



ZEROGEN COMMERCIAL SCALE INTEGRATED GASIFICATION COMBINED CYCLE (IGCC) WITH CARBON CAPTURE AND STORAGE (CCS)

Presentation to Project Interaction and Review Team, Canberra – February 2010

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What is the ZeroGen Project?

► The Project will:

- Design, construct, demonstrate and operate one of the world's first commercial scale integrated gasification combined cycle (IGCC) with carbon capture and storage (CCS) technology
- 530MW (gross) initially capturing 65% of CO₂ emissions, moving towards 90% or up to 100 million tonnes during demonstration phase
- Prove the effectiveness, safety and permanence of CO₂ geosequestration
- Validate the engineering, economic and environmental viability of advanced, coal based, low emission technologies so that similar plants, at industrial scale will be bankable technically
- Standardise technologies and protocols for CO₂ measuring, monitoring and verification

Objectives

- ▶ Accelerate the development and deployment of IGCC and CCS technologies in Australia and globally
- ▶ Assist in providing Australia with a low carbon future while continuing to provide dependable, competitive energy in an active carbon market
- ▶ Ensure the continued mining, export and use of Australian black coal and support this \$50 billion industry

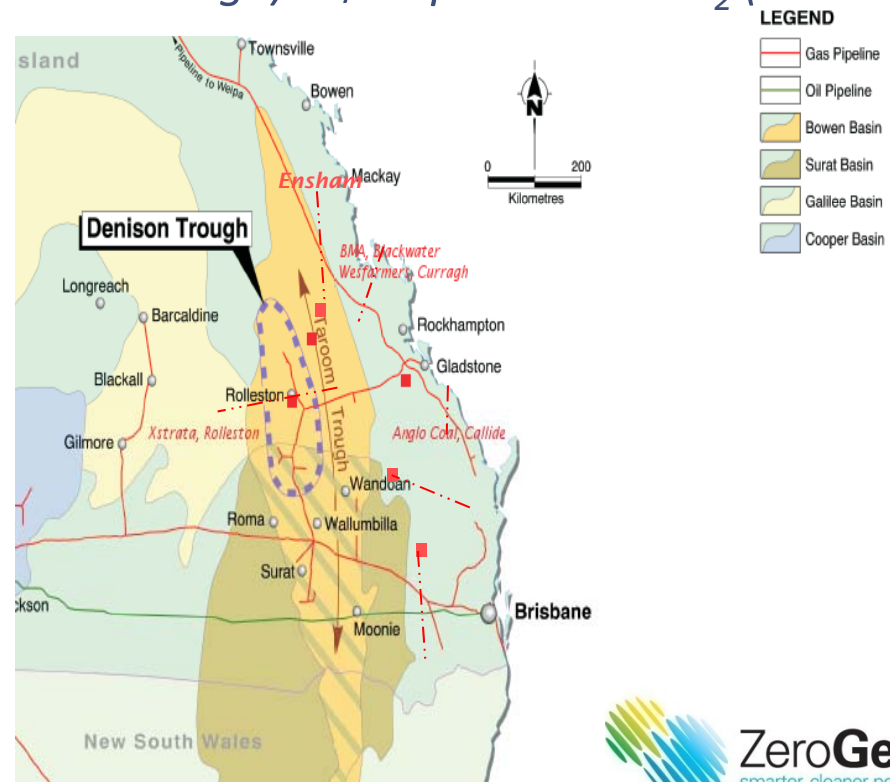


Carbon transport and storage

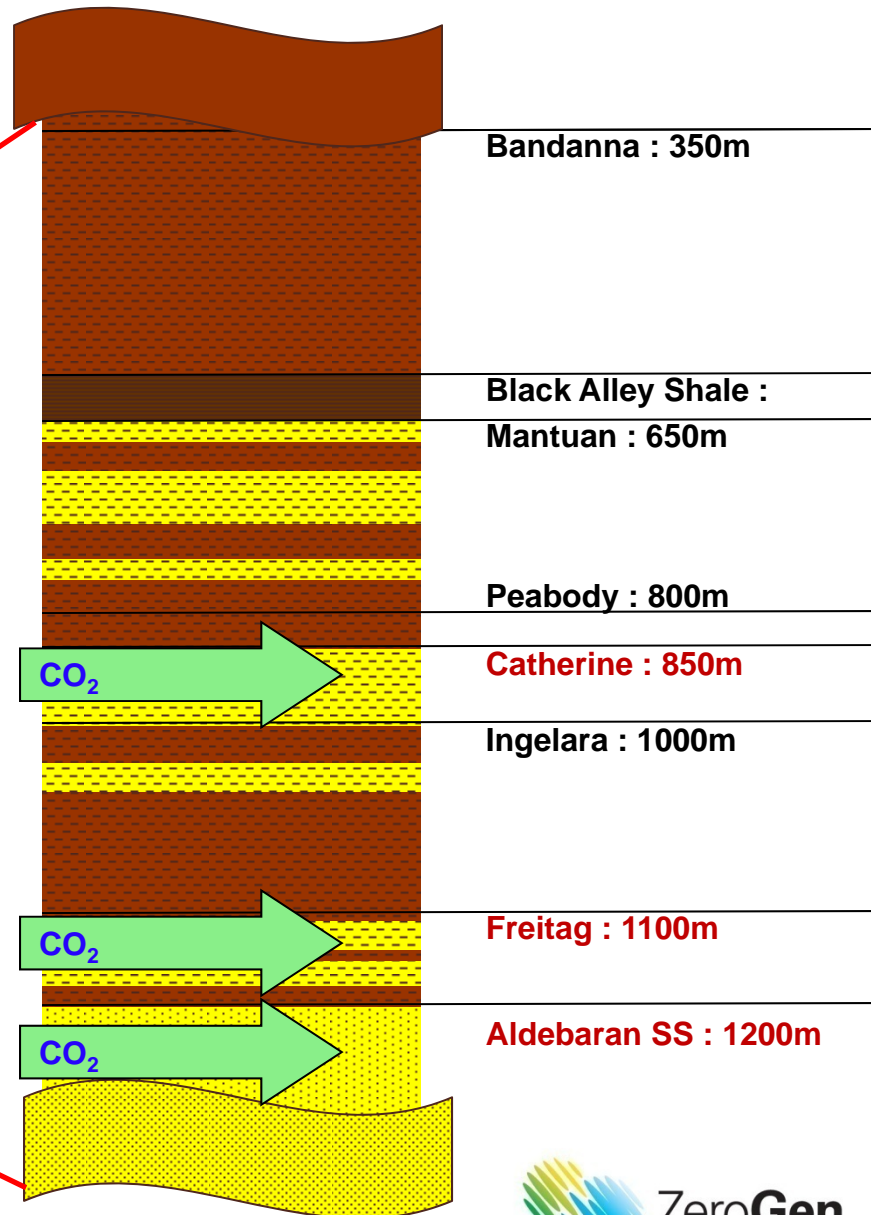
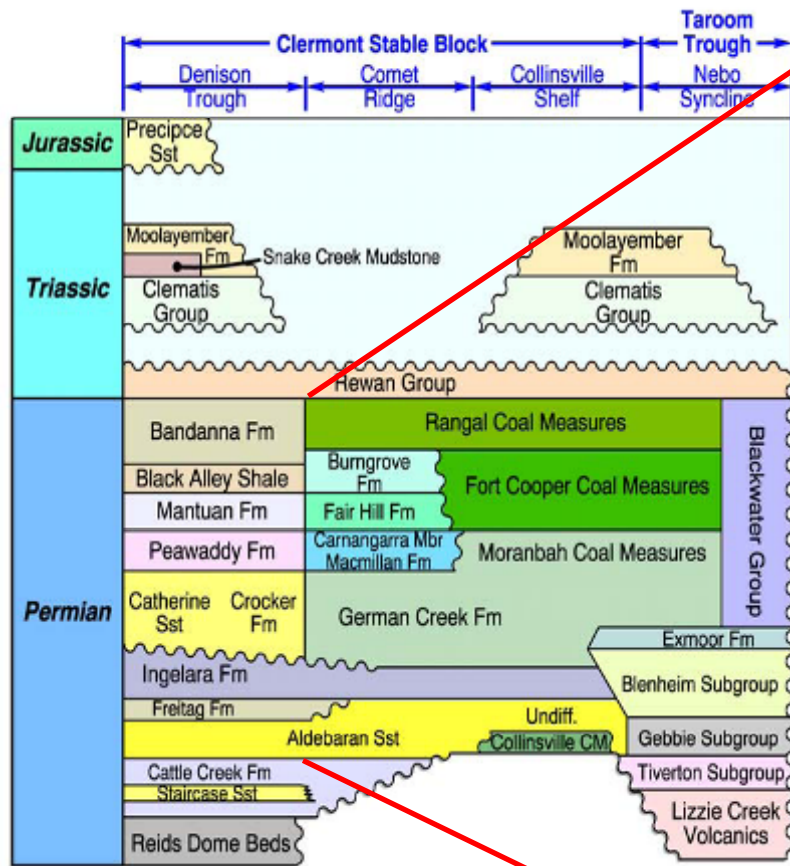
- ▶ ZeroGen is focussed on supercritical storage in deep sandstone formations of Northern Denison Trough.
- ▶ To meet target deployment schedule – operational by 2015 – Carbon Transport & Storage challenge is:

To delineate a sustainable storage capacity of 100 million tonnes with a total sequestration cost (transport & storage) \leq \$50 per tonne CO₂ (including Cost of Capital and O&M).

- ▶ Pre-Feasibility Study will seek to demonstrate this objective to a **P₅₀** level of confidence, by early 2010.
- ▶ Feasibility Study will seek to demonstrate this objective to a **P₇₅** level of confidence, by mid 2011



Stratigraphy (Bowen Basin)

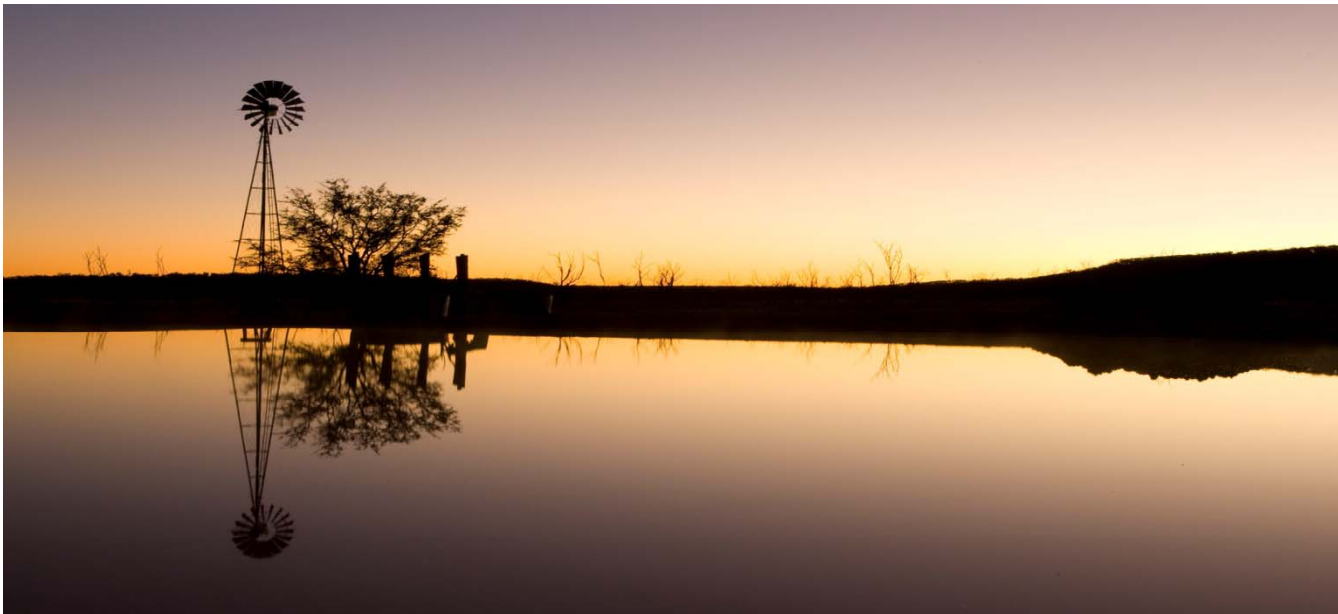


Injection would occur below 900m

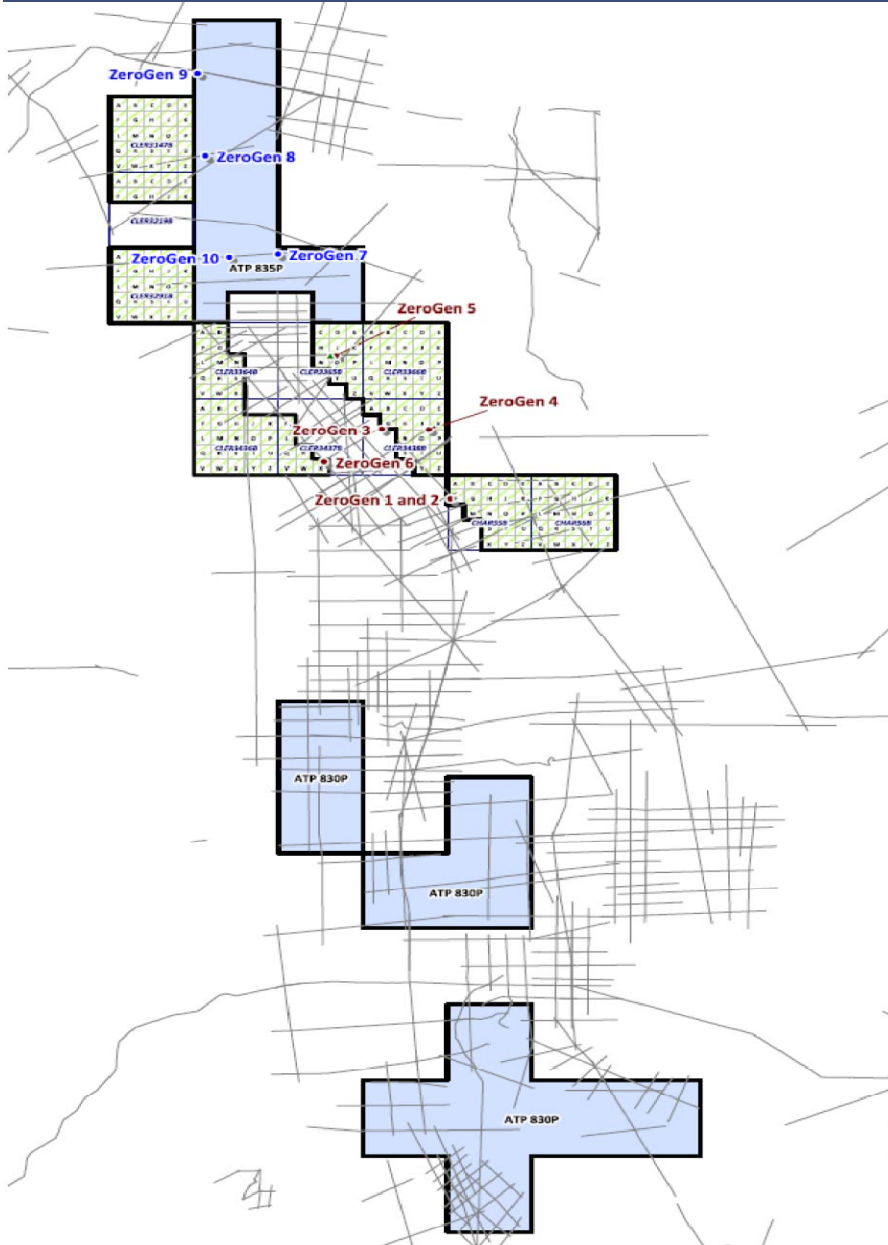
ZERAGEN: LOW EMISSION POWER WITH CARBON STORAGE

Plant Location

- ▶ Plant location will be chosen to optimise factors such as coal supply, transmission, CO₂ transport and storage
- ▶ Currently shortlisted to 3 mine-mouth options plus 1 independent site
- ▶ Selection to be finalised in Q1 2010, with single preferred case to carry forward to Feasibility Study



GHG Exploration Tenements



- ▶ Tenements are essential to progress any exploration program
- ▶ Under Qld *Greenhouse Gas Storage Act*, ZeroGen acquired Greenhouse Gas Exploration Permits
- ▶ ZeroGen is the only organisation at present to hold these permits under Queensland legislation
- ▶ Total area of tenements
 - ▶ 1,225.5km²

Timetable

- ▶ **Prefeasibility Study Completion**
 - ▶ *June 2010*
- ▶ **Feasibility Study Completion**
 - ▶ *End 2011*
- ▶ **Plant Operational**
 - ▶ *End 2015*



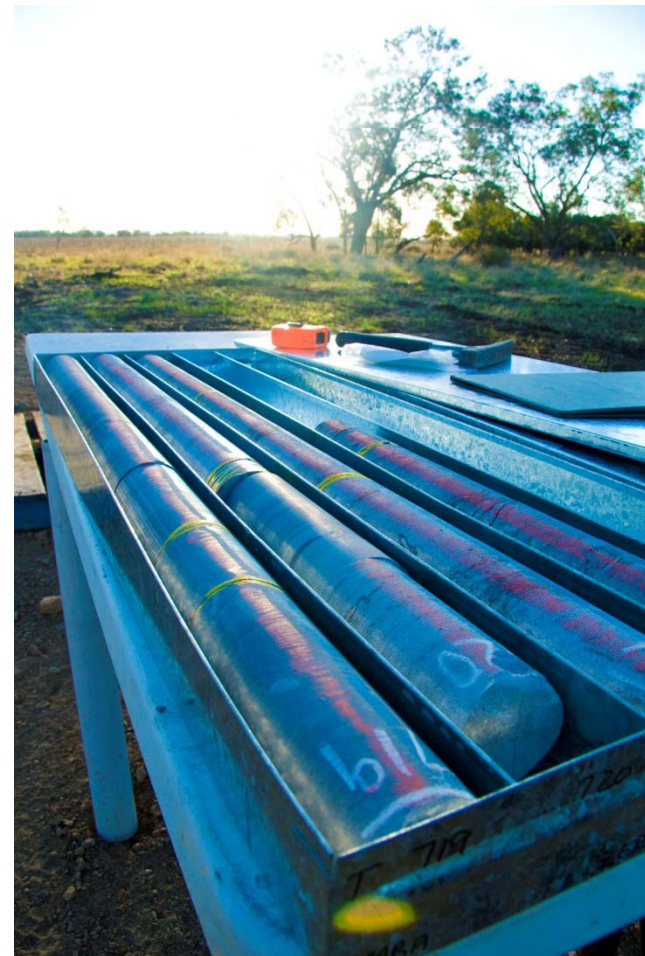
Progress

ZeroGen commenced the first Supercritical CO₂ injection test in Australia as part of exploration activities near Emerald last November



Progress: Storage exploration

- ▶ 12 wells drilled in Northern Denison Trough by end 2009
- ▶ Confirmed potential to safely store injected CO₂ long term
- ▶ 7 km of core extracted and analysed
- ▶ Learning by doing ZeroGen has expertise in:
 - Managing CO₂ exploration program
 - Optimising well field design
 - Developing tests and methodology to achieve storage confidence
 - Optimising costs of CO₂ exploration
 - Sub-surface storage to different geologies



Progress: Studies completed

- ▶ AECOM Engineers have prepared their site evaluation report based on the shortlisted sites to support ZeroGen's site selection decision
- ▶ Desktop corridor studies for natural gas, water and CO2 pipelines and high voltage transmission line have been completed by RLMS for each of the shortlisted sites
- ▶ Hatch Engineers completed evaluation studies for the pipelines for shortlisted sites



- ▶ Water resource assessments for each of the shortlisted site locations completed by 4T Consultants
- ▶ ROAM Consulting completed report on network connection points for each shortlisted site

Progress: Consultancies, tests

- ▶ A 100 tonne sample from each shortlisted site shipped to MHI in Japan in readiness for gasification test
- ▶ UOP has been selected as the preferred technology provider for the Acid Gas Removal process (H₂S removal and CO₂ capture)
- ▶ Haldor Topsoe has been selected as the technology provider to convert Hydrogen Sulphide to sulphuric acid
- ▶ State significant project declaration by Queensland Coordinator General
- ▶ URS selected to conduct EIS
- ▶ Draft Terms of Reference about to be issued - Community consultation on draft TOR begin later this month

Progress: Design

- ▶ Mitsubishi continue to make good progress with the process engineering design
- ▶ Negotiations have commenced with MHI on the details of the EPC contract terms
- ▶ A detailed risk register has been developed to identify technical risks and their mitigation strategies



Progress: Funding, partners

- ▶ State Government
- ▶ ACALET
- ▶ Mitsubishi Corporation
- ▶ Mitsubishi Heavy Industries
- ▶ Federal Government
- ▶ Shortlisted under CCS Flagships program
- ▶ Mitsubishi Corporation and MHI considering shareholding



Next steps

- ▶ Environmental Impact Study
- ▶ Community consultation
- ▶ Power plant site selection
- ▶ Finalise analysis of Northern Denison Trough exploration program
- ▶ Finalise EPC contract
- ▶ Appoint consultant to conduct pipeline / transmission corridors studies
- ▶ Complete pre-feasibility study report end June.





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ZeroGen
smarter, cleaner power