

BE WHAT YOU WANT TO BE

***A Simulation Model To Improve The Energy
Efficiency Of Post Combustion Carbon
Capture Process In Coal Power Plant***

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OPTIONS FOR CARBON MANAGEMENT

Reduce Carbon Intensity of fuel

- Renewable
- Nuclear
- Fuel Switching

Improve Energy Efficiency

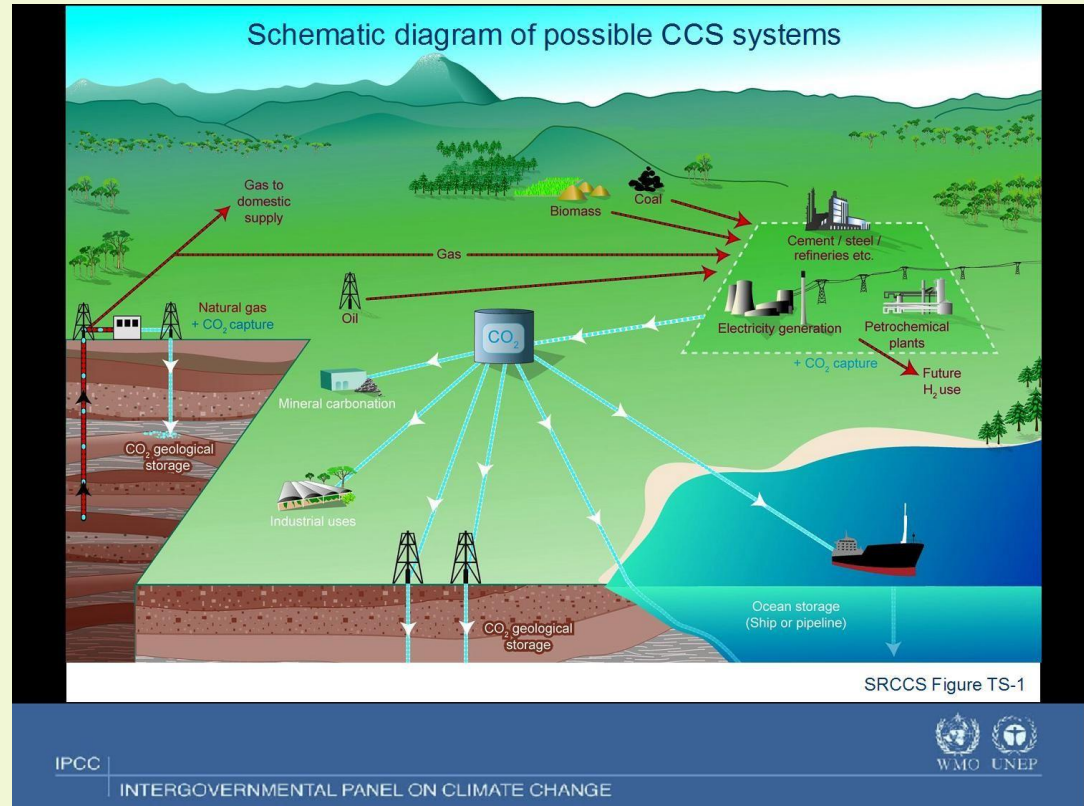
- Power generation cycle, transmission and distribution
- Consumption

Sequester Carbon

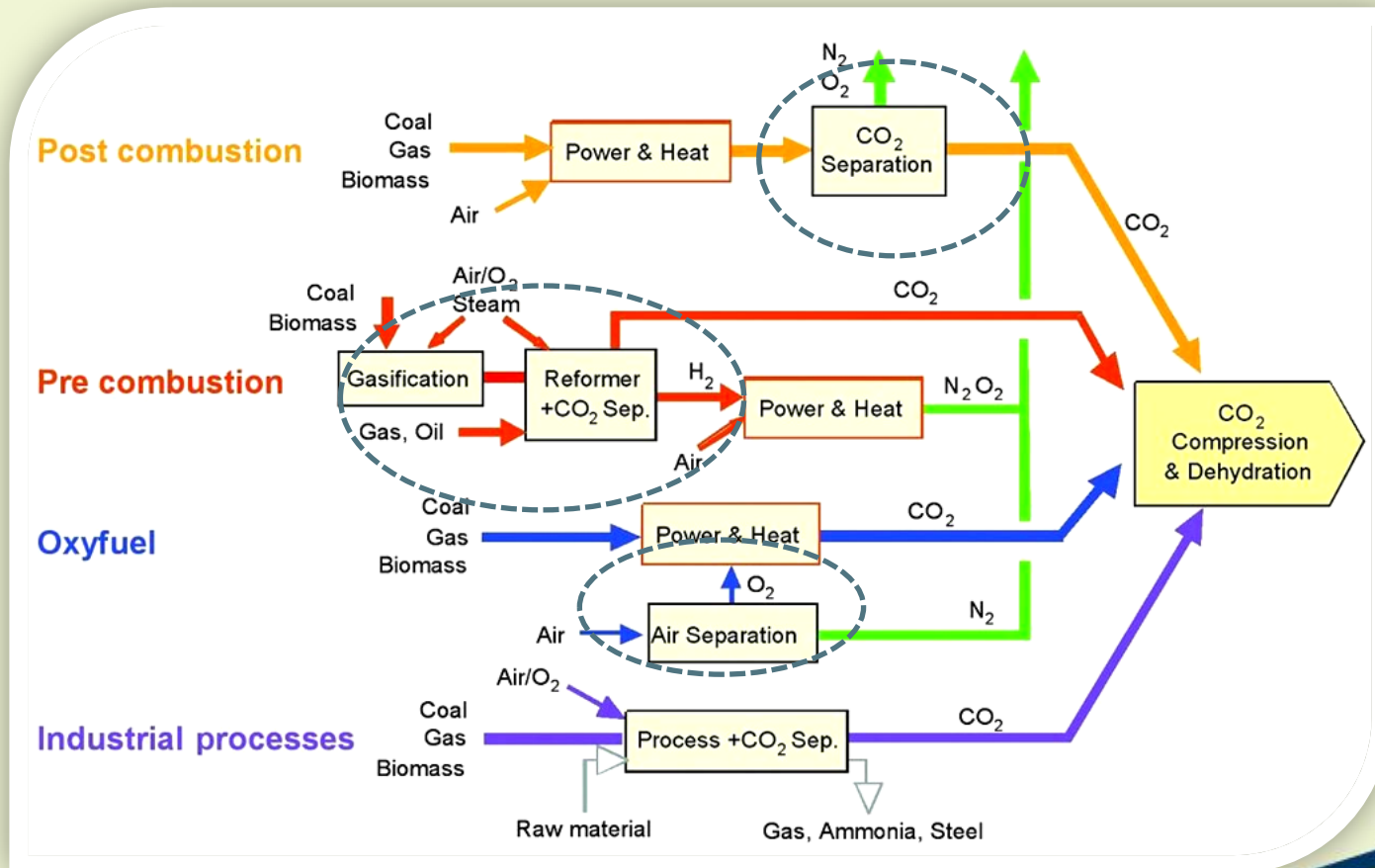
- Capture and storage (CCS)
- Natural process

What is CCS?

Carbon capture and storage (CCS) is a greenhouse gas emissions reducing option that involves an integrated process of separating and compressing CO₂ from other gases, transporting it to the storage site either by pipe line or ocean ships and storing CO₂ into deep geological formations where it will be trapped for thousands or millions of years.

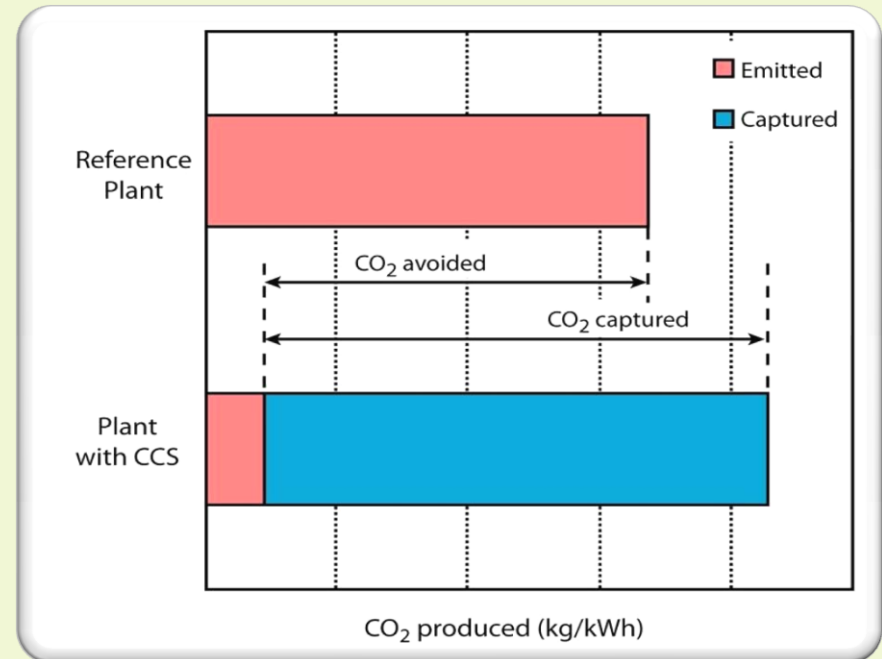


ABOUT CARBON CAPTURE AND STORAGE TECHNOLOGIES



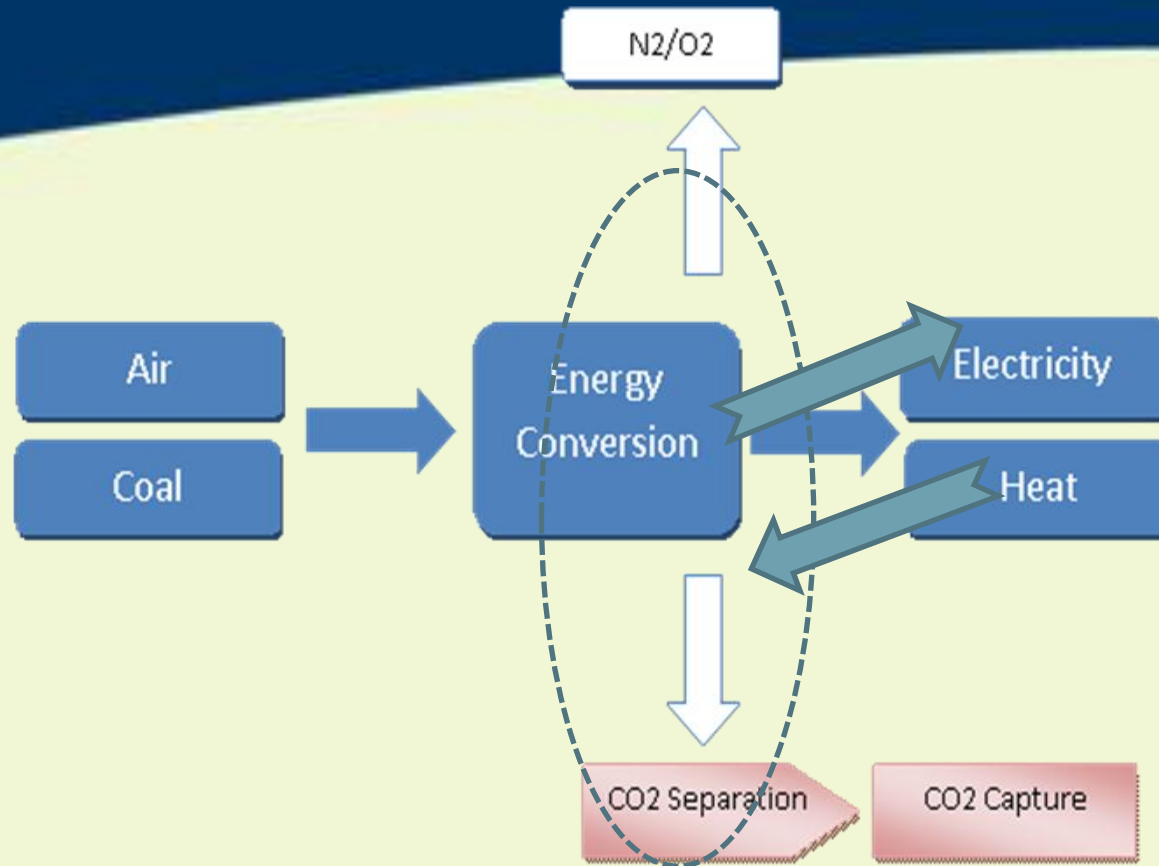
ENERGY PENALTY: THE CRITICAL HINDRANCE FOR CCS ADOPTION

- The CCS process consumes as much as 10-40% of power plant energy causing energy penalty and emission
- The capital investment of CCS is high-about 40-60% of the entire plant



Source: IPCC 2005, Special Report on Carbon Dioxide Capture and Storage

CCS process for coal power plant can consume **8 times** of Australian electricity production



MY PROJECT

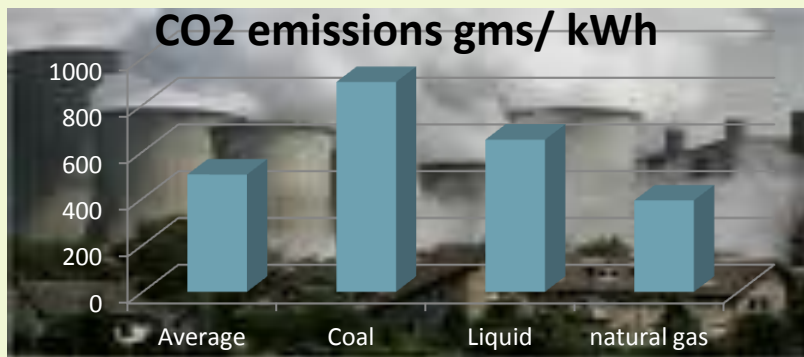
*A simulation model to improve the energy efficiency of **post combustion carbon capture** process in **coal power plant***

WHY POST COMBUSTION CAPTURE?

- Applicable for existing plant
- Post carbon capture causes relatively higher energy penalty, but lower capital investment
- PC Capture accounts 80% cost of CCS
- Energy penalty can be reduced by improving the efficiency of
 - the carbon capture processes and
 - the integration of the capture technology with the power plant

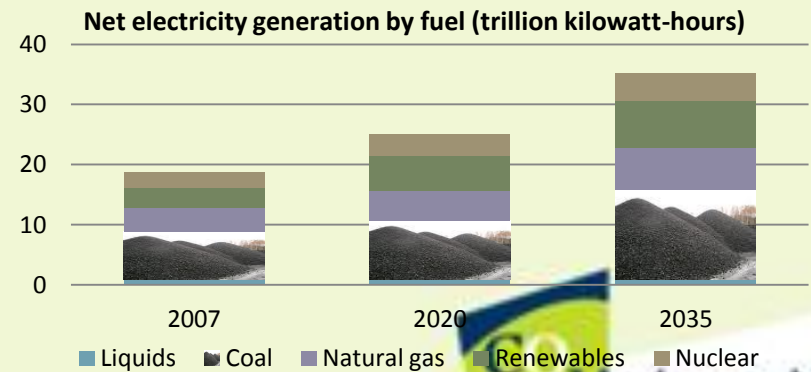
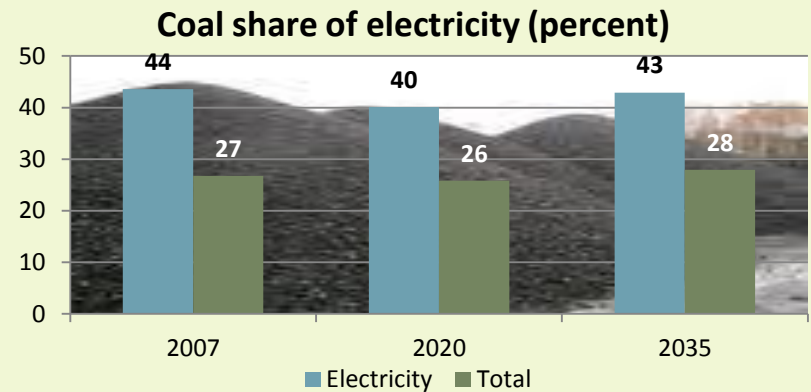
WHY COAL POWER PLANT?

COAL: MAJOR EMITTER OF CO2



Source: IEA 2010, CO2 Emissions from Fuel Combustion

COAL: MAJOR PRIMARY FUEL FOR ELECTRICITY



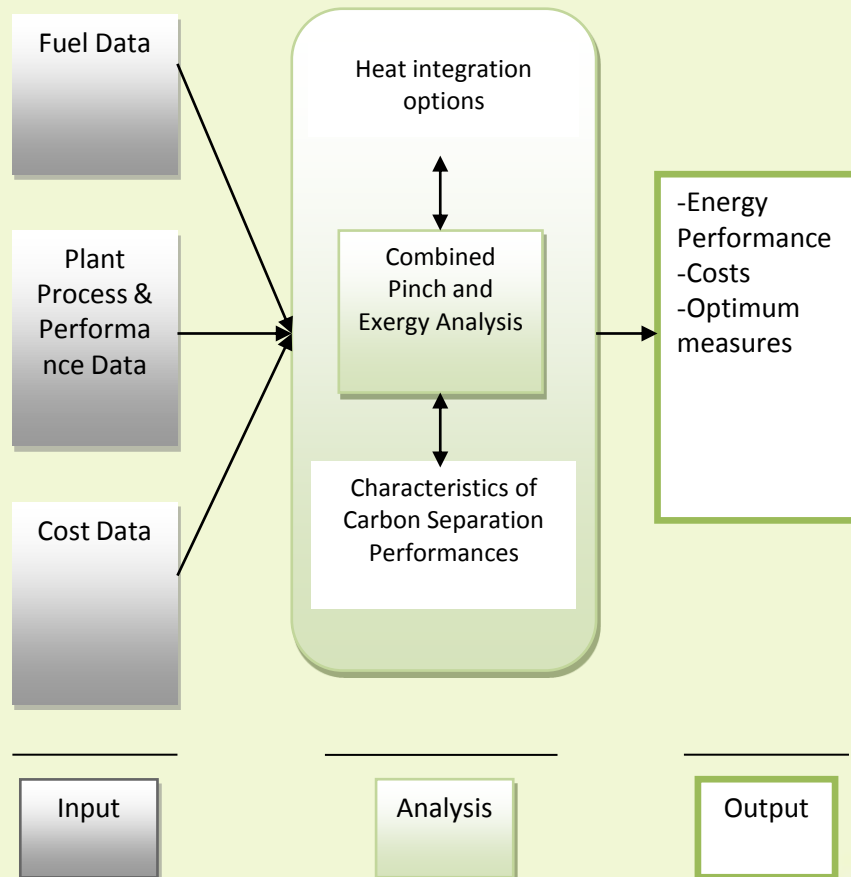
Source: International Energy Outlook 2010
US Energy Information Administration

THE ROLE OF CCS IN A CARBON CONSTRAINED WORLD

- **coal use will increase under any foreseeable scenario because it is cheap and abundant.**
- **CO₂ capture and sequestration (CCS) is the critical enabling technology that would reduce CO₂ emissions significantly while also allowing coal to meet the world's pressing energy needs**

PROCESS INTEGRATION MODEL

Optimizes energy efficiency measures of CCS process integration with the power plant combining strengths of Pinch and Exergy Analysis



- **More on Output**
 - Provides energy efficient design of CCS for existing power plants; and
 - Identifies the most cost-effective integration option for a particular application;
- **Extended Features**
 - Capture ready design
 - Flexible operation of CCS
 - Integration with Power plant control

EXPECTED BENEFITS

- It helps coal power industry of Australia and the world to take positive action towards implementing CCS, thereby, reducing emission
- This can be noted as CQUniversity response towards the emerging global problem

THANK YOU

