



G8-IEA-CSLF Workshop on Near-Term Opportunities for Carbon Capture and Storage (CCS):

Panel 2 Developed Economies (Australia)

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Overview of Australia CCS Activities

Proposed Projects

- Gorgon Project (Chevron) – Gas processing with CO₂ disposal (2.5-3.0 MTPA) in Dupuy Formation below Barrow Island (NW Western Australia) www.gorgon.com.au
- ZeroGen (Stanwell Energy) – Coal IGOC or IGCC with CCS (420,000 TPA) in the Denison Trough www.zerogen.com.au
- Monash Energy (Anglo American) – Brown coal to liquids with CCS in Gippsland Basin www.monashenergy.com.au

Private / Public R&D – CO₂CRC Principal Focus

Australian Government

- Low Emissions Technology Demonstration Fund (LETDF)
- Latrobe Valley CO₂ Storage Assessment - Disposal of CO₂ (2, 15 & 50 MPTA scenarios) from new coal developments in Gippsland basin depleted fields and saline aquifers
- CSLF, IEA and APCDC (AP6)



Technical Issues

“Cooperative Research Centre for Greenhouse Technologies” (CO2CRC)

- 7 Year (2003-2010) ~\$AU140MM Project w/ >25 R&D, industry, government and supporting participants from Australia & New Zealand
- Storage assurance – high value issues in site assessment, subsurface process and monitoring
- Capture cost reduction – enhanced and new separation and capture processes
- Demonstration (Otway Basin Pilot*) – of the capture, transportation and storage
- Special Projects - regional surveys & risk assessment
- Commercialization (ICTPL) – IP issues, proprietary projects
- Communication, Education & Training
- International Collaboration

“Coal21” initiative established in 2003 as a partnership with between state and federal governments, the coal and electricity industries and the research community to advance technology developments (including geosequestration)

“Energy Transformed” R&D project conducted by CSIRO to include among other studies, geosequestration

*Otway Basin Pilot Project (OBPP) – Onshore Victoria; 100,000T over 2 years with comprehensive modeling / simulation and baseline and repeat monitoring program.



Commercial / Financial Issues

The Government:

Requires industry to undertake **"no regrets" measures** (Projects that have an economic return e.g., efficiency improvement)

Encourages industry to undertake **"beyond no regrets"* measures** (Projects that incur an economic cost but reduce emissions)

Programs in place

- Australian Greenhouse Office **"Voluntary" Greenhouse Challenge Plus Program**
- **Low Emissions Technology Demonstration Fund (LETDF)** – offers \$1 for every \$2 spent by industry for projects that demonstrate new low greenhouse emissions technology (Total fund available for all proponents is \$AU0.5B).

* How can "beyond no regrets" measures be encouraged without a cost of carbon to the economy?



Legal and Regulatory (1)

The *Barrow Island Act 2003* (WA) is the **only existing geosequestration legislation in Australia** – Restricted to Gorgon project activities on Barrow Island

Existing environmental laws at State and Federal Level are **adequate to allow for environmental impact assessment of geosequestration** proposals as evidenced by the Gorgon Project Environmental Impact Statement / Environmental Review and Management Program (EIS/ERMP)

The Ministerial Council on Mineral and Petroleum Resources (MCMPR) has produced a draft **“Guiding Regulatory Framework”** in cooperation state, federal and territory jurisdictions which is aimed to facilitate:

- **Investment certainty** for geosequestration projects;
- **Public confidence** that natural resources management, environmental impacts and health and safety issues have been addressed; and
- **Consistency** in the application and regulation of geosequestration technologies and processes
- **Other issues related to access & property rights, long term responsibilities, environmental issues, authorization & compliance, monitoring & verification, transportation and financial issues**
- Principles approved by states in Nov. 2005; Now legislation?



Legal and Regulatory (2)

Proposal for legislation dealing with CCS exploration and access rights in offshore waters administered by the Federal Government which is modeled on Australian Petroleum Legislation. Covers the **right to explore, retain an area for future geosequestration and operate a CO₂ injection project**

- **In place by mid-2007?**
- **Possible overlap with oil & gas interests?**

House of Representatives (Federal Parliament) inquiry into geosequestration (science, risk / benefit, etc.) – conflict with MCMPR?

Might existing regulations be adapted to the regulate the geosequestration lifecycle based on sound site selection criteria and operating practices?



Other Issues

Public Education and Outreach Issues

The Australian GHG Office (www.greenhouse.gov.au) provides general information on climate change science and GHG reduction technologies with strategies to for businesses and residents to achieve reductions

The CO2CRC communications group provides technical information to government, media and private concerns

Project proponents have held or are planning to hold public forums on proposed geosequestration projects (Gorgon, Latrobe Valley, etc.)

International Mechanisms

Kyoto based mechanisms are not available to industry in Australia

The Federal Government has demonstrated its commitment apply resources to international organizations such as CSLF, IPCC and APCDC



Issues and Opportunities

What is the potential for near term opportunities? Gas processing. Little to no potential for ECBM and EOR.

What are the niches, status and outlook for near term technologies? Coal to liquids? GTL?

How can near term opportunities facilitate widespread implementation? Successful demonstrations, public-private partnerships, economics.

What are the commercialization lessons from current projects? Regulatory trail-blazing is difficult and time-consuming.

What are the issues and concerns of stakeholders? Universal: resources diverted from renewables, leakage, increased energy costs

What barriers must be overcome? Capture costs from power generation. Communication of risk to stakeholders. Urgency of the GHG issue.

What types of policies are needed to implement near term opportunity projects? Favorable and consistent regulations. Financial instruments.

Summary

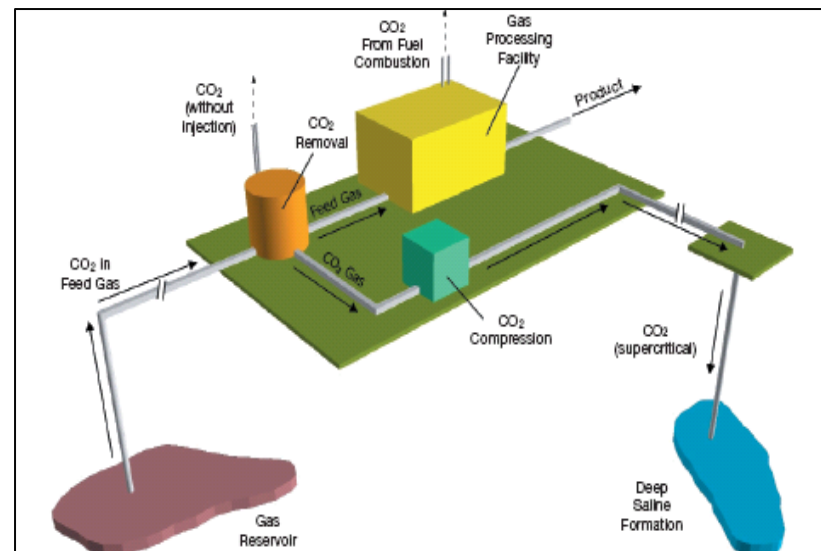
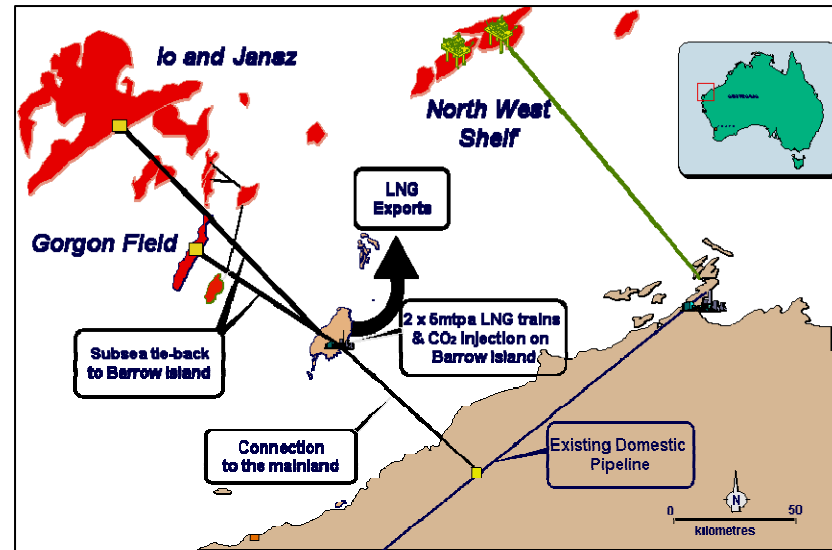
Australia is a leader in science and technology of geosequestration and perhaps the most advanced in terms of legislation

Government can continue to encourage the voluntary uptake of geosequestration by:

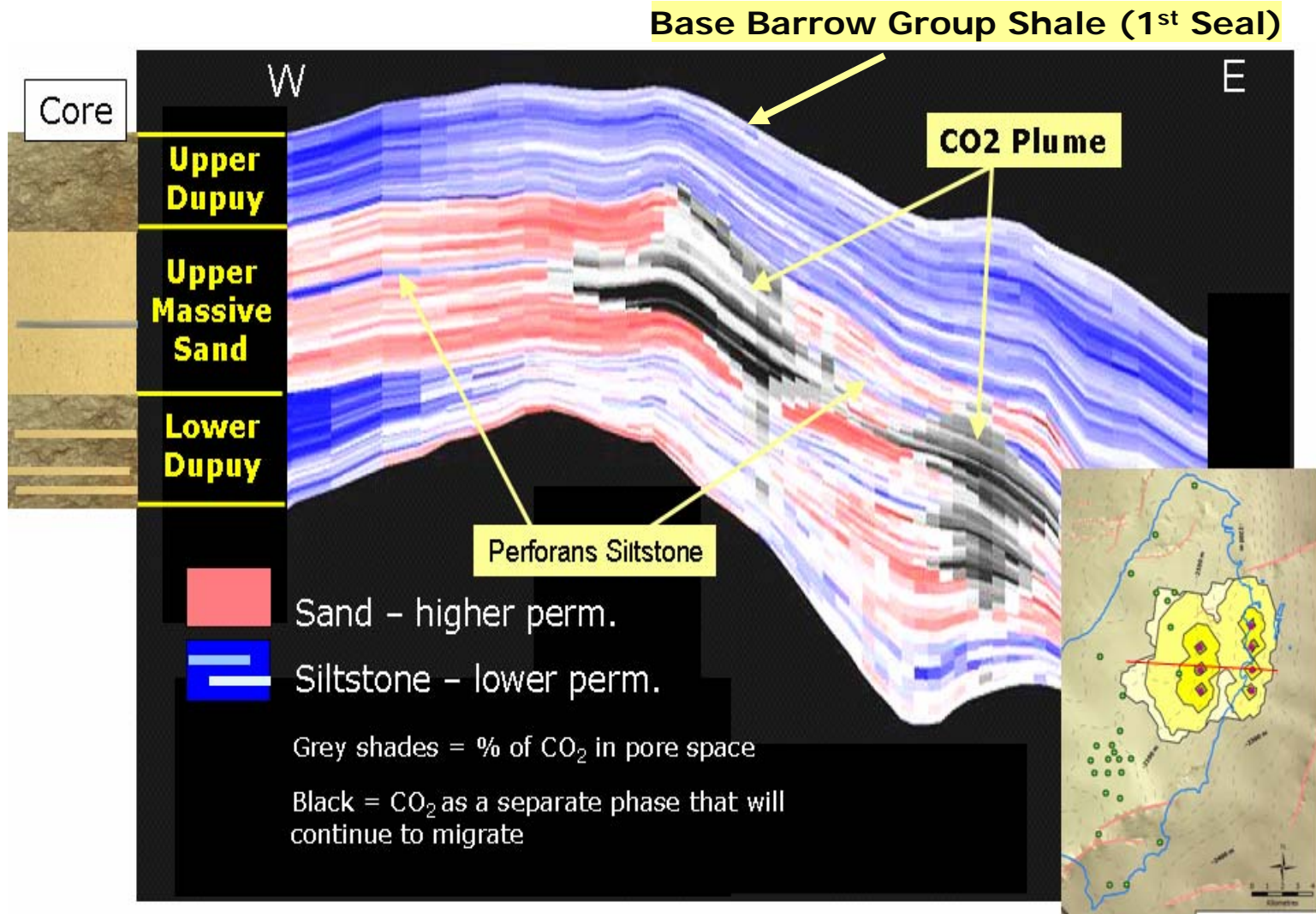
- putting in place a regulatory environment that encourages the uptake of geosequestration rather than acting as a disincentive
- providing targeted financial support for geosequestration projects
- ensuring proponents of early geosequestration projects are not disadvantaged in the event of the introduction of a cost-of-carbon to the economy
- implementing a policy where government assumes the long term responsibility of a geosequestration site once certain site-closure criteria have been met.

Gorgon: Project Summary

- 10 MTPA LNG development on Barrow Island
- Subsea development of the Gorgon and Jansz gas fields
- Reservoir CO₂ removed during gas processing proposed to be injected into the Dupuy Formation 2300m below Barrow Island
- 120 million tonnes CO₂ available for injection over the life of the project
- Project subject to a coordinated Federal and State Environmental Impact Assessment
- Project subject to
 - Environmental approval
 - State Government approval
 - Joint Venture approval



Gorgon: Field Development Plan & Plume Movement





Gorgon: Technical Issues

Site Suitability*

- Comparative Study of Area Sites – Regional techno-economic criteria
- Reservoir & Seal Characterization – Capacity, structure-stratigraphy, barriers
- Injectivity – Permeability distribution suitable
- Fluid Saturations – Potential for mobilizing hydrocarbon fluids
- Migration Pathways – Avoidance of system vulnerabilities (wells, faults)

Permanence*

- Simulation - Flow vectors and rate / extent of trapping mechanisms
- Pressure Field Evolution – Improvement of security with time
- Wells – New well design and existing well remediation

Surveillance Program – Seismic, observation well(s), Near Surface

Uncertainty Management Plan – Contingencies & intervention opportunities

* Issues addressed by CO₂ Data Well Drilled at Barrow Island (2006)