



# **Delta Electricity Pilot Capture Project**

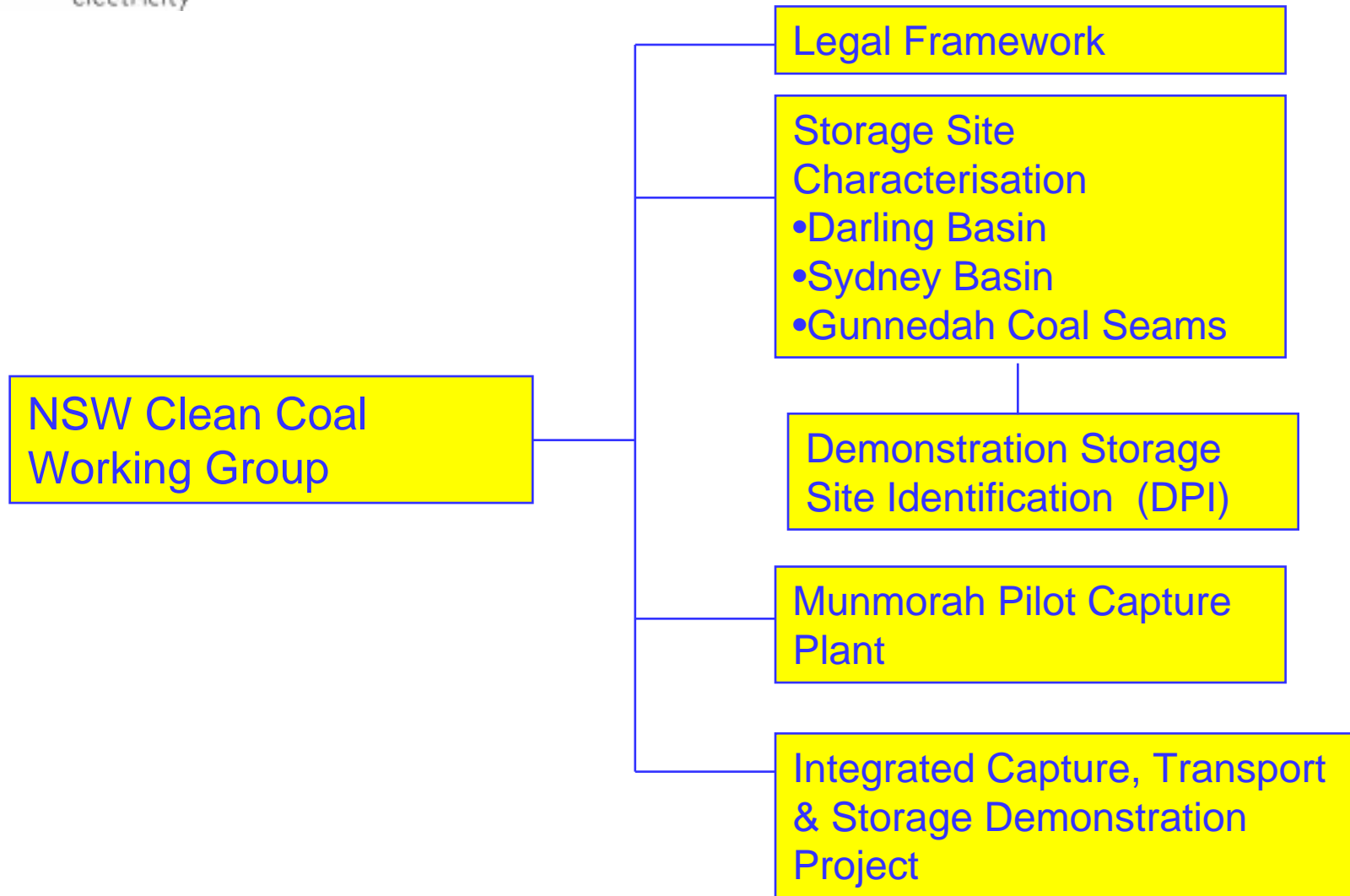
**NSW Clean Coal Summit**

**Parliament House, Sydney**

**7 May 2008**

**Presented By: Greg Everett**

# NSW Clean Coal Projects

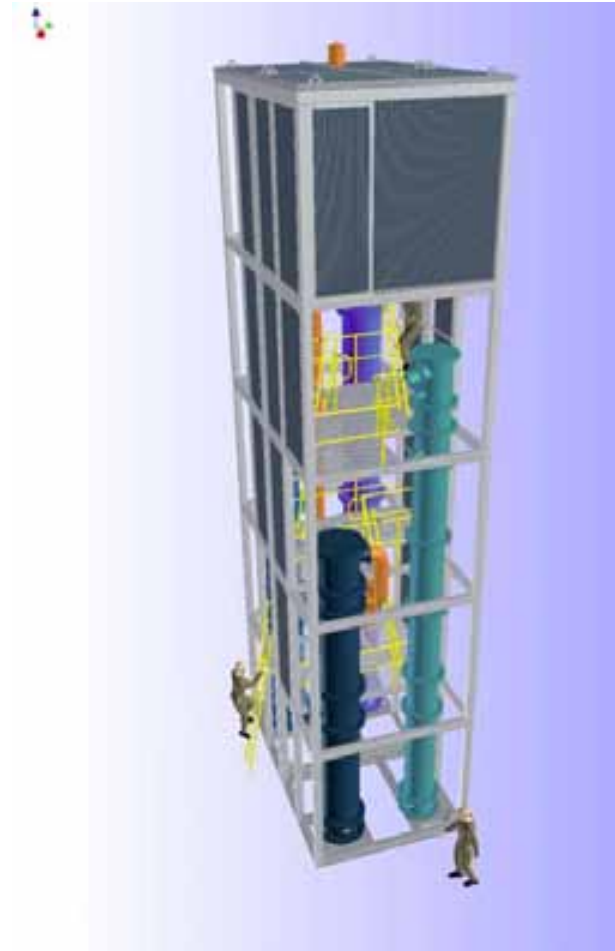


# Post Combustion Capture Pilot Munmorah Power Station



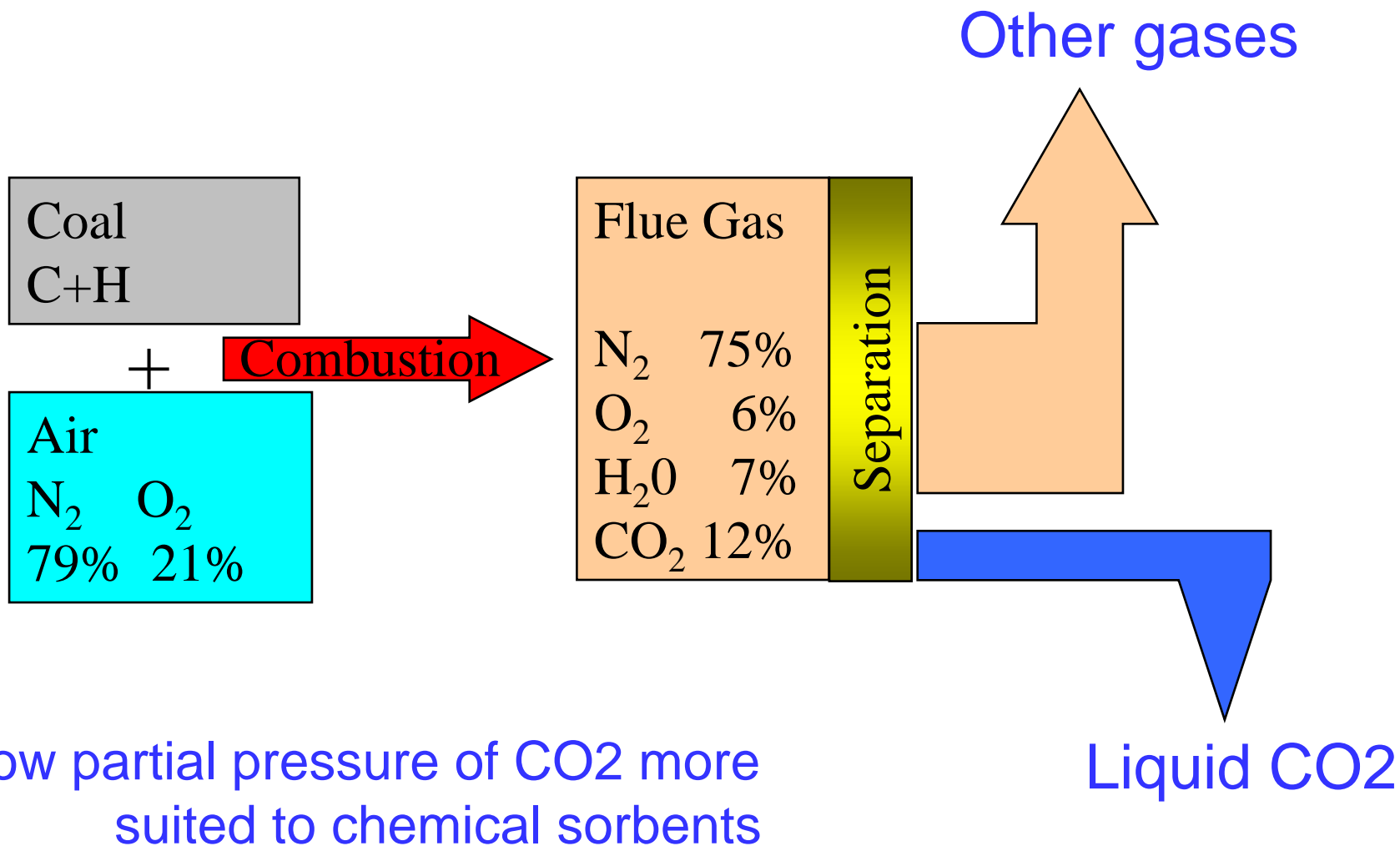
# Pilot Plant Summary

- PCC pilot plant based on aqueous ammonia up to 4000 tpa
- Joint Delta/CSIRO Project
- Asia Pacific Partnership Funding
- \$5 million construct & operate
- Commissioning July 2008
- Complete Experimental Program 2009

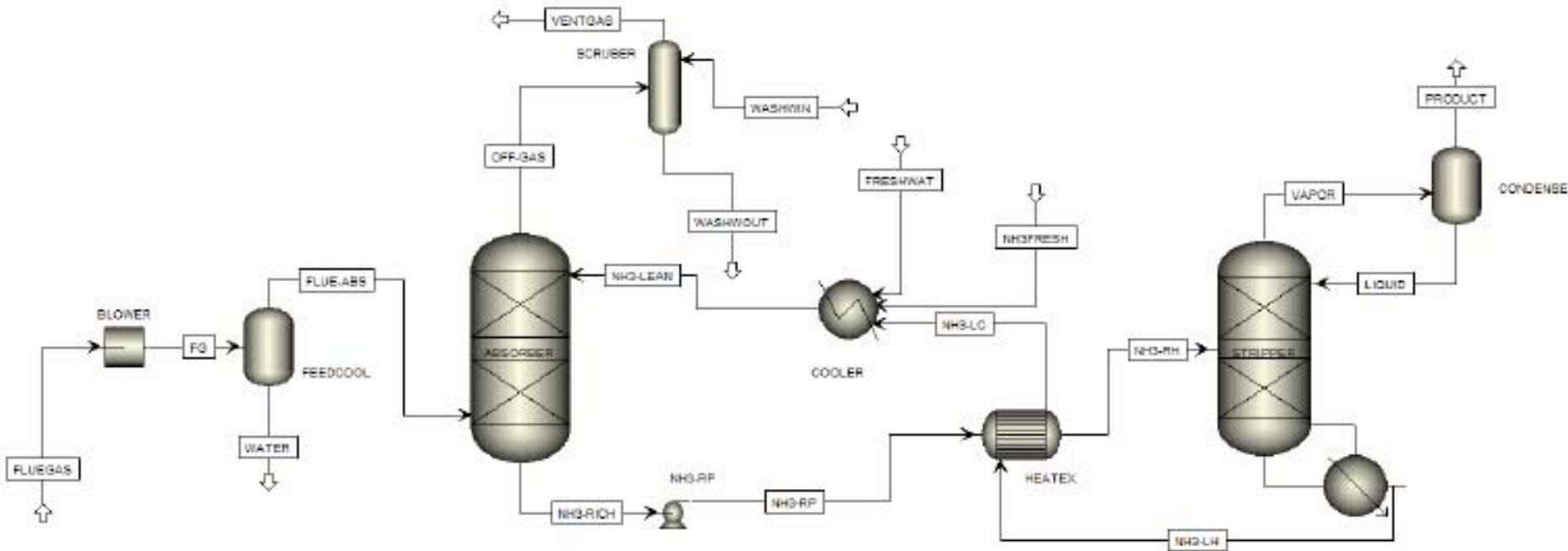


Source: CSIRO

# Post Combustion Capture



# Process Components



Cooling & Cleaning  
of Flue Gas

Ammonium-Carbonate + CO<sub>2</sub>  
→ Ammonium-Bicarbonate

CO<sub>2</sub> Absorption  
(cool)

CO<sub>2</sub> Stripping  
(hot)

Ammonium-Bicarbonate →  
Ammonium-Carbonate + CO<sub>2</sub>

## IGCC & Oxy Fuel

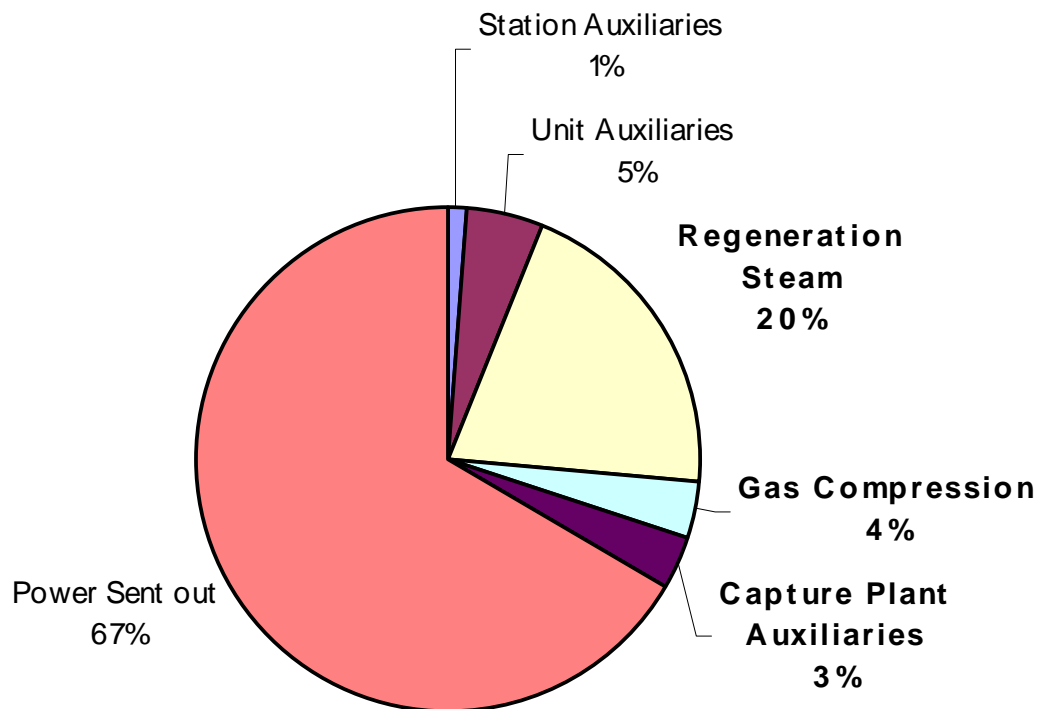
- Up front removal of nitrogen
- Integrated capture
- Always operates with air separation auxiliary energy load

## Post Combustion Capture

- End of pipe retrofit
- Removes CO<sub>2</sub> from Flue Gas
- Flexibility for partial capture
- Flexibility to turn off capture in periods of high electricity demand
- Some absorption processes commercially available

# PCC- Energy Consumption

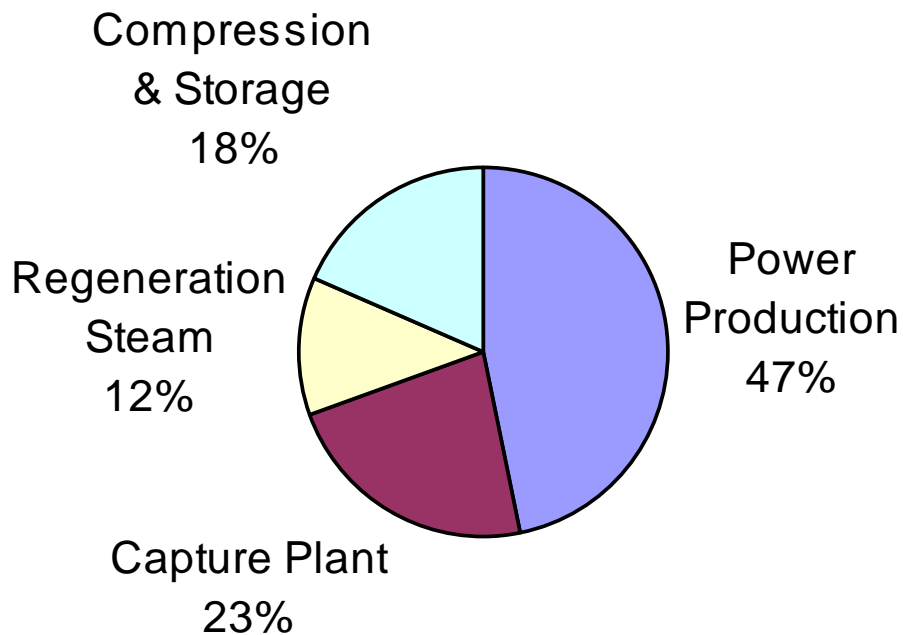
## Post Combustion Capture - Auxiliary Energy Breakup



Data Source: Sequestration report to NSW Generators,  
assumes Amine Solvent

# Capture & Storage Costs

## Distribution of Cost



Data Source: Sequestration report to NSW Generators,  
assumes Amine Solvent

- Potential for reduced energy consumption
- Potential for more efficient compression via high pressure regeneration
- **Potential tolerance to NOx and SOx**

Amine System (commercially available)

FDG + de NOx + gas conditioning + Capture Plant + energy =  
\$\$\$\$

Ammonia System

Gas conditioning + Ammonia Loss + Capture Plant + less energy  
= \$\$

# CAD Impression of Munmorah PCC



# Plant Frames Under Construction



# Operating Facilities – Shady Point

- AES Shady Point, Oklahoma
- Commissioned 1991
- 2 x 160MW Coal Fired Fluid Bed
- MEA Process
- 3% side stream - 200 to 250 TPD CO<sub>2</sub>
- Sold for cryogenic & refrigeration Process

Shady Point, Oklahoma

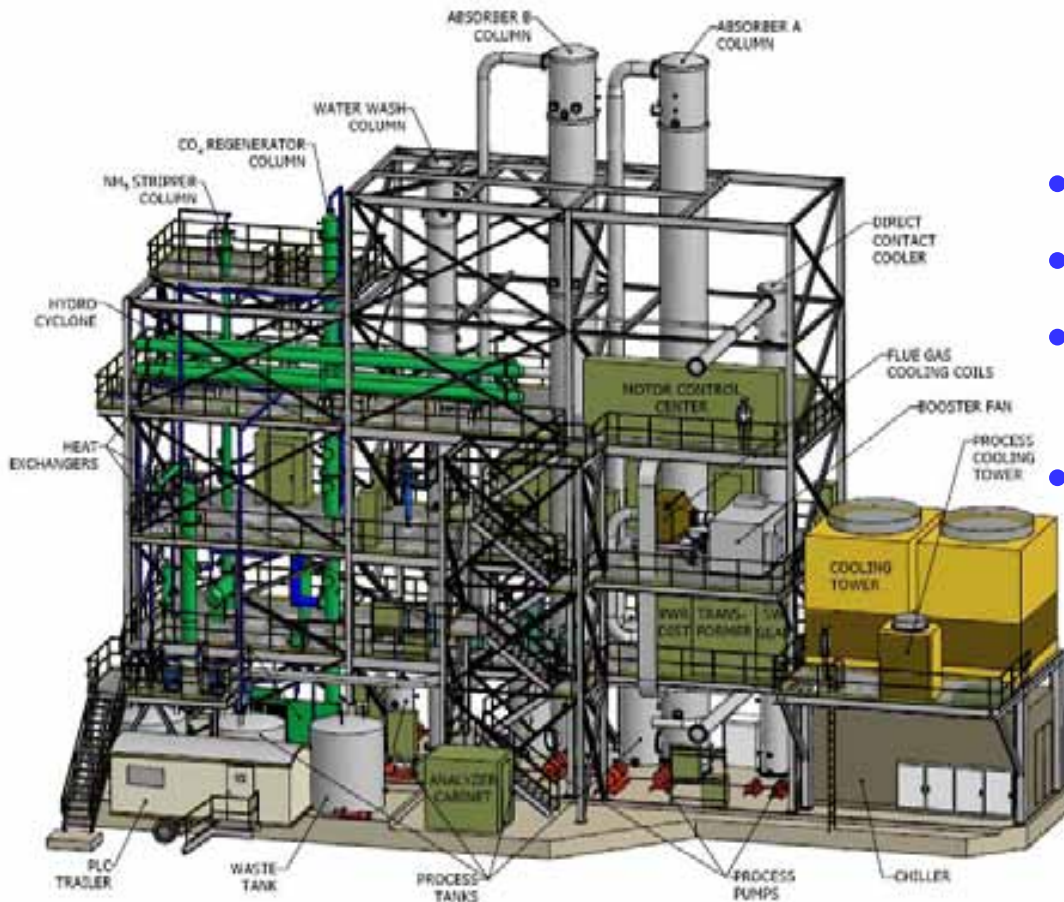


Source: IEPR Californian Energy Commission 2005

# Operating Facilities - Warrior Run

- Warrior Run, Maryland
- Commissioned 2000
- 180 MWe Coal Fired Fluid Bed
- MEA Process
- 5% side stream -150 to 200 TPD CO<sub>2</sub>
- Sold for food processing





- Member of the Electric Power Research Institute (EPRI) Consortium
- Chilled Ammonia Pilot
- Alstom lead developer
- Commenced operation in March 2008
- 12 month experimental program

Picture: WE Energies Web site

## Pleasant Prairie - Wisconsin



# Summary Integrated Capture and Storage Project Program

Project Component	Project Cost - Approx \$150 million		
	2007 – 2009 Phase 1	2009 - 2011 Phase 2	2011 - 2013 Phase 3
<b>Capture</b>	<b>Pilot Plant</b> <ul style="list-style-type: none"> <li>• Munmorah PS</li> <li>• Ammonia Absorption Technology</li> <li>• Up to 11 tpd (0.6MW)</li> </ul>	<b>Demonstration Planning</b> <ul style="list-style-type: none"> <li>• 140 – 280 tpd</li> <li>• 7 – 15 MW</li> <li>• Technology Selection</li> <li>• Planning and Approval</li> </ul>	<b>Demonstration Phase</b> <ul style="list-style-type: none"> <li>• Construction</li> <li>• Commissioning</li> <li>• Operation</li> </ul>
<b>Storage</b>	<b>State Wide Storage Assessment</b> <ul style="list-style-type: none"> <li>• Geological Studies</li> <li>• Access Agreements</li> <li>• Seismic Tests</li> </ul>	<b>Characterisation &amp; Demonstration Well Selection</b> <ul style="list-style-type: none"> <li>• Reservoir Model</li> <li>• Environmental Approvals</li> </ul>	<b>Injection Demonstration</b> <ul style="list-style-type: none"> <li>• Well Development</li> <li>• Operation &amp; Monitoring</li> </ul>
<b>Compression &amp; Transport</b>		<b>Method Selection</b> <ul style="list-style-type: none"> <li>• Rail or Pipeline</li> <li>• Environmental Approval</li> </ul>	<b>Pipeline/Wagon</b> <ul style="list-style-type: none"> <li>• Construction</li> <li>• Commissioning</li> <li>• Operation</li> </ul>