



***Coal Technology Investment:  
Developments & Issues Concerning CCS in Australia***

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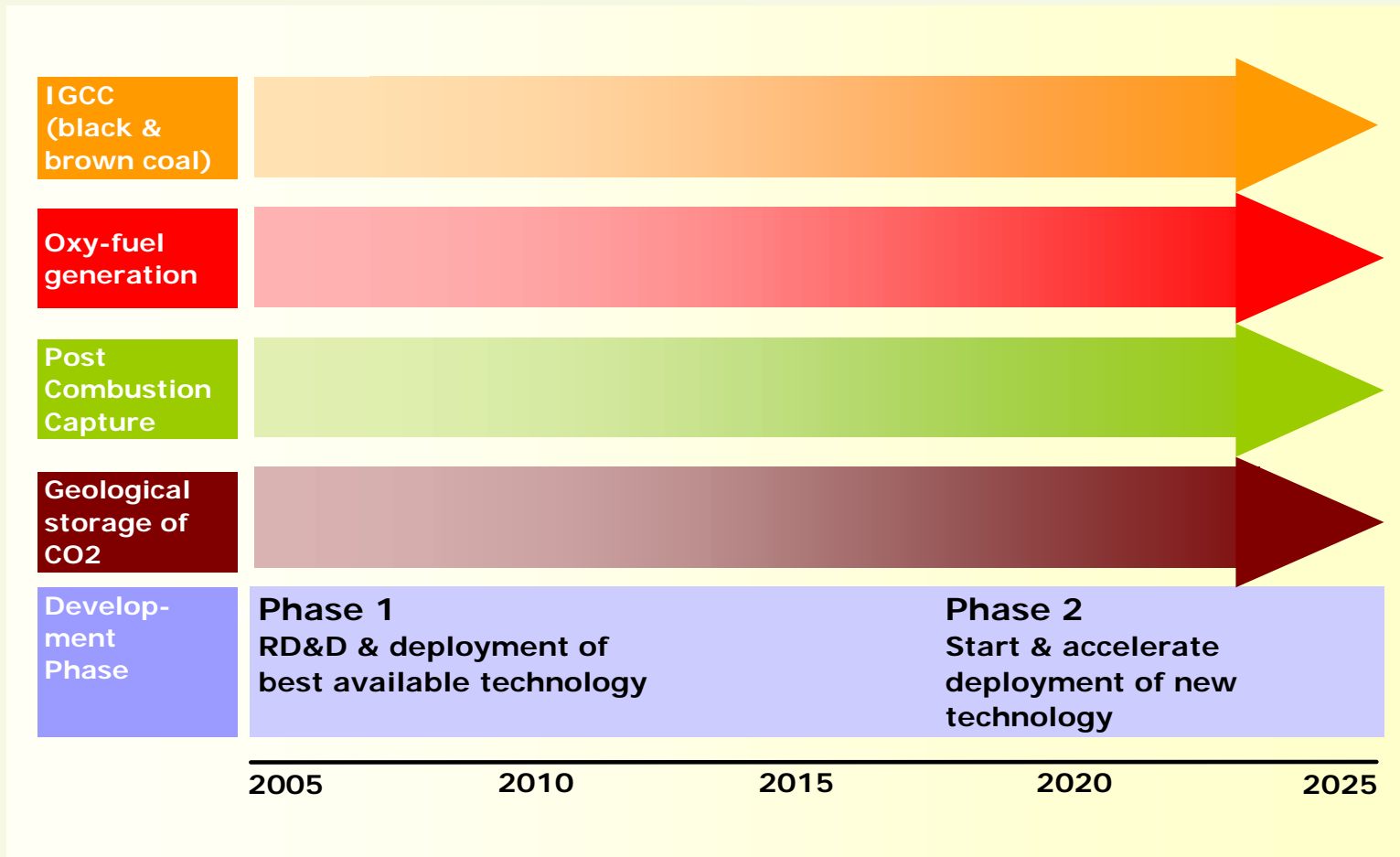


## **COAL21 Objectives**

- Australian National Action Plan for Low Emissions Coal Tech (LET)
- Inform, engage & align govts and industry
- Facilitate LET demonstration & uptake
- Promote supporting R&D
- Foster greater public awareness
- Promote international collaboration



## COAL21 Action Plan





## **COAL21 Fund**

- Voluntary levy on Aus coal production (> 95% buy in)
  - Initial 5yr / AU\$300 million increased to 10 yr / \$1 billion
- For coal LET demonstration projects & supporting R&D
- Managed by ACA Low Emissions Technology Ltd (ACALET)
  - Board (coal co. executives)
  - Tec Advisory Committee (expert advice bought in as needed)
  - Technology Manager
  - Administered by Aus Coal Assoc
- Supported projects:
  - Oxy-fuel - CS Energy Callide Oxyfuel Project
  - IGCC - ZeroGen
  - PCC - CSIRO Post Combustion Capture Project
  - Storage - Otway Project & Geological Reservoir Mapping



## CS Energy Oxy-fuel Project:

- Retrofit oxy-fuel & CO<sub>2</sub> capture to Callide A power station in Queensland

- Partners

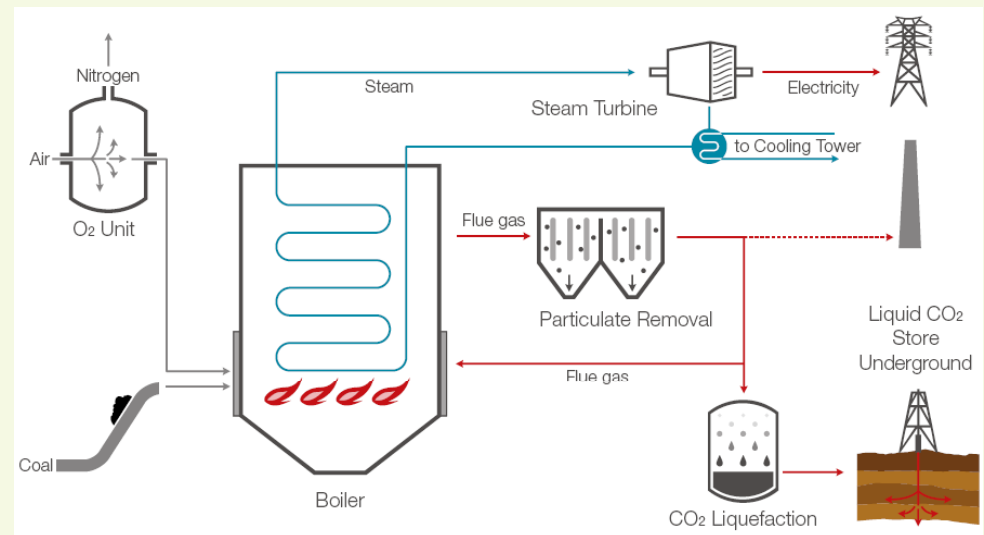
- CS Energy
- IHI
- JPower
- Xstrata
- Schlumberger

- Funders:

- COAL21 Fund - AU\$68M
- Aus Govt - \$50M
- CS Energy/Qld Govt/others - \$88M

- Status:

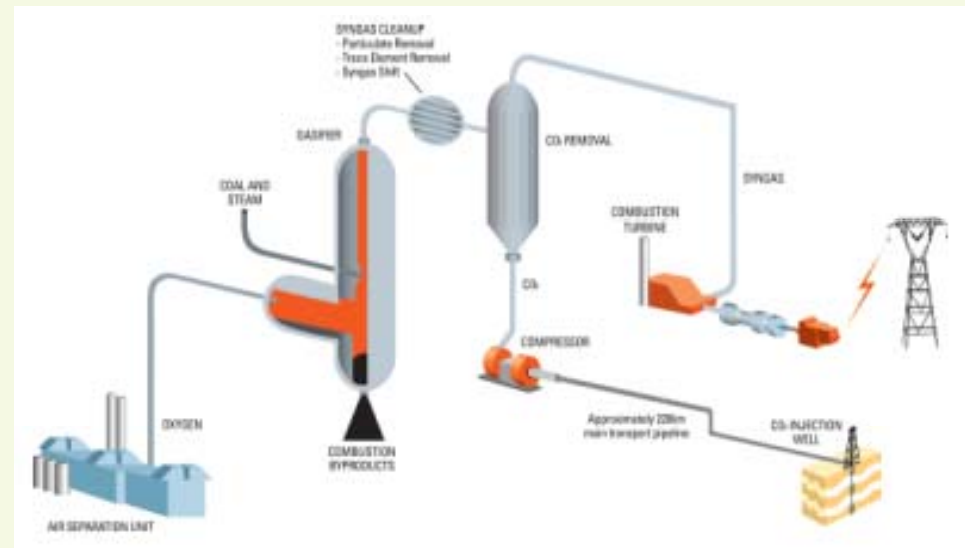
- Feasibility, pilot plant testing done
- Storage site investigations underway
- Plant construction to start late 2008
- Generation from 2010
- Geosequestration from 2011





## ZeroGen Project

- Two stage approach to accelerate large-scale IGCC/CCS
- Stage 1 (by 2012)
  - 80 MW IGCC demo plant
  - CCS (~ 75% CO<sub>2</sub>)
  - GE 6FA gas turbine – pathway to Stage 2
- Stage 2 (by 2017)
  - 300 MW IGCC
  - CCS (~ 90% CO<sub>2</sub>)
  - Next generation large scale high H<sub>2</sub> turbine
- Partners (so far):
  - ZeroGen (Qld Govt/Stanwell Corp)
  - Shell Development Aus
  - COAL21 Fund (AU\$300M)
- Next steps
  - Complete Stage 1 feasibility & fund build
  - Stage 2 Pre-feasibility





## **New South Wales Post Combustion Capture Project**

- Partners (~ AU\$150M)
  - NSW Govt
  - Delta Electricity
  - CSIRO
  - COAL21 Fund (\$50M)
- Pilot capture plant
  - Munmorah power station
  - Ammonia based absorption suited to Aus conditions
- Storage assessment/characterisation
  - Build on previous basin studies
  - Identify test well site by mid-2010
- Integrated PCC & storage demo
  - Install PCC on existing power station
  - Scalable to commercial size
  - Operational by 2014



## Geological storage

- Otway Project (CO2CRC)
  - Stage 1 demo underway (injection into Victorian natural gas reservoir)
  - Stage 2 to target a saline aquifer (enhanced monitoring & verification)
- Regional storage assessments
  - Queensland & New South Wales
  - Assess storage potential
  - Develop storage capability
  - Understand & manage risks
  - Identify large scale/acceptable storage sites



**Otway Project Schematic**

[www.co2crc.com.au](http://www.co2crc.com.au)





## **Vision of success – key elements**

- Political framework & support
  - Qld & NSW Clean Coal Councils
  - National Low Emissions Coal Council
  - National Storage Taskforce (ACA, WWF, mining union, The Climate Institute)
- Effective collaboration
  - Genuine cooperation, not competition
  - All key players (govts, producers, generators, OEMs, researchers)
- Clear aspirations for commercial plant
  - Demos are crucial, but not the objective
  - Demos must be on pathways to commercialisation
- Financial incentives
  - Including emissions trading, but ET alone is not enough
  - Upfront support is essential to overcome market failure
- Supporting regulation
  - Federal (offshore) CCS legislation has been drafted
  - State (onshore) legislation under development



## Threats to success – key challenges

- Plant costs
  - Worldwide equip/infra cost escalation
  - Widens the cost gap between conventional & new generation (demo & commercial) plant
- Long project lead times
  - Increasing urgency for meaningful GHG reductions
  - Early significant progress is important
  - Momentum must be sustained
- Stakeholder buy-in
  - Generators    ➤ Equipment suppliers
  - NGOs        ➤ Public
- Public understanding/acceptance
  - Outreach & education is as important as the technology
- Lack of urgency globally
  - Are we taking baby steps?



## Take-aways



Australia is moving on all the key technologies for coal, but it's just the beginning of a decades long program.

A nation-building approach to carbon capture and storage is needed, based on public enthusiasm, political commitment and a shared vision of success.

Coal technologies must demonstrate significant early progress & sustained momentum if they are to stay relevant to the debate – we cannot risk being on the slow train.

Emissions limits and trading are necessary, but not sufficient - supplementary targeted CCS programs are essential.