Chevron’s Climate Change Position and Action Plan

**Position:** We at Chevron Corporation are responding to increasing climate change concerns by integrating an action-based approach into our business strategy.
Greater Gorgon Development Plan

- **Janz Field**
- **Gorgon Field**
- **Subsea tie-back to Barrow Island**
- **Domestic Gas Connection to the mainland**
- **North West Shelf**
- **LNG Exports**
- **2 x 5mtpa LNG trains & CO₂ Injection on Barrow Island**
- **Existing Domestic Pipeline**
- **LNG Exports**
- **Karratha**
- **Onslow**

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GHG Management Strategy

- Gorgon GHG Management Strategy continues to guide decision making
- LNG process technology & gas turbine & waste heat recovery configuration
  - Major drivers of plant efficiency
  - Represent currently applied best practice but not unproven or ‘leading edge’ practice
- Injection of reservoir CO₂ is an opportunity to significantly reduce Gorgon GHG emissions
GHG Emissions - Efficiency Improvements

- 1998Concept - Greenhouse Challenge Agreement: 0.89
- Use of Sub-Sea Production System: 0.06
- LNG Technology Improvement: 0.20
- Improved Waste Heat Recovery: 0.06
- Reservoir CO2 Injection: 0.20
- Reference Case Emissions Efficiency: 0.35
- Potential for Further Reductions Based on Performance Targets: 0.07

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GHG Emissions – LNG Benchmarking

Australian LNG

North West Shelf (1998) 0.59
North West Shelf (2003) 0.49
North West Shelf - Train 4 0.35
Darwin LNG - 10 MTPA Design 0.44
Gorgon Development 0.46

International LNG Developments

Gorgon Development

Sohanit 0.22
Oran LNG 0.28
Nigeria LNG 0.34
Atlantic LNG 0.36
RedGas 0.39
Qahtars 0.39

Operated by Chevron Australia in joint venture with ExxonMobil

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Gorgon Gas Processing and CO$_2$ Injection

Injection of between 2.7 & 3.2 million tonnes CO$_2$ per annum

Alternative greenhouse abatement options are more costly than CO$_2$ injection and have greater future price uncertainty and security

Gorgon will still emit ~ 3.5 to 4 million tonnes CO$_2$ per annum
Regulation

- *Barrow Island Act 2003* provides:
  - Legislative mechanism for CO₂ conveyance & underground disposal by injection
  - Ongoing management by the BI Act Minister

- Provision for Minister to place conditions or restrictions on the CO₂ disposal
  - Conditions of approval will establish the regulatory framework

- Areas where existing regulations can be applied
  - Federal & State environmental laws
  - State occupational health & safety laws
  - State petroleum pipelines laws (enabled by the BI Act)
  - State regulations for petroleum wells & geophysical surveys
  - Process in the PSLA for ongoing reservoir management
CO₂ Injection Development Concept

Subject to Environmental, State Government and Joint Venture approval

CO₂ compressors and pumps integrated into gas processing facility

7 injection wells drilled from 2 or 3 drill pads

CO₂ pipelines

Fit for purpose monitoring program

Commitment to make data from the ongoing monitoring available to the public
Barrow Island Stratigraphy

Target reservoir for CO₂ injection
2300m

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Containment Mechanisms

- Solution of CO$_2$ into formation water
- Residual gas trapping
- Mineralogical trapping
- Large scale geometric trapping below formation seals

Fine-grained sandstone

1mm
Reservoir Simulation

- Single injection well simulation
- Full reservoir simulation
  - Pressure field
  - Displaced formation water
- Deviations from simulation predictions
  - High permeability layers
  - Down dip migration
  - Existing wells

DM E-W : 5yrs
Dupuy Formation – 5 Years

DM E-W : 5

CO2 Plume

Perforans Siltstone:

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Dupuy Formation – 25 Years

DM E-W : 25

CO2 Plume

Perforans Siltstone:
Dupuy Formation – 100 Years

DM E-W : 100

CO2 Plume

Perforans Siltstone:
Dupuy Formation – 500 Years

Perforans Siltstone:

CO2 Plume
Dupuy Formation – 1000 Years
Monitoring

- Monitoring technologies will evolve over the life of the project.
- A comprehensive CO₂ monitoring program (today’s technology) has been developed focused on seismic technology & observation wells.
- Monitoring to be undertaken in accordance with Barrow Island Act & State Agreement land disturbance provisions.
- Draft EIS/ERMP contains a reference case based on repeat 3D seismic surveys:
  - Use of pre-existing roads etc wherever possible for source lines.
  - Hand carrying all receiver equipment from source line access.
  - Estimated 81km (approx. 35Ha) of new source lines.
  - Includes marine (transition zone) acquisition.
- Likely initial surveys will be acquired at 2-3 year intervals after the injection commences.
Chapter 13 – Greenhouse Gas Emissions Risks and Management

Provides and extensive discussion on Projects greenhouse gas management and the CO2 injection project.