Coal Technology Investment: Developments & Issues Concerning CCS in Australia

Ross Willims
Chair, ACA Low Emissions Technology Ltd

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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

- **IGCC (black & brown coal)**
- **Oxy-fuel generation**
- **Post Combustion Capture**
- **Geological storage of CO2**

**Development Phase**

- **Phase 1**
  - RD&D & deployment of best available technology
- **Phase 2**
  - Start & accelerate deployment of new technology

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<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
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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 & CO₂ 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% CO2)
  - GE 6FA gas turbine – pathway to Stage 2
- Stage 2 (by 2017)
  - 300 MW IGCC
  - CCS (~ 90% CO2)
  - Next generation large scale high H2 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
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.