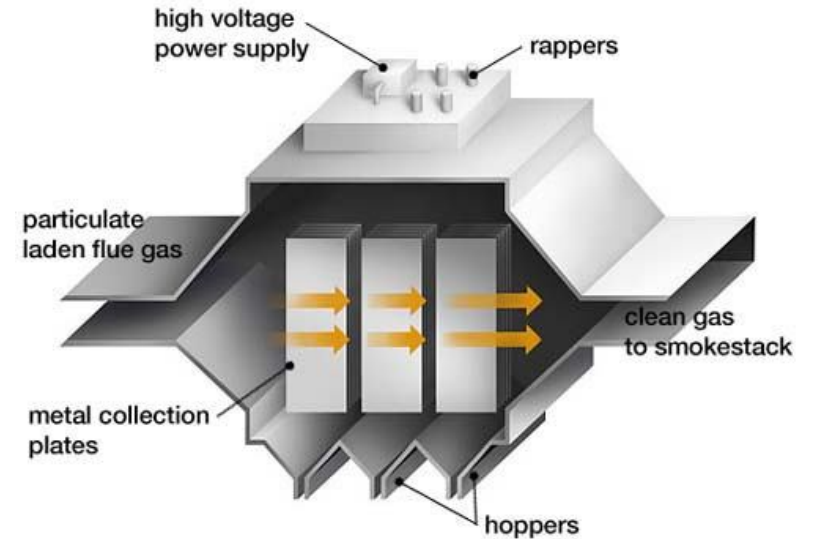


Required for a Permit to Operate

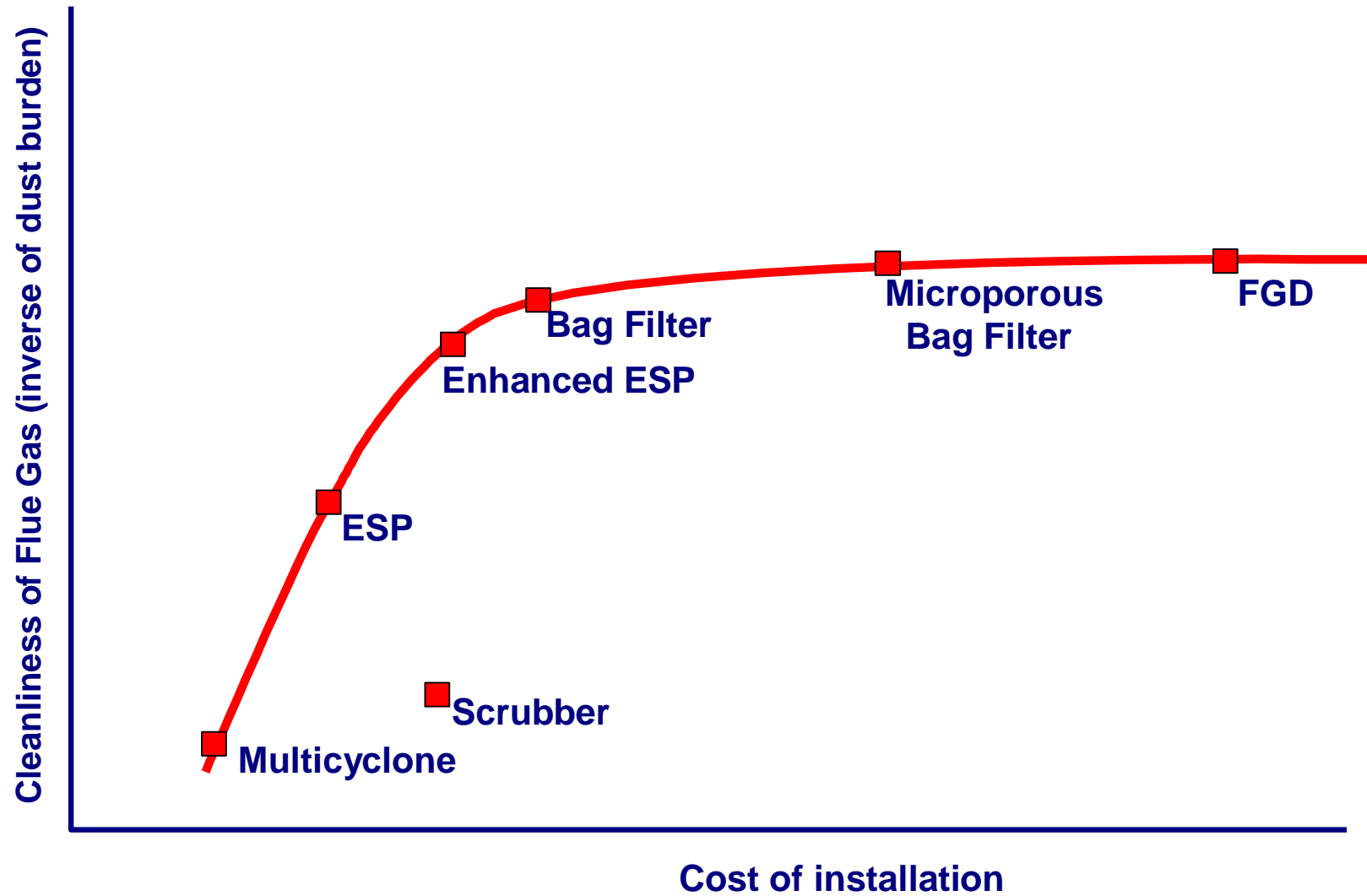
- > LCPD specifies 48hour and monthly ELVs of particulates from LCP
- > Validated measurements are reported which are 30% below the CEM measurement
- > Validation should not be relied on to achieve compliance
- > Legislation also requires the use of BAT for control of particulates
- > BAT is site specific determination

Dust Abatement Technologies

- > Range of technologies:-
 - > Cyclone separator
 - > ESP – wet, dry, hot or cold
 - > Bagfilters
 - > Scrubbers
- > Bagfilters or ESP must suited for LCP



BAT Assessment for Particulate Control



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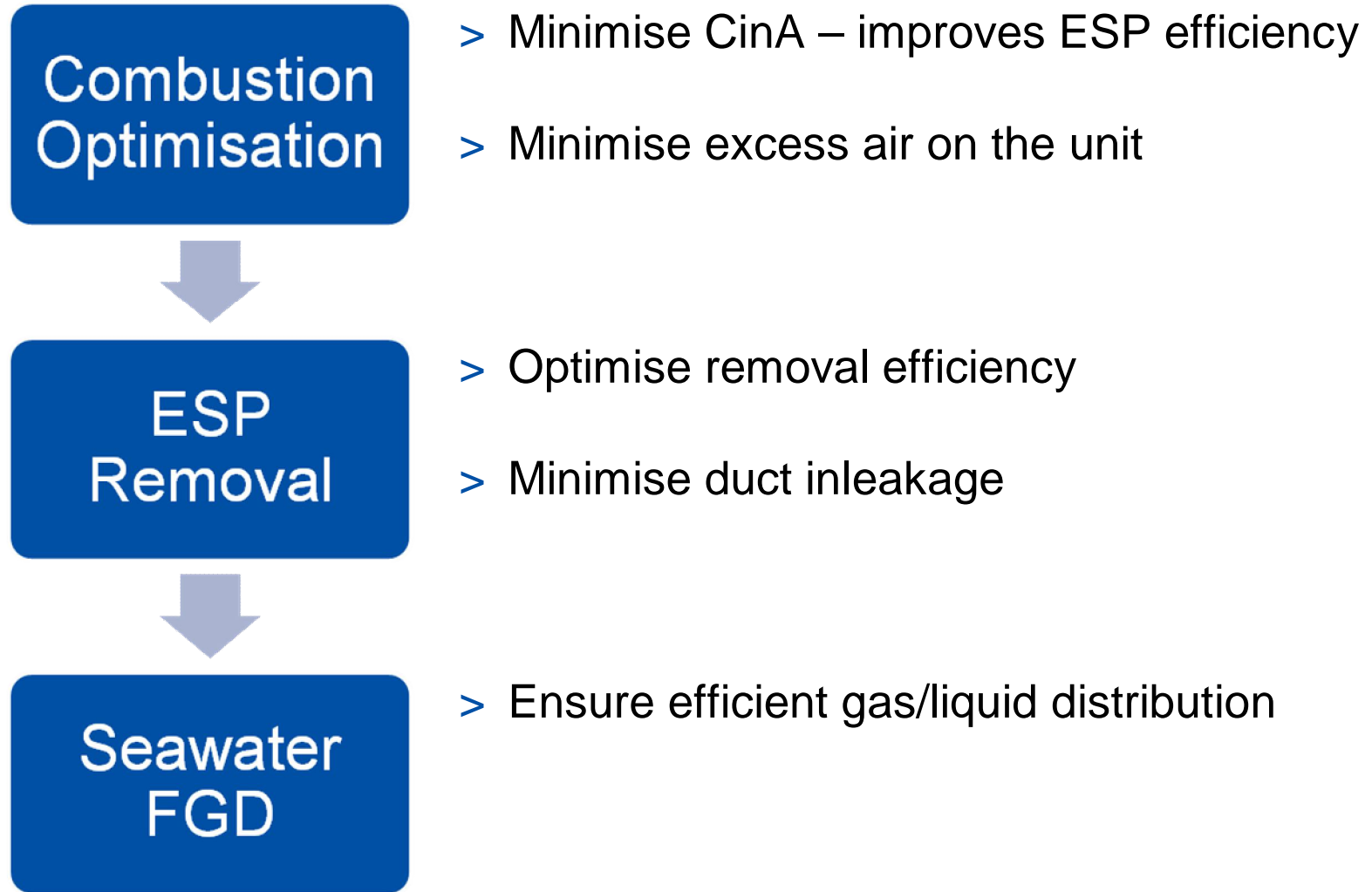
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Case Study:- Aberthaw Power Station

- > Located on the Bristol Channel near Cardiff Airport
- > Fires low volatile semi-anthracite coal in a downshot boiler
- > Three 520MWe direct cooled coal fired units
- > Opt-in to the LCPD, seawater FGD fitted on all units

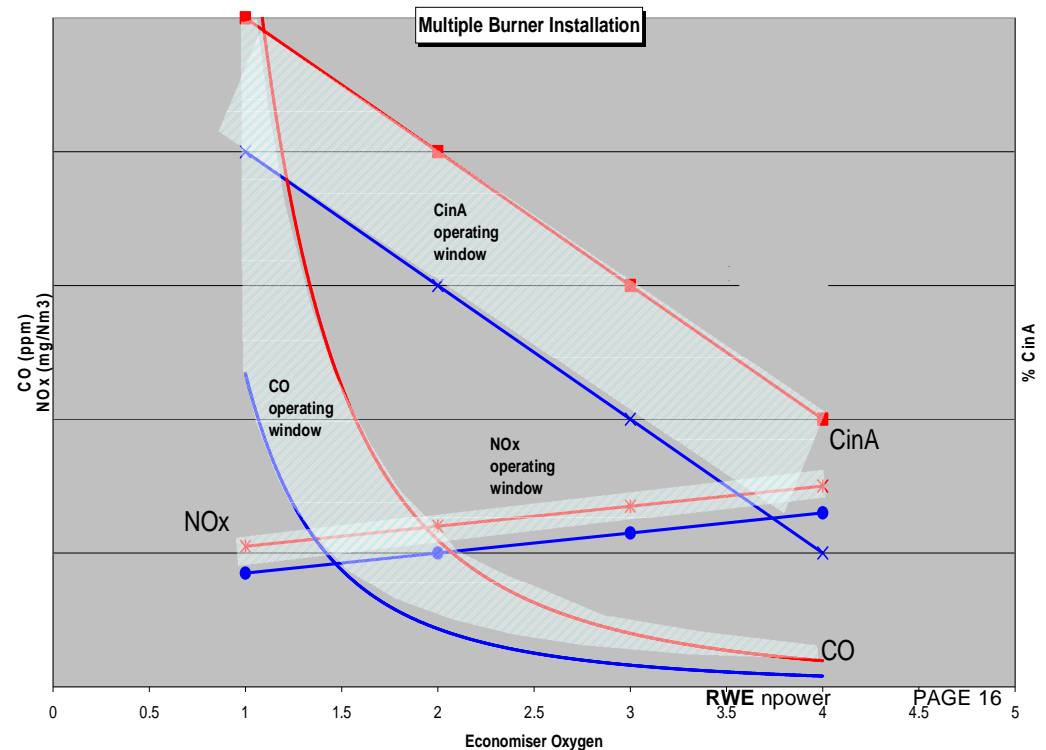
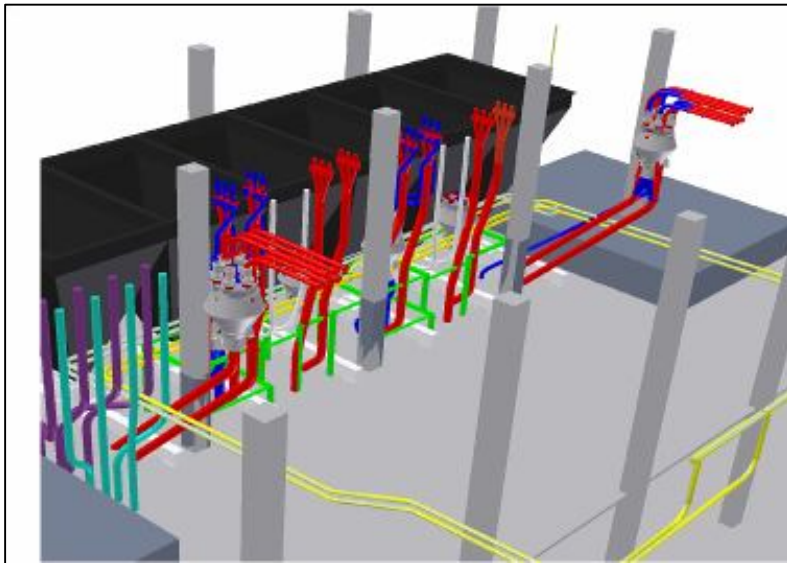


Particulate Control:- A Three Phase Approach



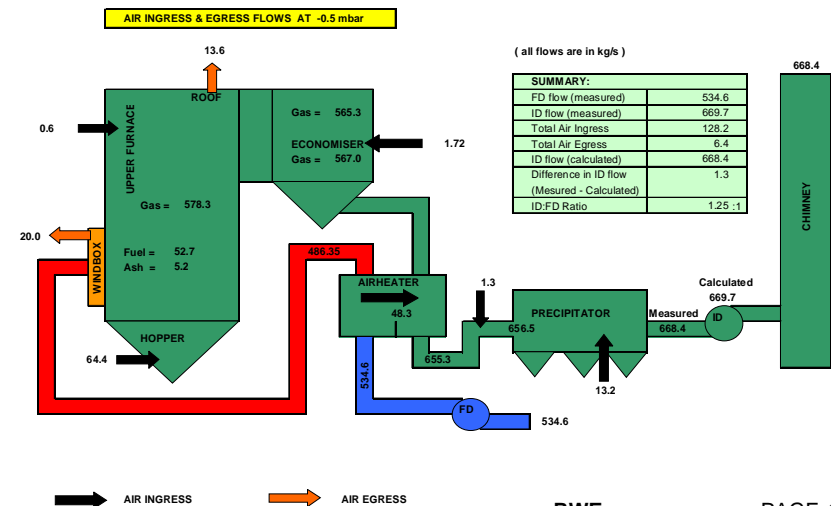
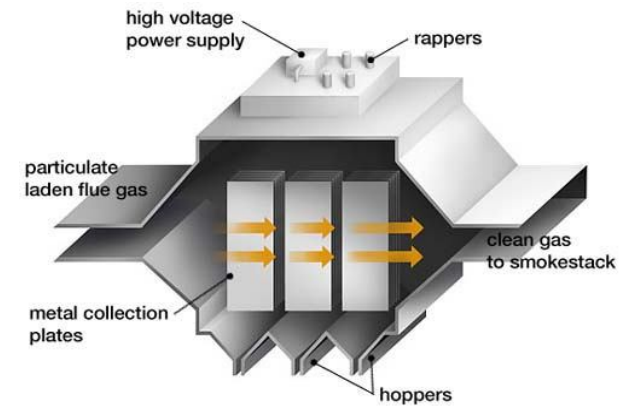
Combustion Optimisation

- > Coals fired must be within a set specification
- > Firing configuration a balance between NOx and dust/CO
- > Dynamic classifiers installed on all units
- > PF leg balancing



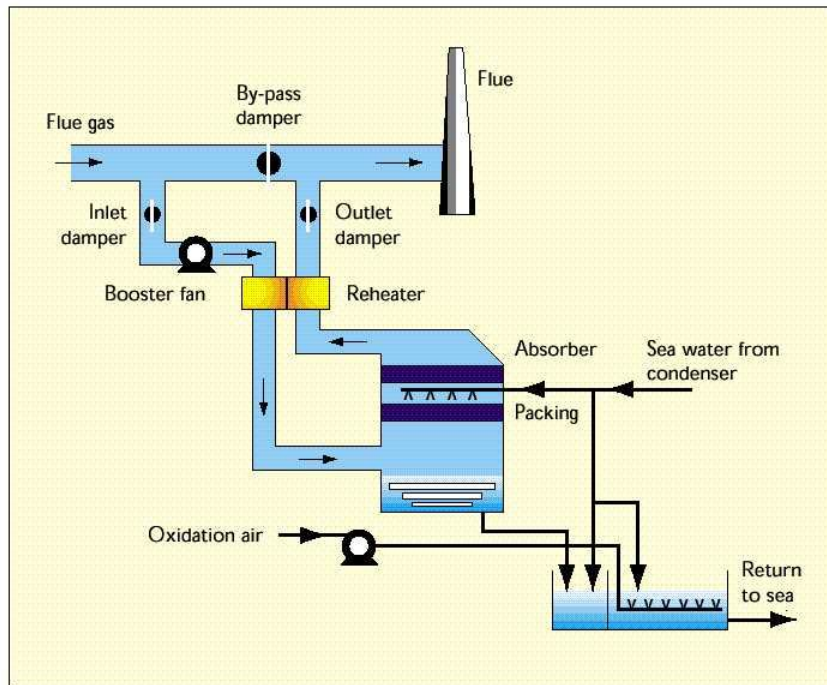
ESP Operation

- > Sulphur trioxide and ammonia injected before the ESP
 - Low sulphur coals more problematic
- > ESP has 3 passes each with 4 fields
- > Transformer rectifier upgraded
- > Air ingress assessments routinely performed on the units



FGD Operation

> Seawater FGD:- 97% SO₂ Removal Efficiency



Operational Challenges

- > Poor quality coal can cause combustion issues
- > Plant faults:-
 - Blocked burners, damper faults, fans
 - ESP failures
 - FGD issues – demister, operational issues
- > Co-firing of biomass
- > Management of ESP rapping

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Future Challenges for LCP

- > Aging Plant – plant degradation and failures
- > PM 10s and PM 2.5s becoming more of a concern
- > Implementation of the IED introduces more stringent “backstop” ELVs:-

(mg/Nm ³)	LCPD Opt-in	IED
Monthly	50	20
48hr	55 (97% compliance)	na
Daily	Na	22
Hourly	na	40 (95% compliance)

- > The BREF may impose yet tighter ELVs

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Summary

- > RWE is one of Europe's five leading electricity and gas companies
- > Particulate Control is important for LCP to maintain a license to operate and for local health effects
- > Aberthaw Power Station uses a combination of combustion, ESP and FGD optimisation to achieve dust emission compliance
- > Future legislation will require LCP to comply with more stringent particulate ELVs

Any Questions?