World Oil Markets and the Challenges for Australia

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Summary

- Projections by Australian Government forecasting agencies indicate that Australia is facing a rapid decline in liquid petroleum production over the next decade. Liquids self-sufficiency is expected to decline from an average of 80-90% over the past decade to less than 40% by 2010.

- The economic implications for Australia are significant including a rapid deterioration in Australia's trade deficit on liquid hydrocarbons (from a surplus of $1.2 billion in 2000/01 to a projected deficit of $7.6 billion by 2009/10).

- Declining production over the next decade appears inevitable. However, options to reduce the longer-term decline are available. These will take time to implement so urgent action is required.

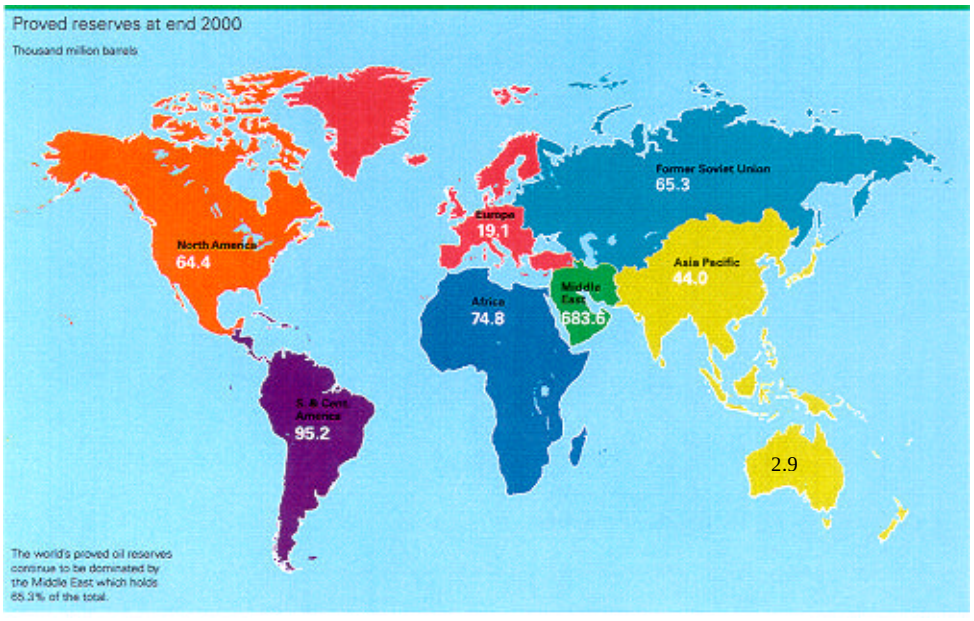
- Priority should be given to:
  - the identification of changes to the Petroleum Resources Rent Tax which would encourage frontier and deepwater exploration and the development of marginal oil accumulations and stranded gas resources;
  - the introduction of internationally competitive depreciation write-off periods of all oil and gas industry assets.

- A comprehensive and coherent energy supply policy and strategy is needed to identify options and priorities and encourage new investment in exploration, research and the development of new energy supply infrastructure to cater for Australia's long term energy needs.

The World Oil Market

As indicated in Figure 1, Australia has a very small percentage of the world's oil reserves (around 0.3%). The Middle East contains around two thirds of world oil reserves and OPEC countries control almost 80%.

Figure 1: Proven Oil Reserves (billions of barrels)



Source: BP Statistical Review of World Energy, June 2001

The world's reserves are equivalent to 40 years of current oil production although OECD reserves amount to just 11 years of production. Australia's proven reserves amount to just over 10 years of current annual production.

Oil prices have been highly volatile over the past decade but there are few signs of any turnaround in the long-term trend of

declining real prices. In a paper to the ABARE Conference in 2001, Professor Paul Stevens of the University of Dundee concluded that oil prices are likely to continue to trend downwards due to advances in production technology and in the longer term, reduced demand (due to the growth of other energy sources).

This means that oil explorers and producers like Woodside will have to live with declining oil prices and build these into our investment decision making. We will need to continue to invest heavily in new technology so as to better find and develop the smaller, higher cost, more remote and more technically complex fields remaining around Australia.

Australian Crude Oil and Condensate Production

Figure 2: Australian Oil and Condensate Production

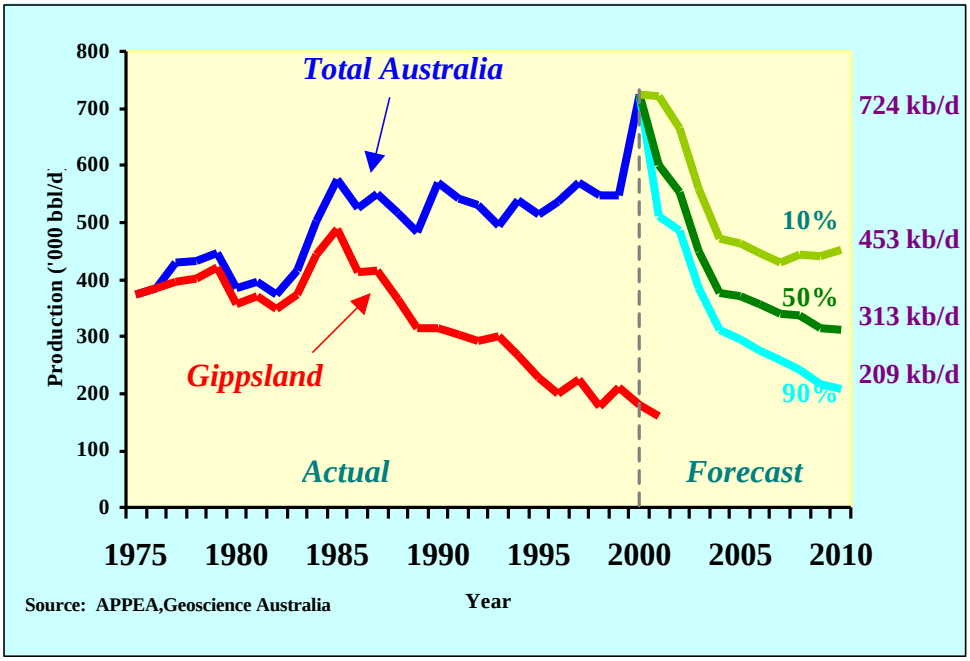


Figure 2 illustrates Australian crude oil and condensate production over the period from 1975 to 2000 and projections of production made recently by Geoscience Australia. Up to the mid 1980s most of Australia's oil production came from the Gippsland Basin but those fields have since been in decline and a myriad of other smaller developments have been needed to maintain production at around 500 to 600 thousand barrels per day (kbd).

Beyond 2000, Geoscience Australia has estimated production from existing fields and new discoveries at probability levels of 10%, 50% and 90%. The most likely or 50% outcome is for production of oil and condensate to decline from the present level of around 724 kbd to 313 kbd by 2010 (a decline of more than 50%).

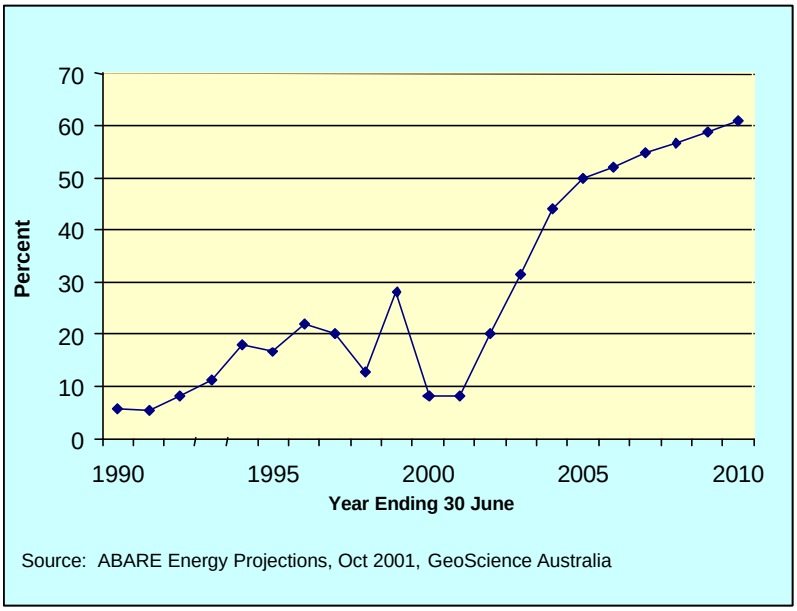
The spike in production in 1999/00 and 2000/01 is largely due to the commissioning of the Laminaria project in late 1999. Production rates of up to 140 kbd have been achieved but these are expected to quickly decline with production in the final quarter of 2001 being just over 100 kbd.

When this outlook for production is compared to ABARE's 2001 projections of crude oil and petroleum products demand we see a trend in oil imports emerging which should sound alarm bells in Treasury and other parts of the Government with economic management responsibilities.

Rising Oil Imports

Figure 3 shows how much of Australia's liquid hydrocarbons demand has been, and is expected to be, met by imports. Liquid hydrocarbons are defined as crude oil, condensate, naturally occurring LPG and liquid petroleum products.

Figure 3: Percentage of Australia's oil and Petroleum Products Consumption sourced from Imports



While total domestic oil and condensate production has remained approximately on plateau over the past decade, consumption of liquid hydrocarbons has been increasing (at an average rate of 1.9% pa). Consequently, the percentage of consumption met by imports has also increased from around 5% in 1990 to more than 20% in the latter part of the 1990s. Laminaria has provided some significant relief over the past two years but from here on the trend in imports is again upwards. Recent discoveries like Vincent, Enfield and Laverda in Western Australia can help to ameliorate the trend, but without further significant discoveries, imports will need to increase rapidly to the point where by 2009/10 they account for more than 60% of Australia's liquids consumption.

On the basis of the current ABARE consumption and Geoscience Australia production projections, oil will need to be imported at a rate of more than 150 million barrels a year in 2004/05 and more than 200 million barrels a year in 2009/10. To place this in context, the Australian oil and gas industry has achieved commercial oil discoveries totalling around 600 million barrels since 1995 (ie an average of about 90 million barrels per year).

Over the past seven years new oil discoveries:

- have replaced less than one half of the oil and condensate that has been produced (about 1.5 billion barrels), or
- equate to less than one third of the amount of petroleum liquids (oil, condensate and petroleum products) which have been consumed (about 1.9 billion barrels).

That is, Australia has been consuming oil three times faster than it has been discovering it.

Economic Implications

1. Balance of Payments

Oil imports of this magnitude will have a significant impact on Australia's balance of payments with implications for our exchange rate, international competitiveness and standard of living.

Up until the late 1990s Australia typically recorded small trade deficits on liquid hydrocarbons (ie petroleum exports excluding LNG less imports). In the three years to 1998/99 these *deficits* averaged $831 million per year. In 1999/2000 and 2000/01 the combination of higher production and higher oil prices resulted in trade *surpluses* being achieved (of $121 million and $1250 million respectively).

Assuming average import prices (of oil and refined products) of $US20 per barrel and an exchange rate of $A1=$US0.55, the trade *deficit* on liquid hydrocarbons is projected to increase to $5.6 billion by 2004/05 and over $7.6 billion by 2009/10.

Such rapid growth in oil imports will have a significant impact on Australia's current account and exchange rate with consequential effects on Australia's international competitiveness and standard of living.

2. Energy Security

A second important consideration is that of energy supply security.

As we saw with Longford, the disruption of energy supplies can have a profound impact on Australians and Australian industry. During the next ten years the rest of the western world will also be facing declining indigenous production and increasing reliance on oil imports, particularly imports from the Middle East.

Economies can adapt when the changes to supply are gradual but the costs from short term disruptions to supply can be substantial. With increasing reliance on Middle Eastern oil, the risk of such disruptions will also increase.

3. Sectoral Impacts

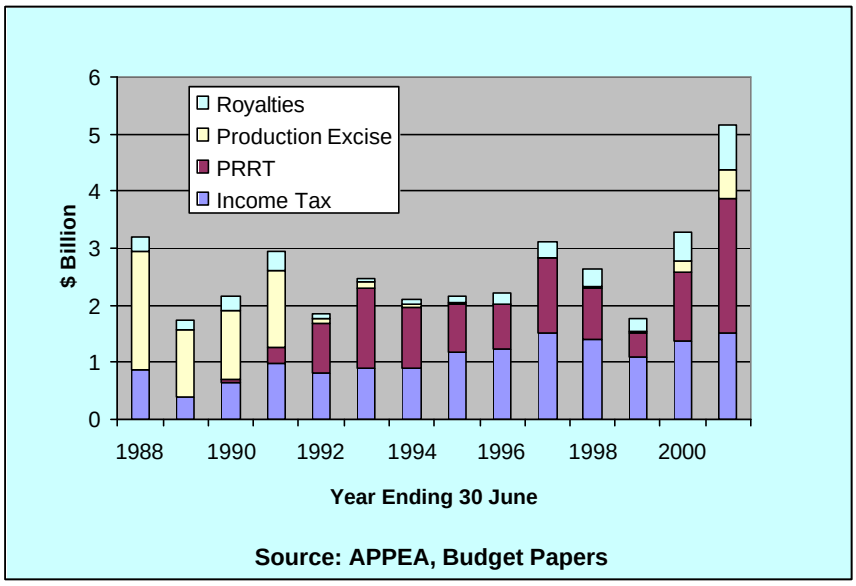
A third consideration is the impact on other Australian industries. Declining local oil production and investment in new oil production facilities will impact on employment and activity within other sectors of the economy.

Research by the University of Western Australia suggests that for every 100 jobs created (or lost) in the West Australian coal, oil and gas industry, roughly 300 new jobs are created (or lost) elsewhere in WA. Suppliers of equipment and services are the obvious winners (or losers) but sectors such as finance and business services, education and health and even entertainment are big winners from an expanding oil and gas industry.

Of particular concern would be the threat to Australia's fabrication and engineering capability resulting from less investment in new liquids production facilities. A 1999 APPEA study estimated that in Western Australia alone, there are over 900 companies employing more than 17,000 people, supplying goods and services to petroleum companies.

4. Government Revenue

Figure 4: Commonwealth Tax Collections from the Upstream Petroleum Industry



An important consequence of direct interest to Canberra is the impact on Government taxation revenue. Governments, particularly the Commonwealth, are major beneficiaries of a healthy upstream oil and gas industry with receipts from secondary taxes and income tax estimated to exceed $5 billion in 2000/01 (see Figure 4). This does not include taxes paid by suppliers, employees and other indirect beneficiaries of oil industry activity which would also be substantial.

The approximate halving of oil and condensate production over the next 9 years (to 2009/10) predicted by Geosciences Australia would reduce Commonwealth tax collections from the upstream petroleum industry by at least $1 billion a year (excluding the effects on tax payments by suppliers) The losses would be substantially higher if there is a sustained increase in oil prices.

So what can we do?

There are four options for avoiding or reducing the impact of declining oil self sufficiency.

1. Explore more.

Figure 5: Australian Oil and Condensate Production by Field

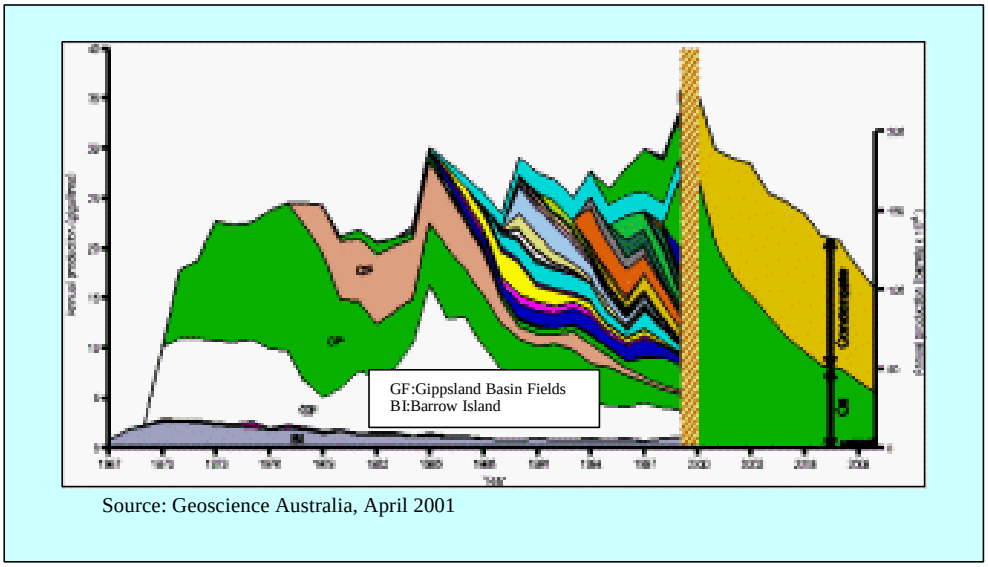
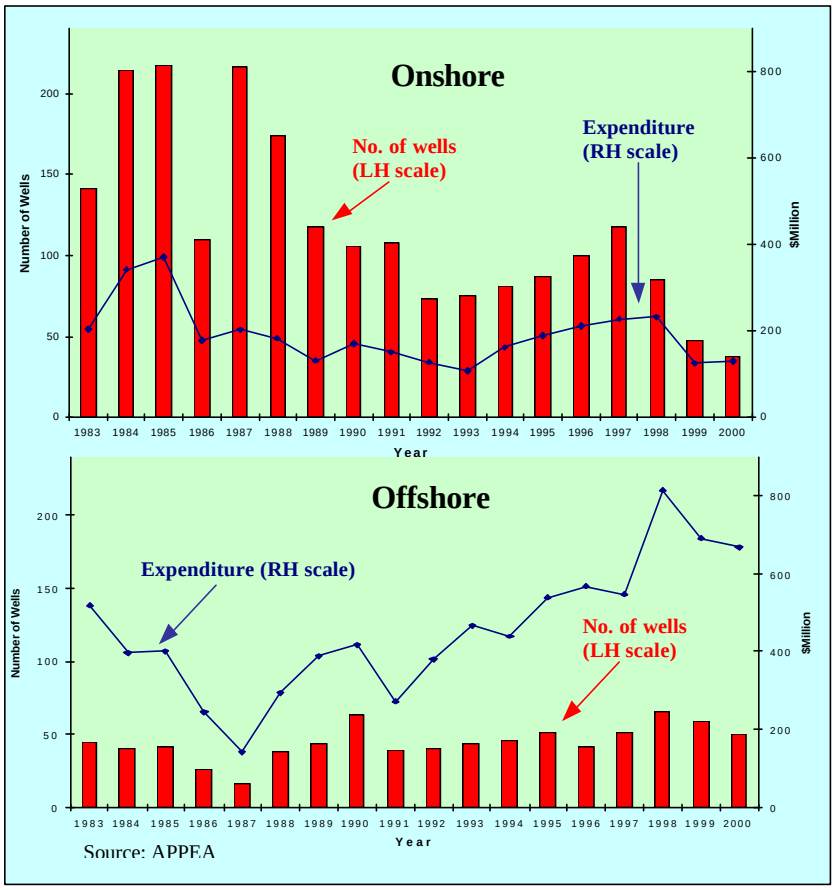


Figure 5 shows how Australia has moved from sourcing its oil from a small number of large fields to a large number of small to medium sized fields.

To maintain production we will need to continue to find and develop a regular stream of new fields.

However, as indicated in Figure 6 onshore exploration drilling and expenditure has been declining. Offshore expenditure has been increasing but the number of wells drilled has remained static. That is, offshore exploration is becoming more expensive (and higher risk) as well depths increase and exploration moves into deeper water and frontier areas.

Figure 6: Australian Petroleum Exploration



Despite the upward trend in exploration expenditure over recent years Australia is still not finding enough oil. As noted above, oil discoveries totalling 600 million barrels from 1995 to 2001 represent less than one half of the oil and condensate that has been produced over that period (and one third of consumption).

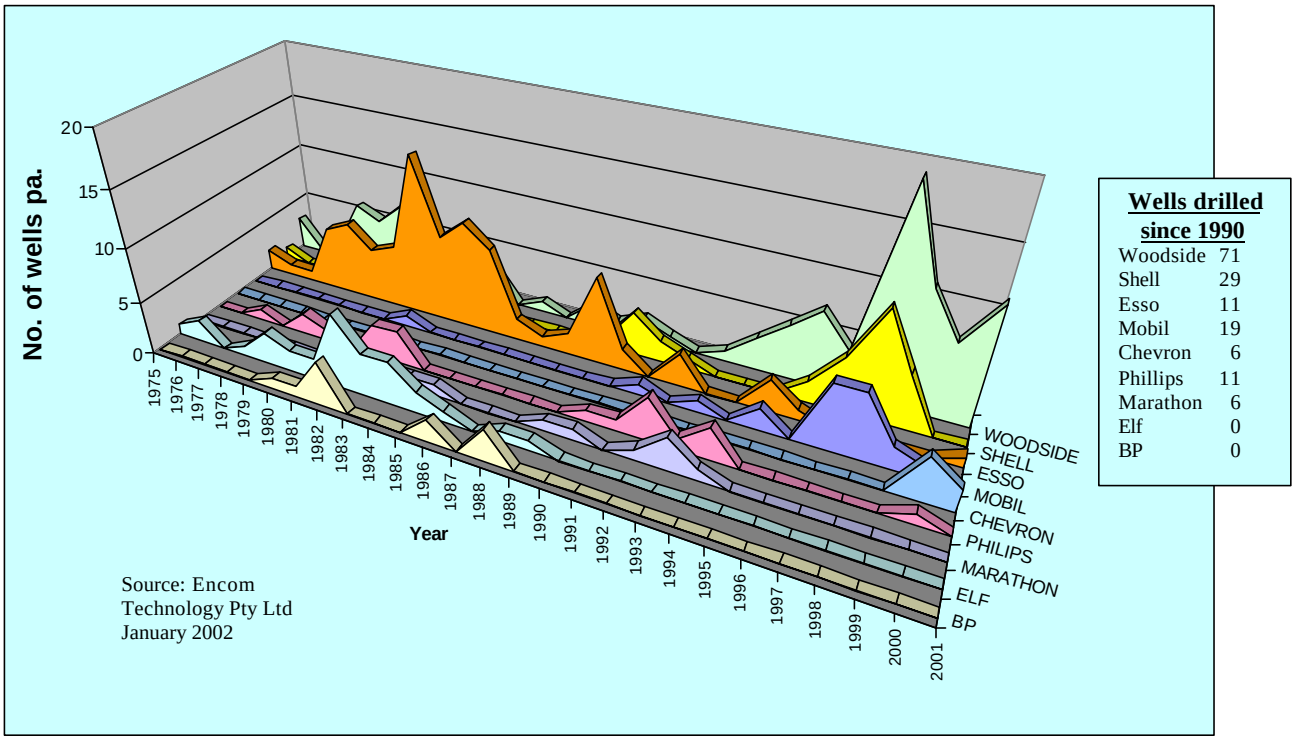
Over recent years industry interest in offshore petroleum exploration acreage releases has declined dramatically. The proportion of areas attracting bids has declined from 85% in 1997 to 22% in 2000 and the number of bids per area has also declined. Only 19 of the 86 areas offered through the 2000 release attracted bids.

The conclusion to be drawn therefore is that although offshore areas are regarded as holding the greatest potential for future discoveries, they are not attracting the increasing levels of exploration interest that are needed if Australia is to maintain reasonable levels of liquid fuels self sufficiency.

The figures also support the general view within the industry that Australia has low oil prospectivity and fields yet to be discovered are of small to medium size and becoming more technically demanding (eg heavy oil or deep water)

As a result the international oil majors have almost ceased oil exploration in Australia (see Figure 7). Woodside is now the largest explorer but we are now having to look overseas for areas with greater prospectivity and more attractive terms.

Figure 7: Australian Exploration History by Operator



Key Factors Affecting Exploration Decisions

Factors	Status within Australia
Success rates	Declining
Competition for capital	Increasing as other countries become more attractive
Government approvals	Becoming more difficult
Fiscal regime	Unattractive for high risk, deepwater, frontier exploration
Sovereign/ country risk	Australia well placed but many other countries improving

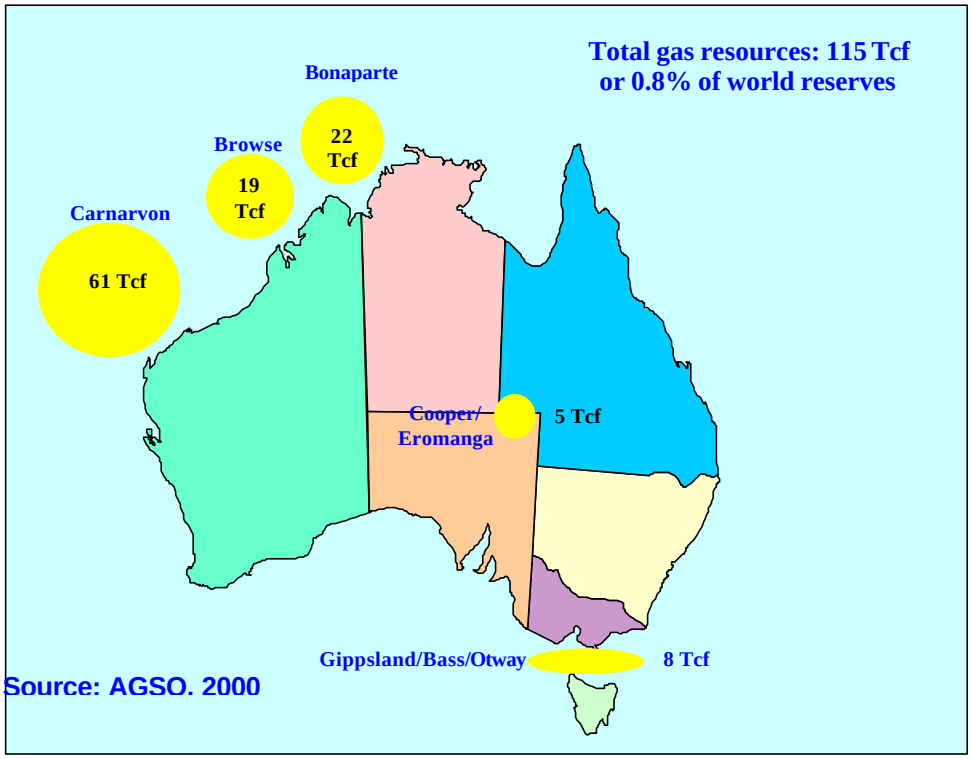
2. Increase Recovery

A second option for reducing oil imports is to recover more via infill drilling. This is heavily dependent on the further development of technology to enable smaller, more complex reservoirs to be economically developed.

3. Increase fuel substitution

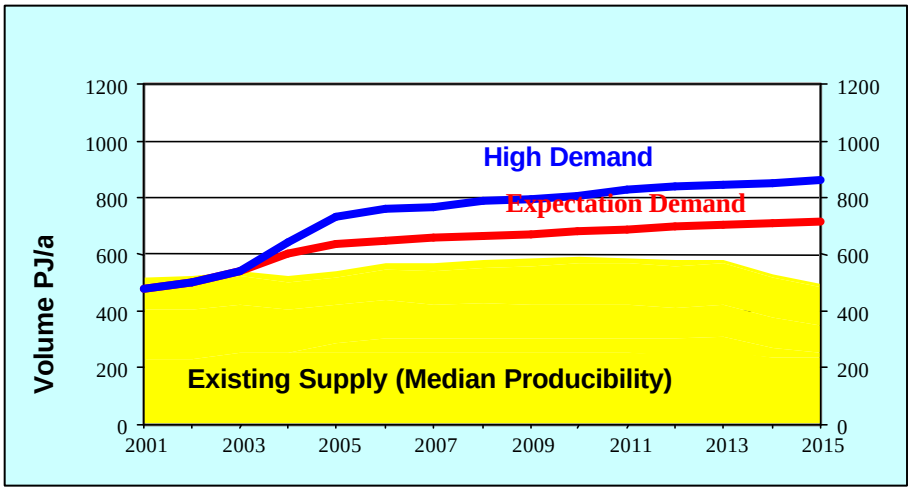
Australia has large gas reserves (see Figure 8) which have the potential to meet a much larger proportion of Australia's energy requirements, including liquid petroleum requirements (via CNG, LNG, Gas to Liquids). Gas for oil substitution would deliver significant greenhouse benefits and help Australia meet its Kyoto target. Increased LNG exports would partly offset the cost of rising liquids imports and help address their impact on the balance of payments .

Figure 8: Australian Gas Resources



However, greater use of gas will require substantially more investment in gas production and pipeline infrastructure. Without such investment, south eastern Australian gas markets will, within a few years, face possible gas shortages. Major consumers will find it more difficult to secure long term supply contracts on sufficiently competitive terms (see Figure 9).

Figure 9: Eastern States Domestic Gas Market (Qld, NWS, SA, Vic)
Existing Gas Supply Vs Forecast Demand



LNG export projects and gas-based value adding projects are needed to underpin the cost of bringing new gas supply sources to shore and to justify the initial investment. These types of projects compete on world markets (primarily with projects in Asia) and the provision of an internationally competitive investment environment including fiscal terms is a key driver.

Hydrogen fuels and ceramic fuel cells are potential substitutes but will need a supportive R & D and investment regime if they are to make significant in-roads into oil demand.

4. Reduce liquid fuels demand

Key factors which could lead to reduced fuel demand are technology (to improve efficiency), prices (relative to other fuels) and incentives to reduce consumption.

Implications for Government Policy

For these things to happen quickly, a number of policy adjustments by Government will almost certainly be required. Most importantly, issues affecting Australia's long term energy supply industry need to be considered and addressed through a comprehensive energy supply policy and Australia's taxation regime for upstream oil and gas projects needs to be modified to reflect changing circumstances.

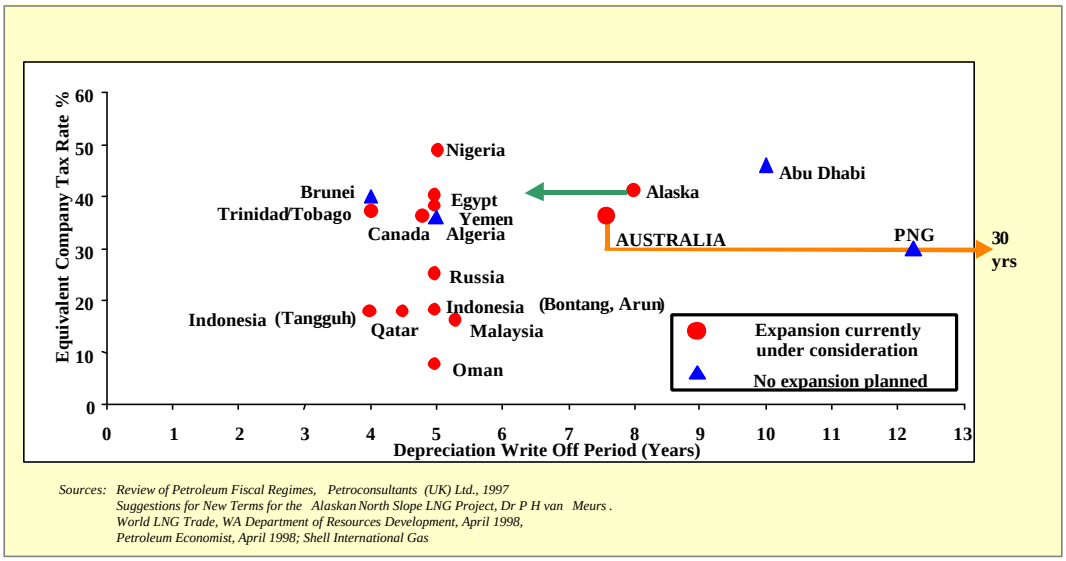
The first requirement is for impediments to the further development of Australia's oil and gas resources to be more thoroughly researched and solutions developed and implemented via an energy supply policy and strategy. The energy review initiated by CoAG last year is welcomed but its terms of reference should not be limited to a review of energy markets and the eastern states electricity sector. There is an urgent need to also examine the policies and strategies needed to maintain a sustainable, secure and competitive upstream energy industry over the coming decades.

The taxation regime applying to oil and gas projects is such an important driver for new investment that it warrants special consideration. The world oil and gas business and Australia's relative attractiveness for new investment are continually changing. Most countries adjust their oil and gas taxation regimes in order to fine tune their competitive positions. We need to ensure that Australia offers a taxation regime which is internationally competitive and sensitive to Australia's declining prospectivity and the increasing costs and risks associated with Australian exploration and development activity.

Within the company tax framework, the depreciation arrangements have a major impact on the economics of long life, capital intensive gas projects. Investment in new gas projects is needed to enable greater gas for oil substitution and associated liquids production. Increased LNG exports would also help to offset the growing oil import bill. However, the Tax Office proposals for 30 year depreciation of many oil and gas industry assets compare very unfavourably with the 5-10 years available to gas projects overseas (see Figure 10).

A modification to the effective life policy for major capital intensive projects is needed to provide a depreciation regime which is internationally competitive and which better accommodates the Government's other policy objectives such as energy supply security, increased value adding, regional development, economic growth and employment.

Figure 10: International Company Tax Regimes for LNG Investment



Sources: Review of Petroleum Fiscal Regimes, Petroconsultants (UK) Ltd., 1997
Suggestions for New Terms for the Alaskan North Slope LNG Project, Dr P H van Meurs .
World LNG Trade, WA Department of Resources Development, April 1998,
Petroleum Economist, April 1998; Shell International Gas

The overall tax rate from the Petroleum Resource Rent Tax (PRRT) plus income tax can be up to 58%. Changes to the PRRT are needed to provide greater flexibility and improve the attractiveness of exploration in deepwater and frontier areas and the development of smaller, more technically complex pools. Options include an exemption for a specified initial amount of production (as is the case with crude oil excise) or the introduction of a concessional PRRT tax rate (for deepwater developments) or tax rates linked to oil prices (to assist marginal fields).

Changes are also needed to deliver a more competitive sharing of the risks and rewards from high cost gas projects. This could be achieved by increasing the uplift rate for general expenditure on gas projects.

Conclusions

Australia is at a critical point in its ability to continue to meet the majority of its oil requirements from local production. Petroleum demand continues to grow, production from existing fields is declining and the industry's interest in new oil exploration areas in Australia is at a low level. Exploration expenditure is insufficient. Projections prepared by government agencies, clearly indicate that a do-nothing policy will result in rapidly increasing oil imports and significant economic costs for Australia.

Options are available to significantly reduce the growth in oil imports. These will take time to implement and have a meaningful impact so urgent action is required.

This should start with the development of a comprehensive and coherent energy supply policy and strategy to identify options and priorities and encourage new investment in exploration, research and the development of new energy supply infrastructure.

After two and half years of discussion about depreciation rates it is time to finalise these and provide a regime which is internationally competitive and will attract the large capital investment needed to meet Australia's growing energy requirements. Modifications to the PRRT could also go a long way towards reducing the costs resulting from a rapidly increasing dependence on oil imports.

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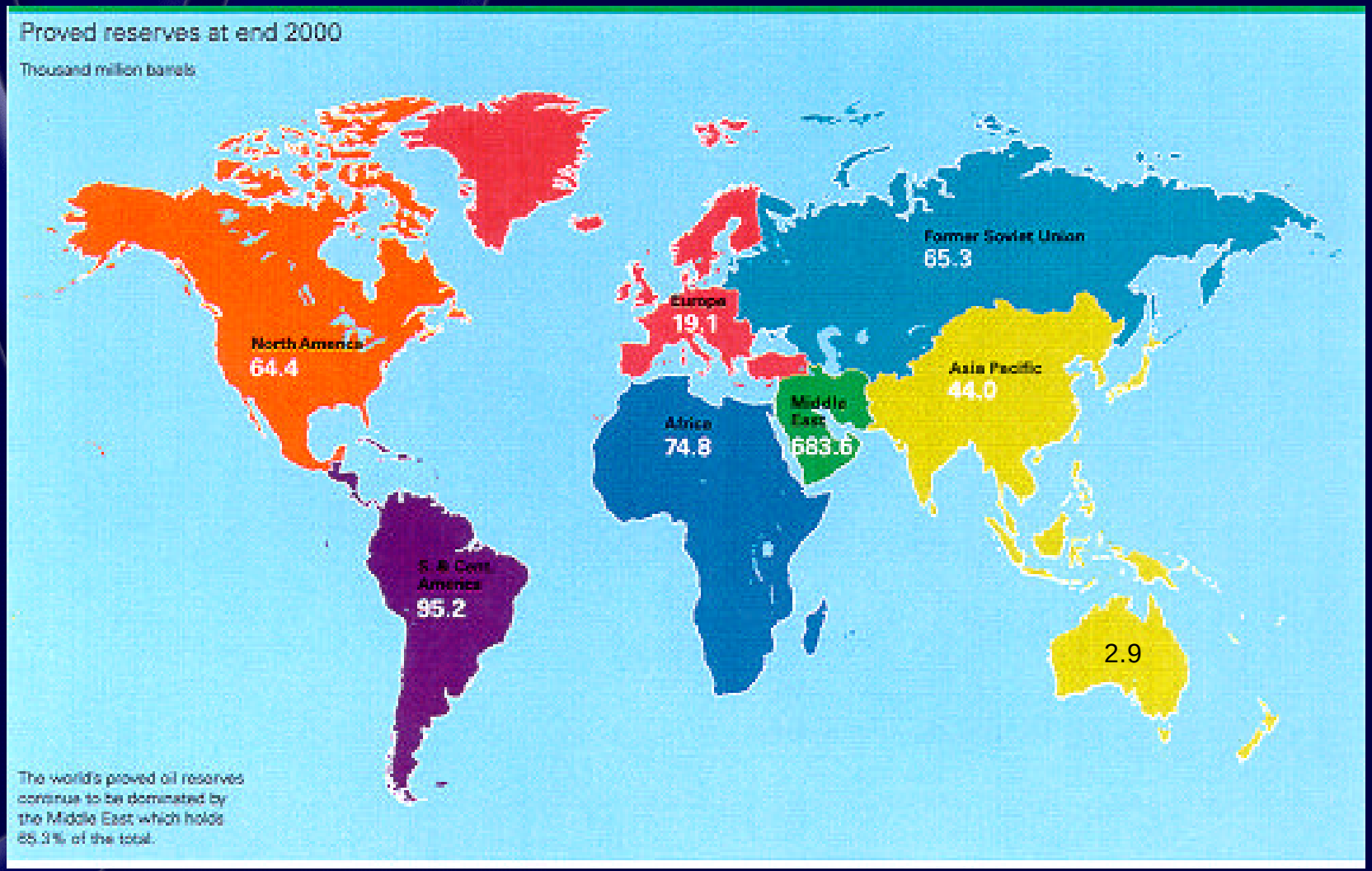
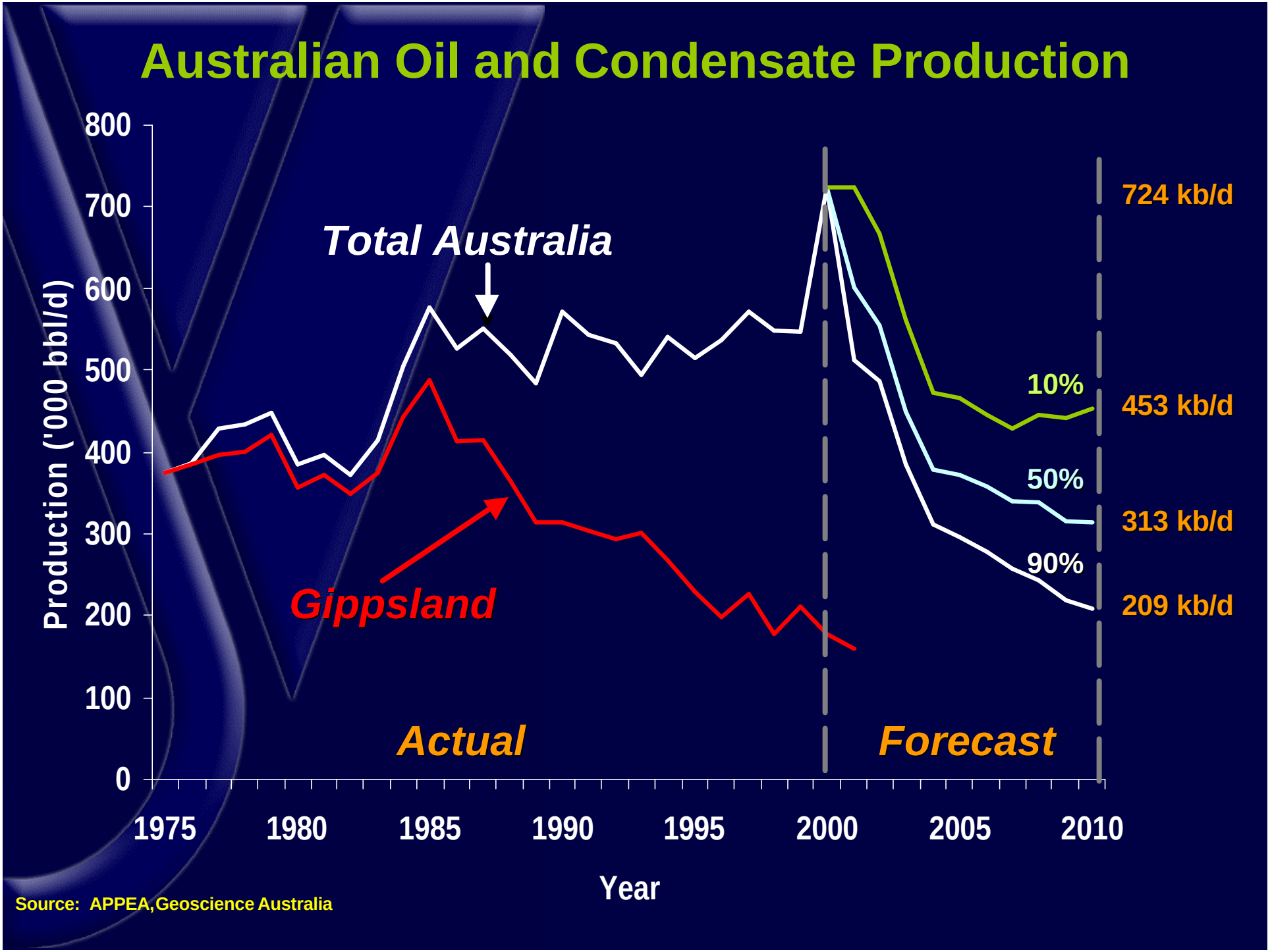
Proved Oil Reserves

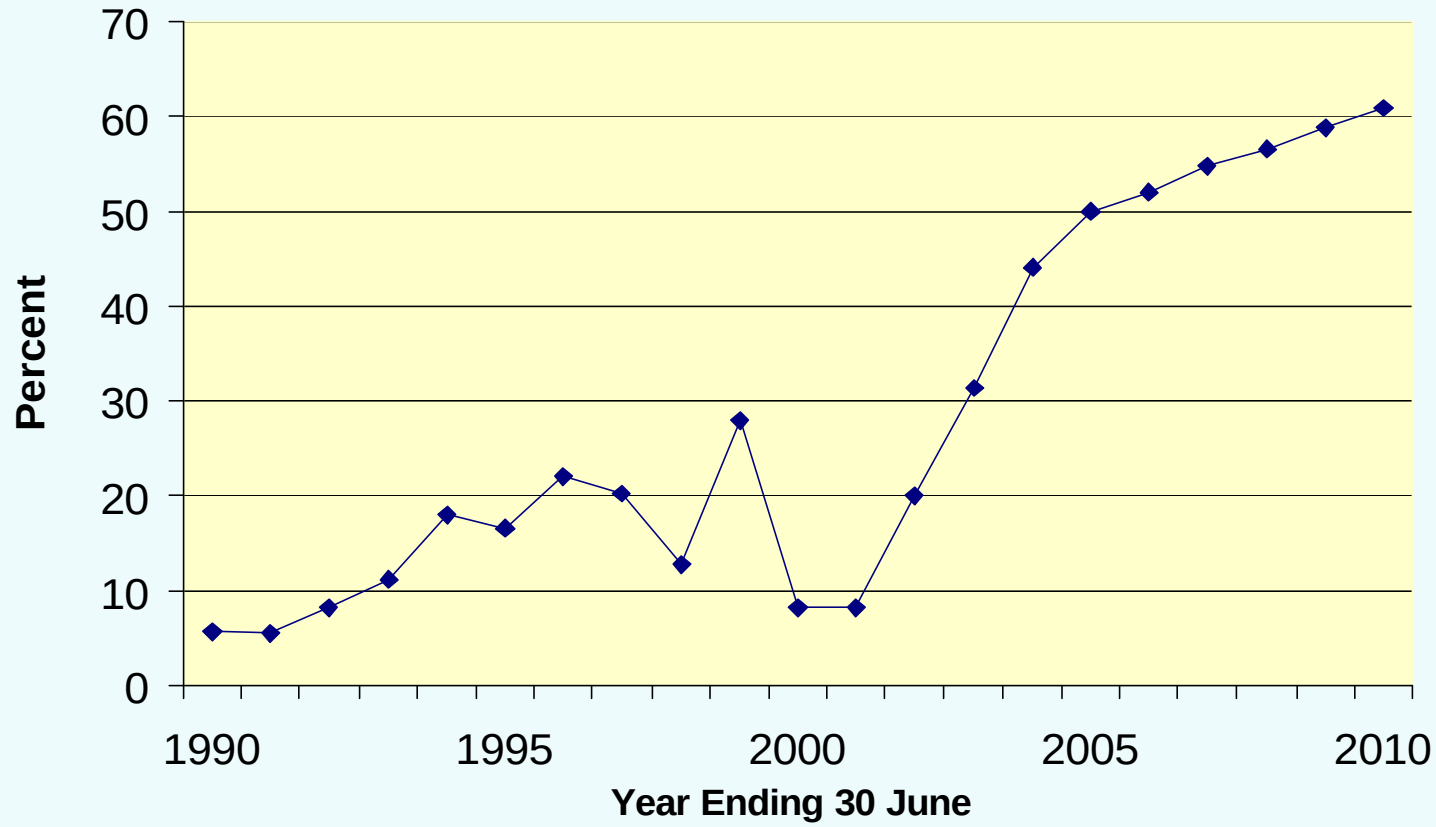
Australia has 0.3% of world oil reserves



Source: BP Statistical Review of World Energy, June 2001


Australian Oil and Condensate Production
Production ('000 bbl/d)
800
700
600
500
400
300
200
100
0
1975
1980
1985
1990
1995
2000
2005
2010
Year
Total Australia
Gippsland
Actual
Forecast
724 kb/d
10%
453 kb/d
50%
313 kb/d
90%
209 kb/d
Source: APPEA, Geoscience Australia

Australia: Percentage of Oil and Petroleum Products Imported

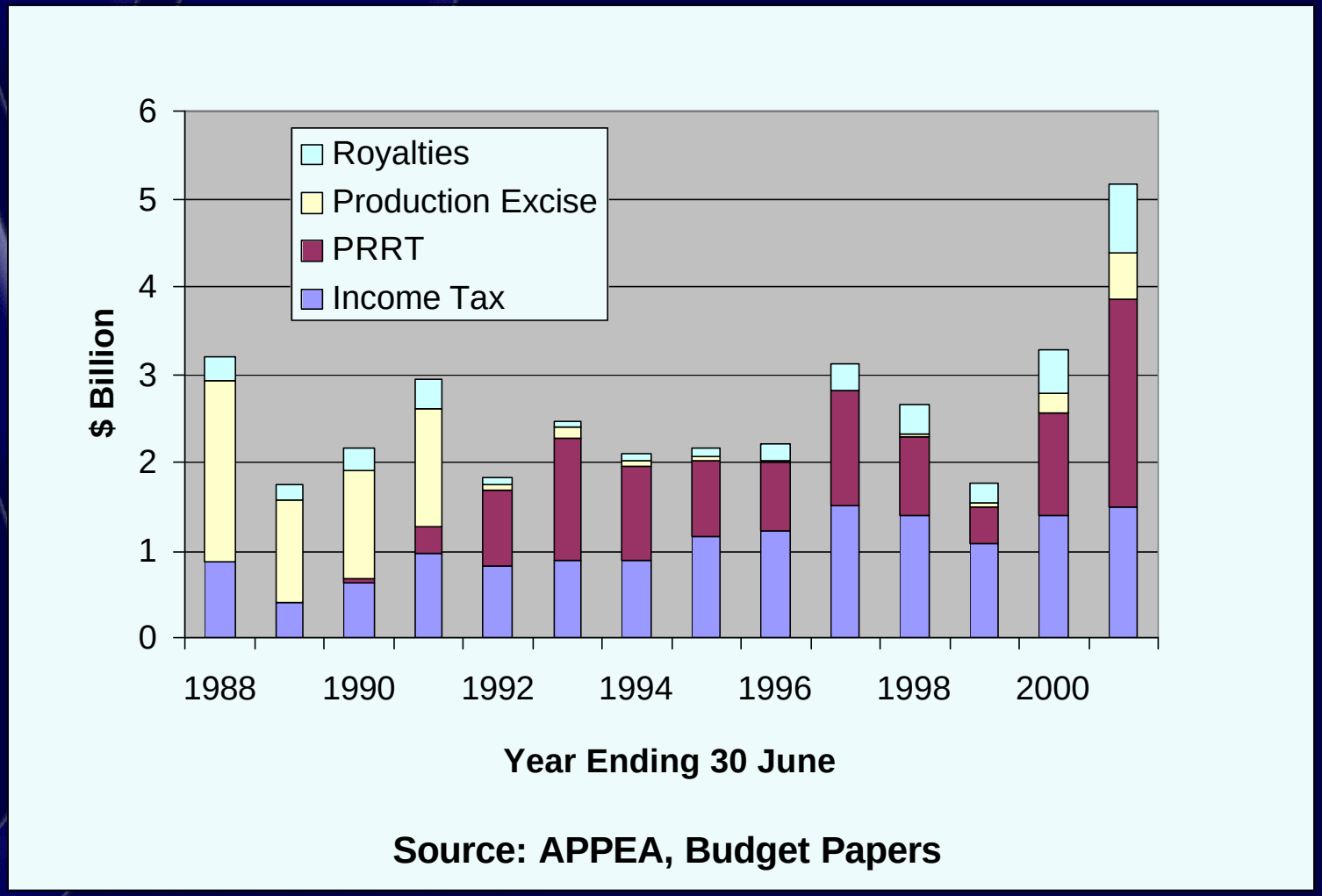


Source: ABARE Energy Projections, Oct 2001, GeoSciences Australia

Increasing Oil Imports - So What?

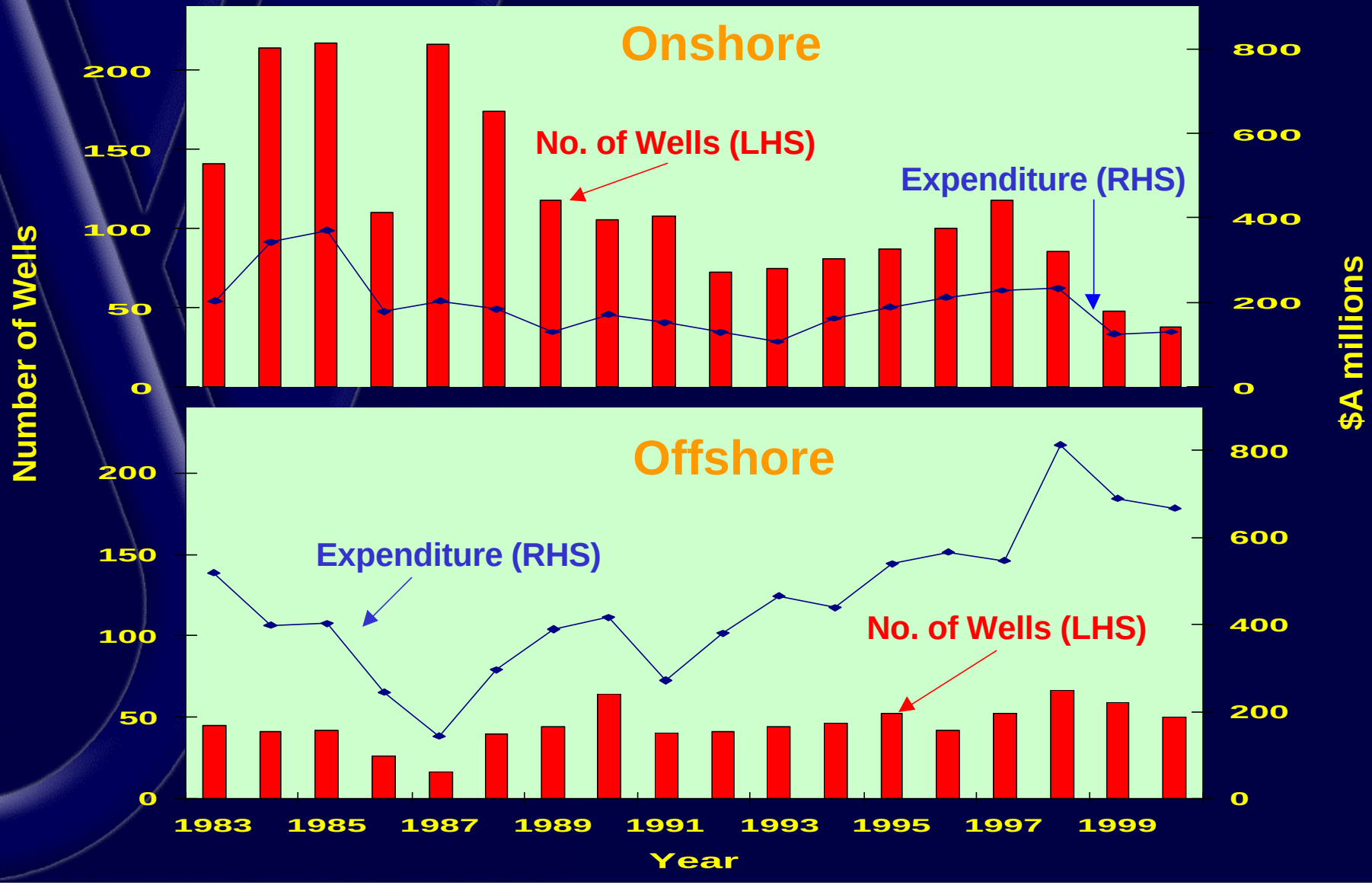
- **Balance of Payments**
  - Trade *surplus* in 2000/01 of $1.2 billion
  - Trade *deficit* in 2009/10 of $7.6 billion
- **Supply Security**
- **Flow on Effects**
  - 900 suppliers with 17,000 employees in WA alone
  - Maintaining Australian engineering and fabrication capability
- **Government Tax Revenue**

Commonwealth Tax Collections from the Upstream Petroleum Industry



The combined tax rate from PRRT and company tax is up to 58%

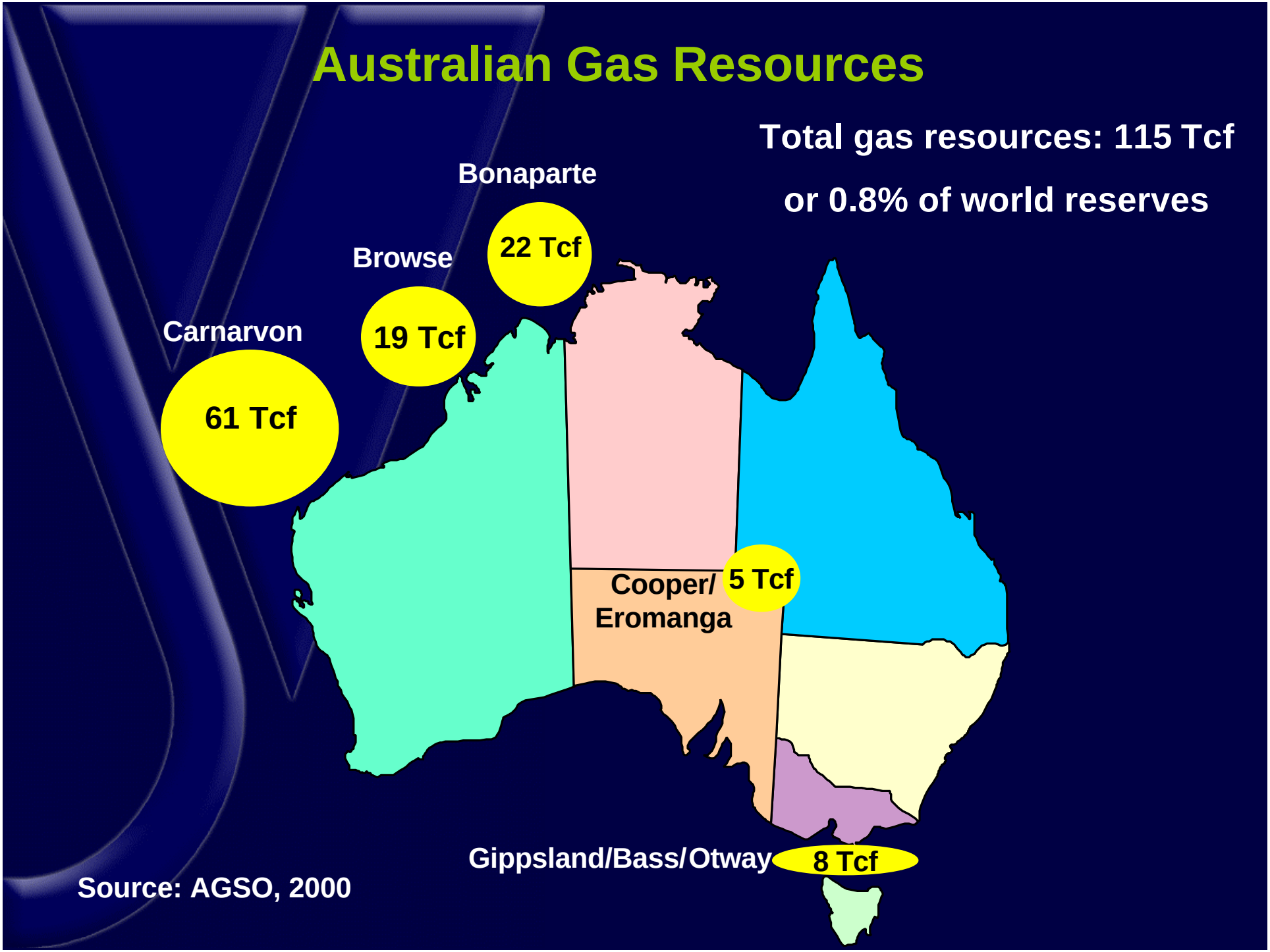
Australian Petroleum Exploration 1983-2000



Australian Gas Resources

Total gas resources: 115 Tcf

or 0.8% of world reserves



Source: AGSO, 2000

Policy Requirements

1. Energy supply policy and strategy

- wide ranging policy review of long term energy supply for Australia (and for export)

2. Competitive and flexible taxation

- cap depreciation write-off periods at an internationally competitive level
- PRRT changes to stimulate exploration and development of higher cost oil and stranded gas resources