Presentation to the Australian Institute of Company Directors

The State of the Nation’s Oil & Gas

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World Reserves ≈ 40 years production
OECD Reserves ≈ 11 years production
Australia’s own reserves ≈ 10 years own production
Oil production was broadly flat in 2001 compared with the previous year. Strong growth in the Former Soviet Union was offset by a decline in OPEC output.
History of Crude Oil Prices

- Pennslyvania Oil Boom
- Money of the day
- $ 2001
- 1861 - 69
- 1870 - 79
- 1880 - 89
- 1890 - 99
- 1900 - 09
- 1910 - 19
- 1920 - 29
- 1930 - 39
- 1940 - 49
- 1950 - 59
- 1960 - 69
- 1970 - 79
- 1980 - 89
- 1990 - 2001
- 2002 - 03

- Iraq invade
- Kuwait
- Yom Kippur War
- Iranian Revolution
- Pennsylvania Oil Boom

US dollars per barrel

AICD - State of the Nation’s Oil & Gas

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Australian Crude Oil and Condensate Production

Source: APPEA, Geoscience Australia

Year


Actual

Forecast

Gippsland

Total Australia

Production ('000 bbl/d)

0 100 200 300 400 500 600 700 800

209 kb/d

313 kb/d

453 kb/d

724 kb/d

10%

50%

90%
Australian Crude Oil and Petroleum Products Imported

Economic Implications of Higher Oil Imports

- **Balance of Payments:**
  - Surplus/(Deficit) $billion
  - 1999/2000: 0.12
  - 2001/2002: 1.25
  - 2004/2005: (5.60)
  - 2009/2010: (7.60)

- **Energy Security:**
  - Increased reliance of less stable oil exporters - Middle East, Indonesia, etc.

- **Sectoral Impacts - Jobs:**
  - Every 100 jobs created (or lost) in WA oil and gas industry leads to ~300 jobs created (or lost) elsewhere in WA.

- **Government Revenues:**
  - Next slide.

Source: ABARE Energy Projections, Oct 2001, GeoScience Australia
Commonwealth Tax Collections from the Upstream Petroleum Industry

Source: APPEA, Budget Papers
So What can be Done?

- Increase Exploration.
- Increase Recovery from Existing Resources.
- Increase Fuel Substitution - to gas and others.
- Reduce Liquid Fuel Demand - technology.

but

There is little chance to return to self sufficiency
Australian Petroleum Exploration

• Australia has relatively low oil prospectivity compared to other parts of the world.

• Fields are generally smaller and technically more challenging - ie expensive and riskier - heavy oil, deep water, etc.

• Other countries have more attractive terms.
Proved Gas Reserves - Global Picture (2001)

- Middle East: 1,974 Tcf
- Former USSR: 1,982 Tcf

- Europe: 172 Tcf (3%)
- South & Central America: 253 Tcf (5%)
- North America: 267 Tcf (5%)
- Africa: 395 Tcf (7%)
- Asia Pacific: 433 Tcf (8%)
- Middle East: 36%
- Former USSR: 36%
Australia’s Gas Resources and Population Density

- West Coast Population ~ 1.9 million
- East States Population ~ 16.0 million
- Total gas reserves 0.8% of World Reserves
- Australia uses ~1 Tcf/year

West Coast:
- Greater North West Shelf 75 Tcf
- Browse Basin 30 Tcf

Central States:
- Cooper/Eromanga 5 Tcf
- Gippsland/Bass/Otway 8 Tcf

East States:
- PNG 10 Tcf
- Bonaparte 22 Tcf
- Browse Basin 30 Tcf

Australia’s Gas Resources and Population Density

AICD - State of the Nation’s Oil & Gas
Fuel Substitution with Gas

- Create a new source of automotive fuels - gas-to-liquids.
  - But marginal economics where gas has market value.
- Increase balance of payments and revenues by reducing oil imports and increasing gas exports (LNG).
- Increase security of supply.
- Reduce GHG emissions - coal to gas and oil to gas.
Gas to Liquids offers the opportunity to tap almost unlimited markets when compared to LNG alone.
Gas to Liquids

Strategic Drivers

- Abundant remote gas reserves
- Stable investment climate
- Complementary to LNG – Strategic Diversification
- Growing demand for clean fuels

Economic hurdles

- Capital costs of construction
- Gas into plant price- offshore remote gas is an economic challenge
- Fiscal regime
- Local synergies (infrastructure, power, water)

GTL can be a key enabler for the future development of Australia’s gas resources
East Asia LNG Supply/Demand

LNG Supply (Million Tonnes)

- Iran
- Qatar - Other
- Rasgas - Qatar
- Arun/Botang - Indonesia
- Lumut - Brunei
- NWS - Australia
- Sunrise - Australia
- Oman LNG
- Qatargas
- Yemen LNG
- Gorgon - Australia
- Malaysia LNG
- Sakhalin - Russia
- Tangguh - Indonesia
- Bayu Undan
- NWS - Australia

LNG Demand (Million Tonnes)

- Contestable Demand
- Contracted Supply

Source: CERA - December 2002

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Regional Resources

Legend

Suppliers:
- Existing
- Near Future

Markets:
- Existing
- Near Future

- Malaysia
  - MLNG I - III
  - Tangguh
- Brunei
  - Lumut
- Indonesia
  - Arun
  - Badak
  - Tangguh
- Oman
  - Qalhat
- Qatar
  - Qatargas & RasGas
- Yemen
  - Balhaf
- Russia
  - Sakhalin II
- Alaska
  - Kenai
- Japan
  - Taiwan
  - SE China
- SE Asia
  - South Korea
- India
- South Korea
- Iran
  - South Pars
- Abu Dhabi
  - Das Island
- Qatargas
- Brunei
- Lumut
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Australia’s Gas Resource Ownership

- WA-267-P
- Scarborough
- Bayu Undan
- Sunrise
- NWS Uncontracted
- Brecknock - Scott Reef
- Greater Gorgon

Woodside
Shell
ChevronTexaco
ExxonMobil
BHPB
BP
MIMI
ConocoPhillips

Trillion Cubic Feet (Tcf)

0 5 10 15 20 25

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Competing Uncommitted Reserves Interests of Majors

P50 Reserves - Trillion Cubic Feet

- Shell
- ExxonMobil
- ChevronTexaco
- BP
- Woodside
- ConocoPhillips
- Other

AICD - State of the Nation’s Oil & Gas
World Emissions by Region

- **USA** (30.3%)
- **Canada** (2.3%)
- **Europe** (27.7%)
- **Former Soviet Union** (13.7%)
- **China, India & Developing Asia** (12.2%)
- **Japan** (3.7%)
- **Australia** (1.1%)
- **Other Developing countries** (8.9%)

Source: World Resources Institute, 1999

Has announced intention to ratify Kyoto

AICD - State of the Nation’s Oil & Gas
Australia Projections

1990 to 2010 Projections:

- 116% accounting for land use changes and forestry.
- 130% without accounting for land use changes.
- 144% if no abatement and business as usual.
Greenhouse Gases

- Australia/Global have accepted the need to reduce Greenhouse Gas emissions.
- Woodside operations have voluntarily reduced emissions intensity by 45% between 1996 and 2002.
- Need to approach Greenhouse Gas abatement with a national and international perspective.
- Need to address the flaws in Kyoto protocol.
- Need to develop a longer term plan for addressing GHG to improve business investment certainty.
Lifecycle Emissions Comparison

Kg CO$_2$-e/Mwh electricity generated.

- **Inside Australia**
- **Inside Japan**

Source: CSIRO

Note: oil emissions calculated using Middle Eastern oil (Australian oil is expected to produce slightly lower CO$_2$ emissions)
Clean Energy Exports

Kyoto Protocol has no mechanism to recognise the **global environmental benefits** of Clean Energy Exports (CEE).

**Limitations of Kyoto Protocol**
- Emissions inventories are confined within country boundaries.
- Does not accommodation trans-boundary energy movements.
- Only developed countries have Assigned Amounts.

**Implications for Australia**
- Australia bears the emissions burden, while contributing to a global solution.
- Kyoto compliance leads to Australia de-industrialisation.
Renewable Energy - Hot Dry Rock Technology

- Potential for base-load generation
- Potential for large scale > 500MW
- Renewable Energy Source
- Australia has 10,000’s km³ of hot granites;
- Geodynamics Ltd (Woodside shareholding 31%) has commenced the first stages of a pilot development in the Cooper Basin, SA.
- The Cooper Basin tenements have total potential reserves equivalent to > 50 billion barrels of oil equivalent (or 12 times the energy equivalent of the North West Shelf)
- Feasibility remains to be proven.
Summary

• Australia’s oil reserves replacement and production will fall drastically over the rest of the decade.

• Increased imports will effect balance of payments, jobs and security of our energy supply.

• We need to incentivise explorers plus increase use of gas as a substitute fuel.

• Australia is blessed with very large gas reserves namely the North West of Australia.

• Gas exports will help the balance of payments and job creation.

• Gas to liquid research could lead to an alternative source of transportation fuels, but economics are difficult.

• Substitution of coal and oil power stations with gas will reduce GHG emissions.

• Recognition of transboundary energy movements is required to create a genuine global solution.

• Other energy sources will be researched and developed - eg Hot Dry Rock Technology, solar, wind.