



Doosan Babcock Energy

## Post Combustion Capture Technology

### Official Opening of the OxyCoal™ Clean Combustion Test Facility Technical Seminar

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Date: 24<sup>th</sup> July 2009  
Department: Research & Development

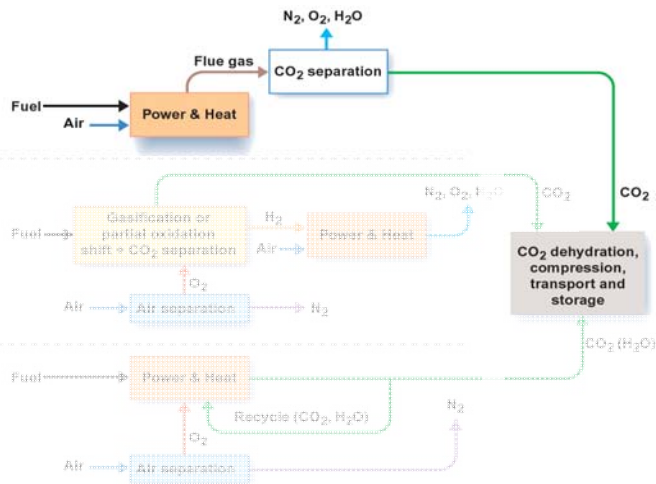
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## CO<sub>2</sub> Capture Technology – Leading Technologies

There are three main pathways to the capture of CO<sub>2</sub> from coal-fired power generation

### Post-combustion capture

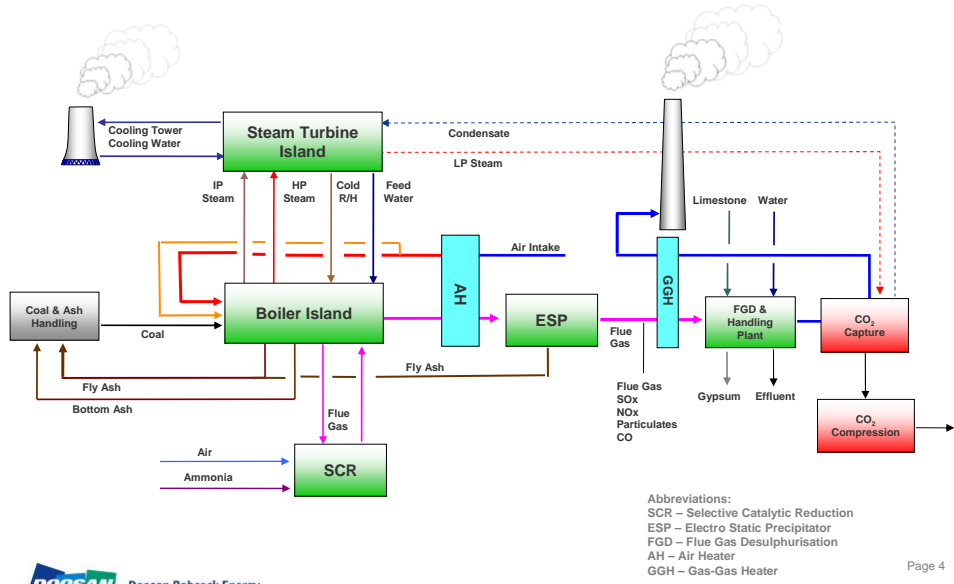


## Post Combustion Carbon Capture (PCC) Technology – Solvent Scrubbing

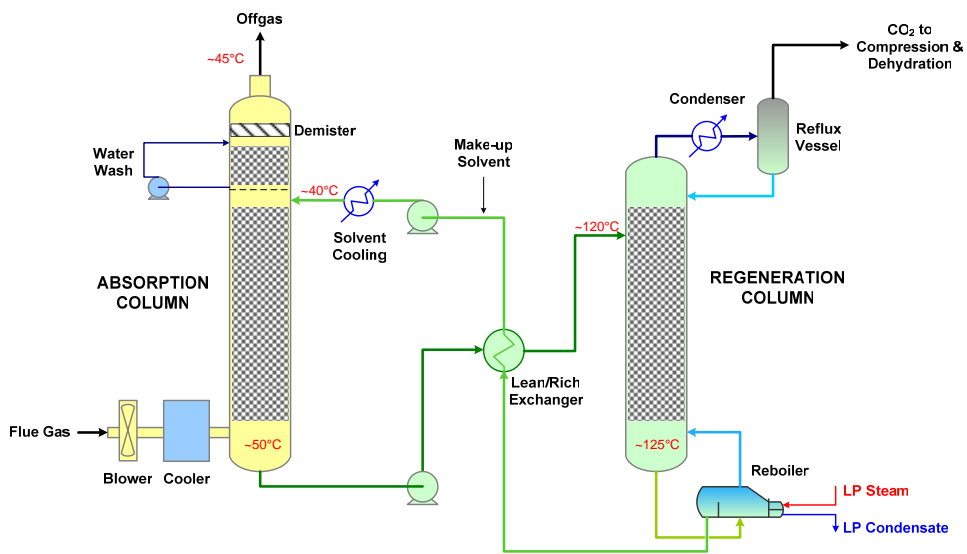
### Background

- Solvent Scrubbing also known as “sweetening” or acid gas removal was originally developed to remove H<sub>2</sub>S and CO<sub>2</sub> from gases in natural gas processing plants and other industries.
- In recent years, interest in the development of this process for the dedicated capture of CO<sub>2</sub> from Pulverised Coal Flue Gas has increased significantly, driven by the concerns about the impact of rising CO<sub>2</sub> emissions from fixed sources.

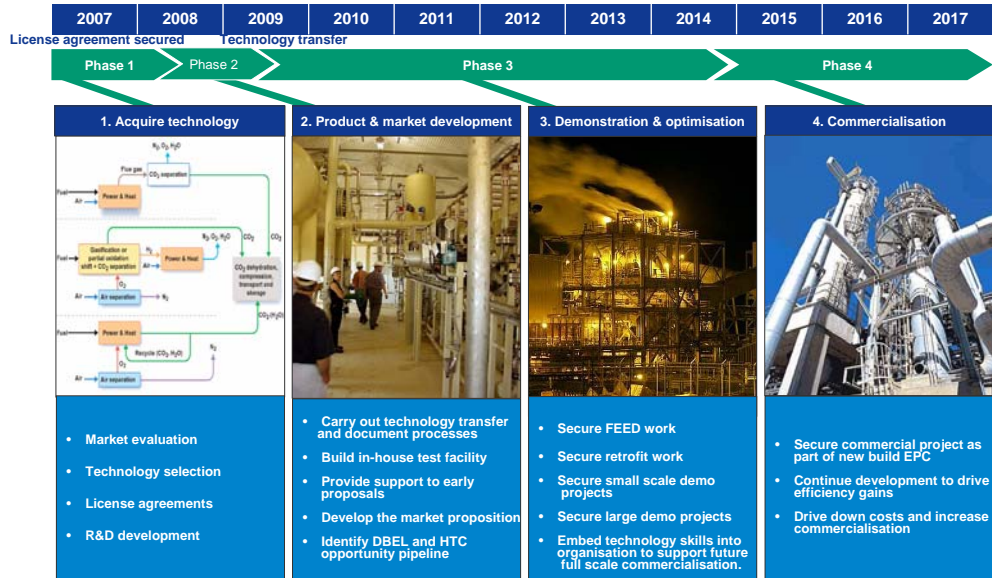
## Power Plant with Integrated PCC



## PCC Technology – Solvent Scrubbing

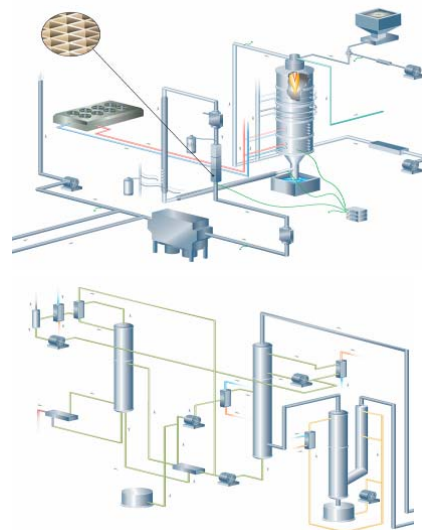


## Doosan Babcock Post Combustion Capture Road Map (2007 – 2017)



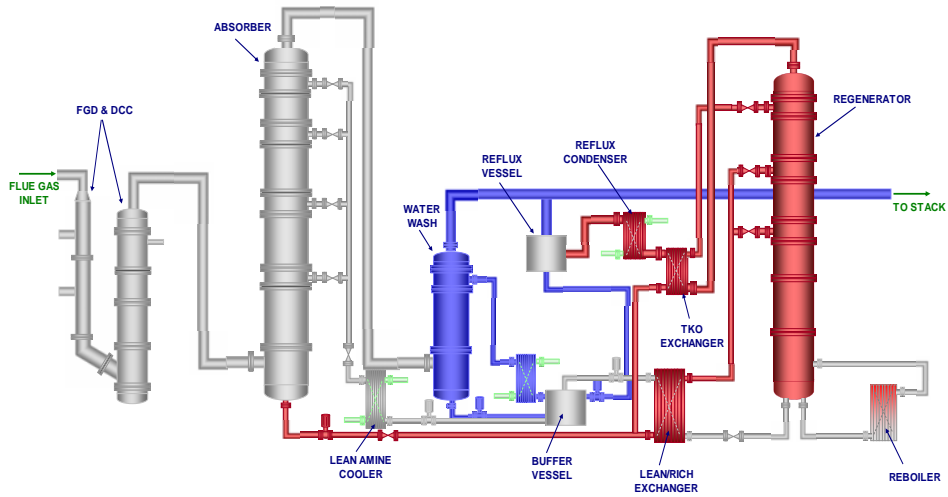
## Emissions Reduction Test Facility (ERTF) Upgrade for Solvent Scrubbing

- Pilot Scale Plant Upgrade
  - Upgrade of the 160kW ERTF by adding Flue Gas Desulphurisation (FGD) and Solvent Scrubbing to capture 1t/day CO<sub>2</sub>.
- Operation & Performance
  - Using UK and world traded coals
  - Further optimisation of the process, including:
    - solvent testing
    - material selection
    - packing performance



## Emissions Reduction Test Facility (ERTF) – Solvent Scrubbing

Schematic of ERTF Solvent Scrubbing Process



## Boundary Dam – 4t/day Solvent Scrubbing Demonstration Plant



*Boundary Dam – Estevan, Saskatchewan*

- Built in 1987
- Operated as a dedicated Carbon Capture test facility from 2000 – present
- Long term coal fired operating experience with various solvent, packing and process combinations

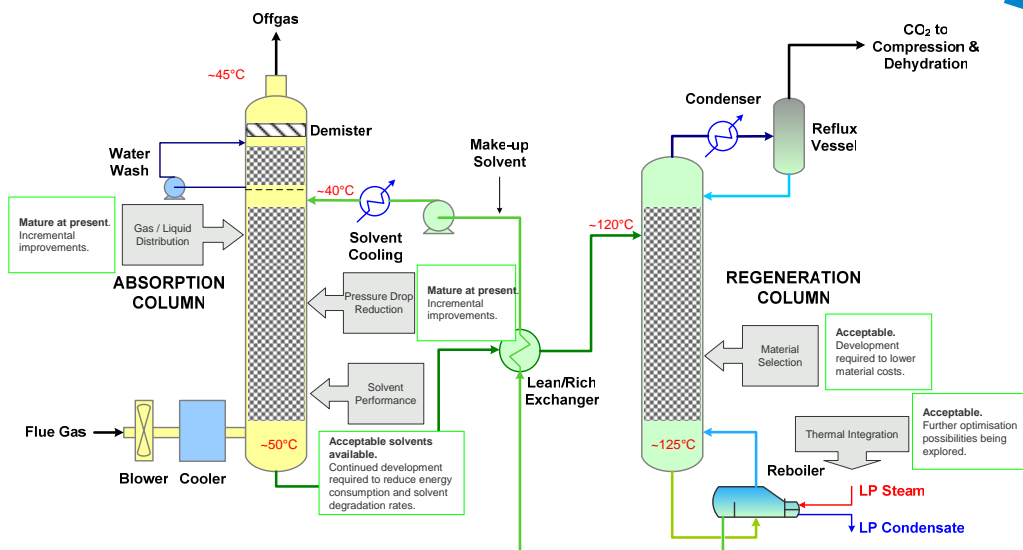
## Boundary Dam – Solvent Verification

Latest Test Run:

- Lignite flue gas
- Process modified with TKO™ configuration
- Preliminary Results for RS™ solvent
  - High absorption efficiency (~ 85% CO<sub>2</sub>)
  - Low solvent degradation rate
  - Low steam consumption (<1.1 kg Steam : 1kg CO<sub>2</sub>)



## Development Opportunities

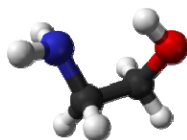


## Solvent Development

### MEA

#### ADVANTAGES

- High Reactivity
- Low Cost
- High absorbing capacity



#### DISADVANTAGES

- Highly Corrosive
- Thermal Instability
- High Regeneration Energy

### NEXT GENERATION SOLVENTS

- Higher Capacity for CO<sub>2</sub> Capture
- Lower Regeneration Energy
- Higher absorption/desorption rates and regeneration at lower temperatures
- Lower volatility and better thermal stability
- Less Degradation and Lower Corrosivity

## Concluding Remarks

Doosan Babcock are taking a proactive role in the development and implementation of post combustion carbon capture (PCC) technologies.

- Doosan Babcock has established a dedicated Carbon Capture Business Group to commercialise Carbon Capture technologies.
- We are undertaking a front end engineering design (FEED) studies for a range of large scale demonstration plants.
- Our Research & Development is focused on enhancing the existing design to provide flexible and fully integrated solutions for clients.



## Commercial Contact Details

Doosan Babcock is committed to delivering unique and advanced carbon capture solutions.

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