

# Australian Crude Oil Production to Decline 85% over 10 years

On 1<sup>st</sup> March 2010, the Federal Government published a new Australian Energy Resource Assessment (AERA)<sup>1</sup>. In chapter 3 on oil it contains a graph on future oil production on page 79.

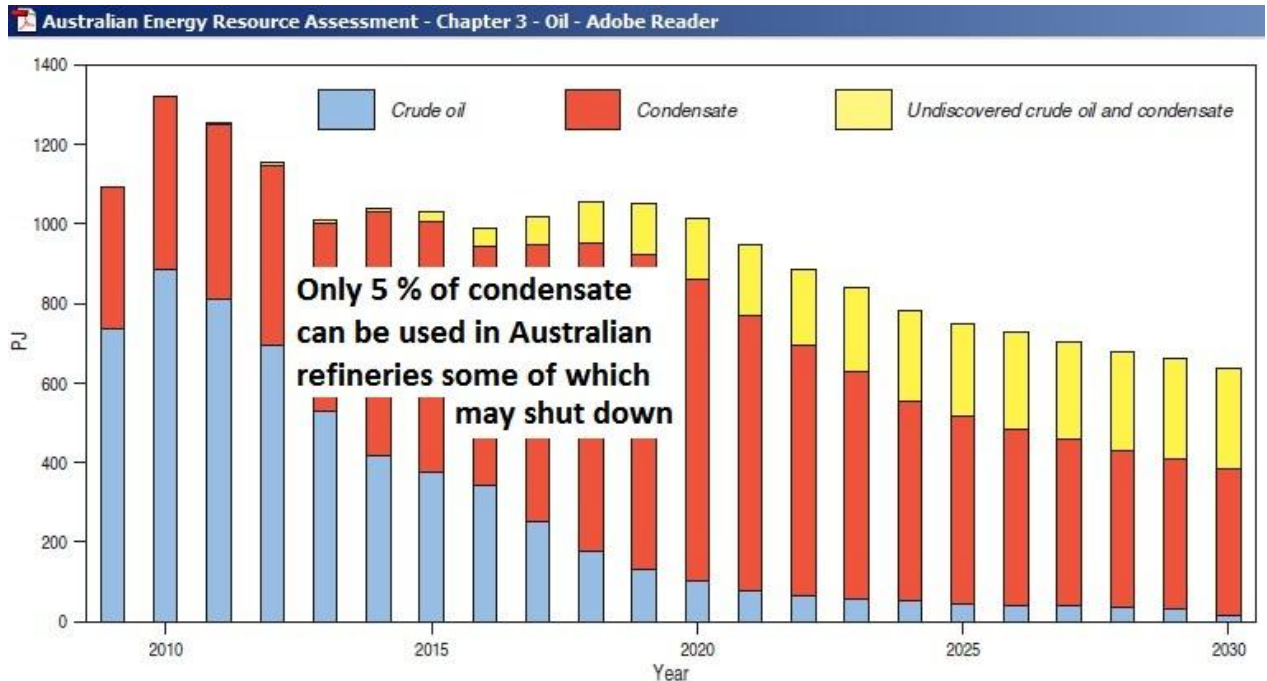


Figure 3.43 Australian oil production outlook from proven hydrocarbon basins

AERA 3.43

Note: the production forecast is based on data from an industry survey of producing fields and Geoscience Australia's assessment of undiscovered resources in proven basins

Source: Geoscience Australia

<https://www.ga.gov.au/servlet/BigObjFileManager?bigobjid=GA16759>

What we can see from this graph (note the inserted comment is by the author of this paper):

- Crude oil production from known oil fields will dramatically decline by 85% over the next 10 years (  $1 - (105 + 0.14 \cdot 152) / 890 = 0.85$  )
- This decline is offset by condensate from wet gas (mainly in LNG projects) but because of a lack of condensate splitters in Australian refineries 95% of this is exported.
- The prospect for new oil discoveries is not very good. Geologically, Australia is better off with natural gas

Since global oil export volumes are shrinking at the same time (details below), Australia will slide into a huge oil import crisis. The government hopes coal-to-liquids, gas-to-liquids and 2<sup>nd</sup> generation bio fuels will come to the rescue but it is very uncertain whether that will materialize in the quantities required, at acceptable prices and the timeline dictated by events surrounding the global peaking of oil production. The energy profit ratios of these fuels will be very low:

6/1/2010

Diminishing Returns of Fossil Fuel Energy Invested

<http://www.crudeoilpeak.com/?p=909>

<sup>1</sup> [https://www.ga.gov.au/products/servlet/controller?event=GEOCAT\\_DETAILS&catno=70142](https://www.ga.gov.au/products/servlet/controller?event=GEOCAT_DETAILS&catno=70142)

Let's check how the above graph compares with previous government reports. The following figure 6 is from Geoscience Australia's 2005 submission 127 to the Senate Inquiry on Oil Supplies:<sup>2</sup>

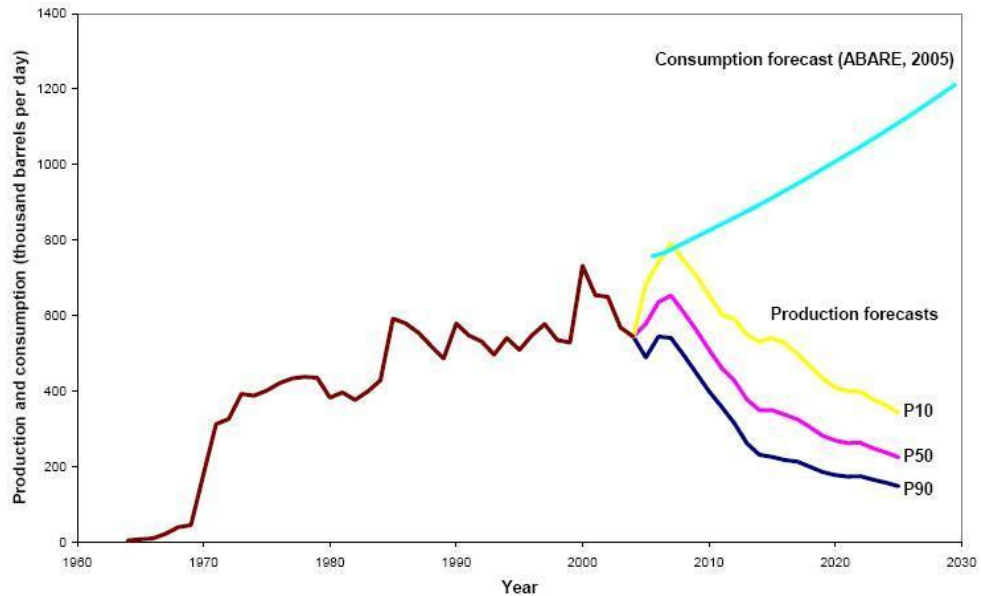
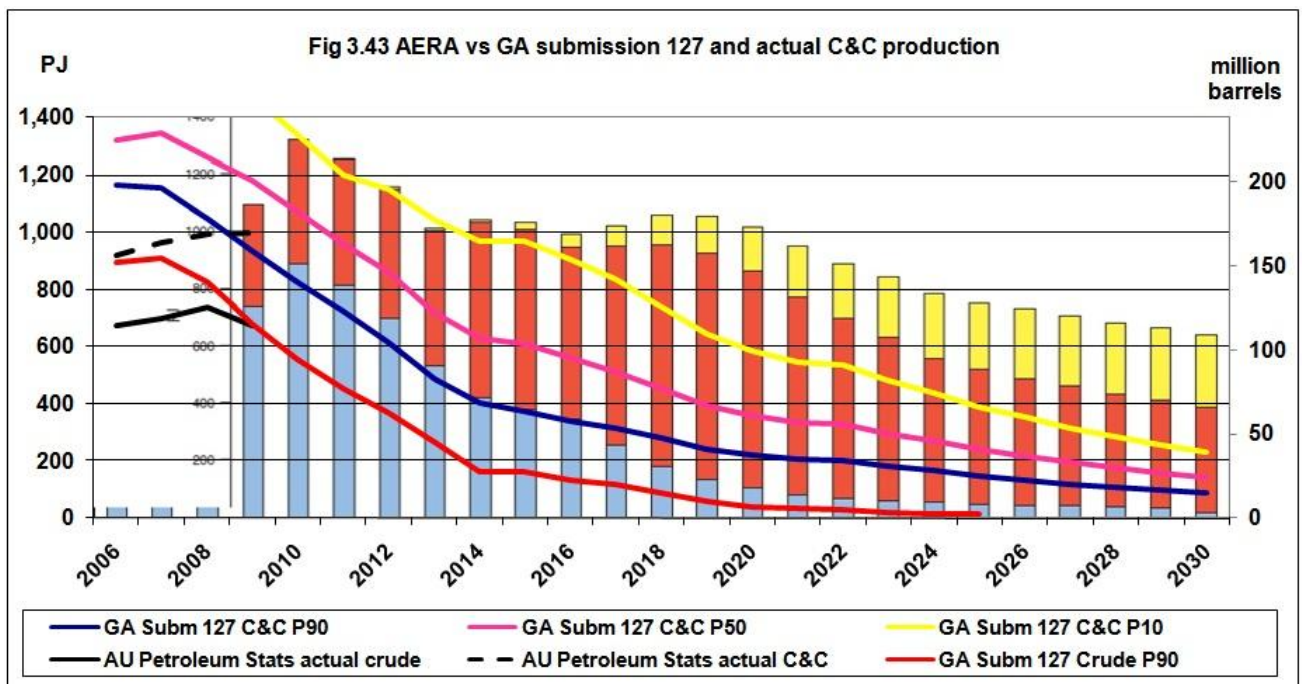


Figure 6: Forecast Australian consumption of petroleum products (excluding LPG) and forecast of Australian crude oil plus condensate production rate at various probability levels

It shows 3 projections up to 2025: P10, P50 and P90. Each number denotes the probability in percent that this projection will actually occur. Strangely, the AERA report does not show different probabilities. So let's superimpose the 2 graphs to see where we are:



<sup>2</sup> [http://www.aph.gov.au/Senate/Committee/rrat\\_ctte/completed\\_inquiries/2004-07/oil\\_supply/submissions/sublist.htm](http://www.aph.gov.au/Senate/Committee/rrat_ctte/completed_inquiries/2004-07/oil_supply/submissions/sublist.htm)  
[http://www.aph.gov.au/Senate/Committee/rrat\\_ctte/completed\\_inquiries/2004-07/oil\\_supply/submissions/sub127.pdf](http://www.aph.gov.au/Senate/Committee/rrat_ctte/completed_inquiries/2004-07/oil_supply/submissions/sub127.pdf)

We can see from the graph:

- The actual crude production curve (black line 2006-2009) has just hit the P90 estimate from 2005. It remains to be seen whether it will follow the new projection (light blue columns)
- A lot of condensate has been added and that assumes all LNG projects go ahead as planned.

## Oil reserves and resources:

AERA uses the McKelvey classification while the IEA World Energy Outlook 2008 table 9.1 refers to 2P reserves (proven and probable) and the BP Statistical Review quotes 1P (proven) reserves only.

**Table 3.5** Australian crude oil resources represented as McKelvey classification estimates as at 1 January 2009

Crude Oil Resources	PJ	mmbbl
Economic Demonstrated Resources	6950	1182
Sub-economic Demonstrated Resources	1464	249
<b>Total</b>	<b>8414</b>	<b>1431</b>

**Table 3.7** Australian naturally-occurring LPG resources represented as McKelvey classification estimates as at 1 January 2009

LPG Resources	PJ	mmbbl
Economic Demonstrated Resources	4613	1096
Sub-economic Demonstrated Resources	1597	379
<b>Total</b>	<b>6210</b>	<b>1475</b>

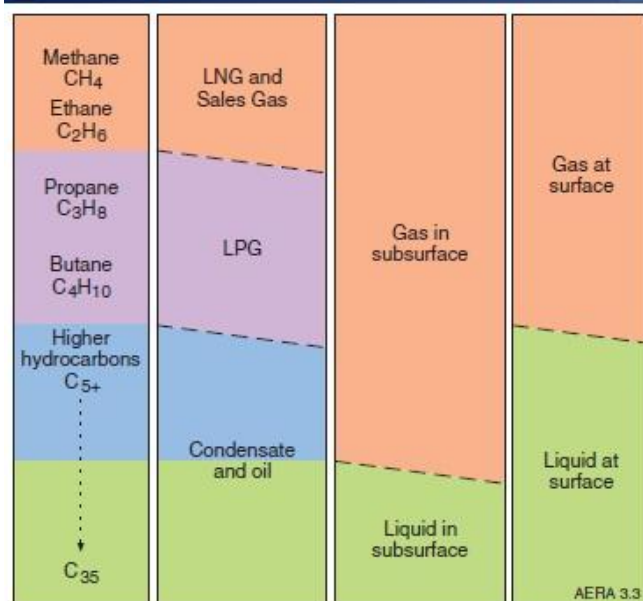
Source: Geoscience Australia 2009a

**Table 3.6** Australian condensate resources represented as McKelvey classification estimates as at 1 January 2009

Condensate Resources	PJ	mmbbl
Economic Demonstrated Resources	12 560	2136
Sub-economic Demonstrated Resources	3610	614
<b>Total</b>	<b>16 170</b>	<b>2750</b>

Resource classification is more fully discussed in Appendix D, but note that EDR are resources with the highest levels of geological and economic certainty and include remaining proved plus probable commercial reserves of petroleum. Sub-economic Demonstrated Resources (SDR) are resources for which profitable extraction has not yet been established. Inferred Resources are those with a lower level of confidence that have been inferred from more limited geological evidence and assumed but not verified.

### Australian Energy Resource Assessment - Chapter 3 - Oil -



**Figure 3.3** Petroleum resources nomenclature in terms of chemical composition, commercial product, physical state in the subsurface and physical state at the surface

Source: Geoscience Australia



The graph to the left shows how the 3 types of liquids crude oil, condensate and LPG fit into the whole picture of hydrocarbons.

Important to distinguish are:

$C_3H_8$  Propane – LPG – liquid under pressure

$C_4H_{10}$  Butane – LPG – liquid under pressure

$C_5H_{12}$  Pentane (condensate)

Condensate comes from wet gas and is used as feedstock in special splitters in the petrochemical industry for the production e.g. of Naphta, high octane petrol, solvents etc.

Let's compare tables 3.5 to 3.7 with Geoscience Australia's submission 127 to the Senate inquiry on oil supplies, OGRA's website and the production contained in graph 3.43

In million barrels	GA Submission 127 As at 1/1/2005		OGRA 2008 <sup>3</sup> As at 1/1/2009		AERA 2010 Tables 3.5 - 3.7		AERA Fig 3.43
	Table 6	Table 7 McKelvey	Reserve table 1	Reserve table 2 McKelvey	Reserve table 1	Reserve table 2 McKelvey	Estimated Production 2009-2030
Cat 1 (2P)							
Crude	714	988	881	1,181		1,181	1,021
Condensate	634	1,738	704	2,137	not	2,137	2,027
LPG	736	1,339	749	1,096	quoted	1,096	na
Subtotal	2,084	4,065	2,334	4,414		4,414	
Cat 2							
Crude	781	507	549	249		249	485
Condensate	1,841	737	2,045	614	not	614	
LPG	3,381	492	725	379	quoted	379	na
Subtotal	6,003	1,736	3,319	1,242		1,242	
Category 1 comprises current reserves of those fields which have been declared commercial. It includes both proved and probable reserves.							
Category 2 comprises estimates of recoverable reserves which have not yet been declared commercially viable; they may be either geologically proved or are awaiting further appraisal.							

We can see from this table:

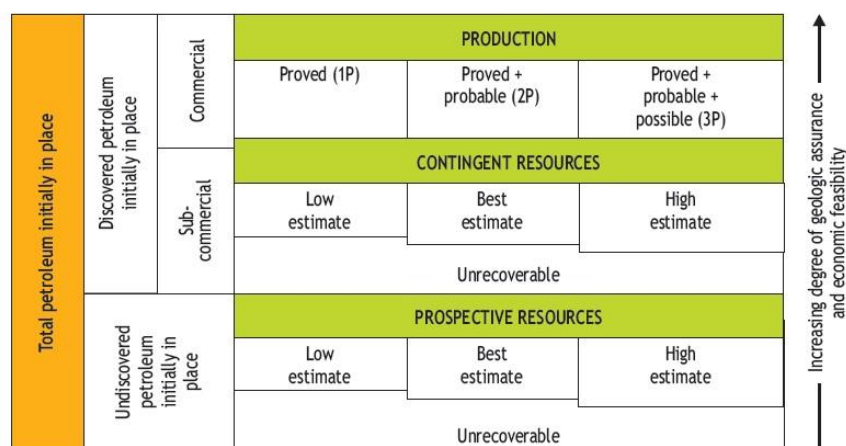
- AERA quoted the higher McKelvey figures, but not the lower OGRA figures from reserve table 1. It is not clear why these figures were omitted
- For condensate the McKelvey figures are 3 times higher than in reserve table 1, the estimated production as shown in graph 3.43 is slightly lower (2,027 mb) than from reserve table 2 (2,137 mb)
- The estimated production of crude of 1,021 mb from 2009 to 2030 as presented in graph 3.43 is somehow in between the lower (881 mb) and higher (1,181 mb) figures

Please note that the “economic demonstrated resources” (EDR) seem to be equivalent to what is generally known as proven and probable (2P) reserves.

Reserve classification used by the International Energy Agency in their World Energy Outlook 2008 →

weo2008\_part2.pdf (SECURED) - Adobe Reader

Figure 9.1 • Hydrocarbon resource classification



<sup>3</sup> <http://www.ga.gov.au/resources/publications/oil-gas-resources-australia-2008/reserves/reserves-table-1.jsp>

How about Australia's reserves as reported in the BP statistical review 2009 which includes data up to December 2008? Here is the reserve history, highlighted:

statistical_review_of_world_energy_full_report_2009.xls											
	A	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1	<b>Oil: Proved reserves</b>									Change	2008
2										2008 over	share
3	Thousand million barrels	2001	2002	2003	2004	2005	2006	2007	2008	2007	of total
59	<b>Australia</b>	<b>5.0</b>	<b>4.6</b>	<b>4.4</b>	<b>4.1</b>	<b>4.2</b>	<b>4.2</b>	<b>4.2</b>	<b>4.2</b>	+	0.3%
30	Brunei	1.2	1.1	1.1	1.1	1.1	1.2	1.1	1.1	-	0.1%
31	China	18.3	15.5	15.5	15.5	15.6	16.3	16.1	15.5	-4.2%	1.2%

The BP review quotes 1P = proven reserves although it is uncertain whether all countries adhere to this definition:

*Proved reserves of oil - Generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions.*<sup>4</sup>

BP reports 4.2 Gb of 1P (=proven reserves) for Australia in 2008. Compare that to 2.3 Gb in reserve table 1 which is 2P (=proven and probable). So 1P reserves are lower. There is a huge difference there. Obviously Australia reports to BP on the basis of the more optimistic McKelvey classification, a definition of which is given in Appendix D of the AERA report.<sup>5</sup> What are the reasons for this?

### **Global reserves and production as presented in the AERA report**

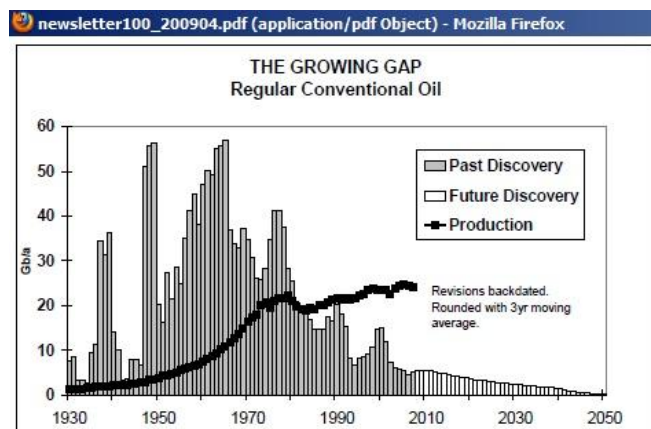
One has to be very careful with reserves. In chapter 3.2.3 (page 47) the AERA report quotes world proven oil reserves at 1,400 Gb without mentioning

- the very well known problem with overstated OPEC reserves
- that this figure includes Canadian tar sands which have a completely different production profile (mining operation) from conventional oil

What's worse, we read on page 48:

*"At current rates of world production, the estimated proven oil reserves are enough to last for around 42 years. Since the mid- 1980s the global reserves to production ratio has been steady at around 40 years or more (BP 2009a) as production is balanced as new discoveries are made and new reserves are developed each year."*

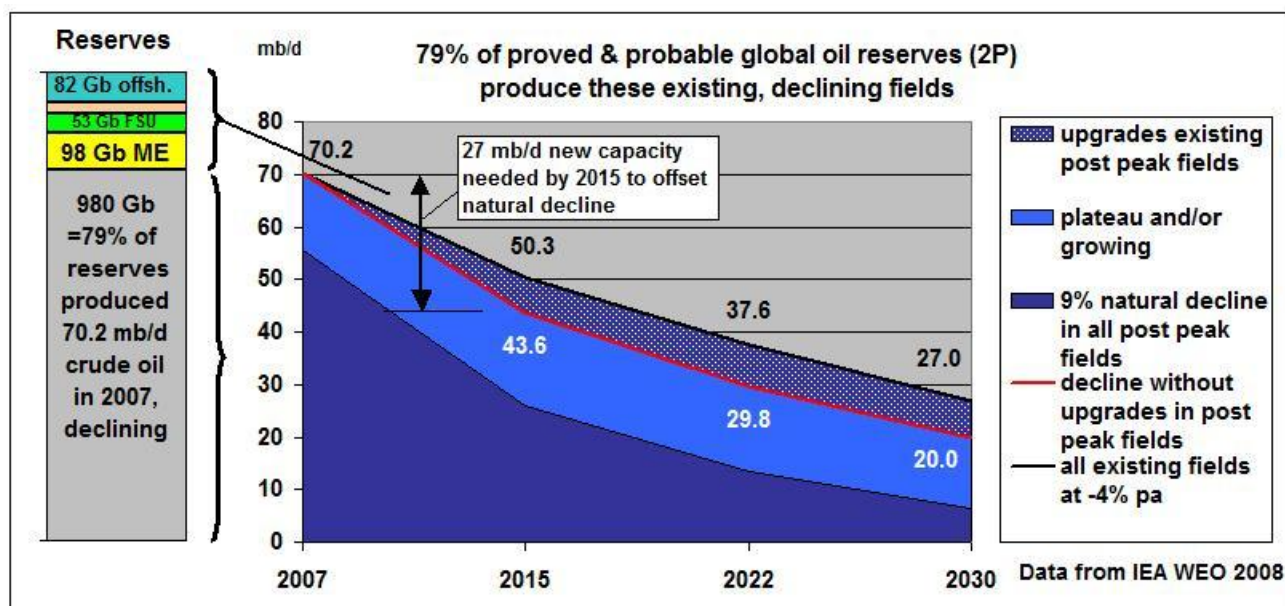
Firstly, production exceeds discoveries since the mid 1980s so it is NOT balanced. See the graph from the ASPO newsletter April 2009 → This fact is well known and it is incomprehensible that the AERA report publishes both a misleading interpretation of the reserve to production ratio ("enough for around 42 years") and also wrong facts.



<sup>4</sup> <http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622>

<sup>5</sup> <https://www.ga.gov.au/servlet/BigObjFileManager?bigobjid=GA16718>

Secondly, according to the IEA WEO 2008, 79% of reserves are under production (page 223), but yield only declining production at around -4% pa (Figure 11.1, page 250)



Detailed assessments of these issues can be found here:

12/11/2009

"Key oil figures were distorted by US pressure, says whistleblower"

<http://www.crudeoilpeak.com/?p=564>

18/10/2009

OPEC reserves revisited

<http://www.crudeoilpeak.com/?p=355>

29/5/2009

Submission Energy White Paper 2009

<http://www.crudeoilpeak.com/?p=36>

6/3/2008

The Disconnect between Oil Reserves and Production

<http://www.crudeoilpeak.com/?p=715>

### The problem with LPG

Unfortunately, the LPG resource data of the AERA report do not differentiate between propane and butane. This would be very important as that will impact on the availability of automotive LPG, which should not contain more than 60% butane in a propane/butane mix<sup>6</sup>. Australia has an excess production of butane. LPG supplies to regional centres (both automotive and domestic) are mostly propane for logistic reasons while some big cities can afford separate storage facilities for propane and butane. Therefore, the total availability of locally produced (naturally occurring) automotive LPG will be limited by the production of propane.

<sup>6</sup> <http://www.environment.gov.au/atmosphere/fuelquality/publications/pubs/lpg-fuel-quality-standard-discussion-paper.pdf>

This issue of propane deficient LPG where excess butane must be exported was mentioned in the 2007 report of the Senate Inquiry on oil supplies on page 104 (items 6.79 and 6.80) but not resolved.<sup>7</sup>

There is also the problem of West coast LPG supply surpluses and East coast shortfalls best described in LPGA's submission 100 to the Energy White Paper:

*"...the Port Botany storage is configured to handle large shipments of propane only...It will seek VLGCs fully loaded with 44 kt of propane...It is more economical to import propane to the east coast from overseas and export both propane and butane produced in the west to international markets"*<sup>8</sup>

The appendix 1 of LPGA's submission contains a list of propane and butane storage facilities. The only sizeable butane storage tanks are in (all refrigerated):

- Port Bonython (SA, 30 kt)
- Westernport (VIC, 55 kt)
- Dampier (WA, 36 kt)
- Kwinana (WA, 15 kt)

This is ABARE's forecast for LPG dated December 2006<sup>9</sup>

table 16 energy production in Australia (extract only)

	production				average annual growth	
	2004-05	2010-11	2019-20	2029-30	2004-05 to 2010-11	2004-05 to 2029-30
	PJ	PJ	PJ	PJ	%	%
crude oil <b>a</b>	1 011	1 074	1 139	1 078	1.0	0.3
LPG <b>b</b>	123	142	228	262	2.4	3.1

**a** Includes condensate. **b** Naturally occurring LPG.

Compare the 1,078 PJ of crude and condensate for 2030 with the above Fig 3.43 (400 PJ) and that gives you some idea how reliable the LPG figures would be.

What's more, Australia's capacity for LPG conversions is limited. The automotive industry does not have enough licensed gas mechanics. In 2008:

Queue up for LPG conversions

[http://www.carsguide.com.au/site/news-and-reviews/car-news/queue\\_up\\_for\\_lpg\\_conversion](http://www.carsguide.com.au/site/news-and-reviews/car-news/queue_up_for_lpg_conversion)

Related reading:

AIP's supply reliability<sup>10</sup>

Structure of the Australian petroleum industry<sup>11</sup>

<sup>7</sup> [http://www.aph.gov.au/SENATE/committee/rrat\\_ctte/completed\\_inquiries/2004-07/oil\\_supply/report/c06.pdf](http://www.aph.gov.au/SENATE/committee/rrat_ctte/completed_inquiries/2004-07/oil_supply/report/c06.pdf)

<sup>8</sup> <http://www.ret.gov.au/energy/Documents/ewp/pdf/EWP%200100%20DP%20Submission%20-%20LPG.pdf>

<sup>9</sup> [http://www.abareconomics.com/interactive/energy\\_dec06/pdf/energyAUS\\_06.pdf](http://www.abareconomics.com/interactive/energy_dec06/pdf/energyAUS_06.pdf)

<sup>10</sup> <http://www.aip.com.au/industry/supplyreliability.htm>

<sup>11</sup> <http://www.accc.gov.au/content/index.phtml/itemId/906872>

## Oil import crisis

Already in February 2008 we were warned:

MARTIN FERGUSON, RESOURCES MINISTER: *“Australia's got a huge challenge. We've got huge problems on the trade front, but also importantly, a real problem in terms of energy security and our economic future by 2015.....We've got to find another Bass Strait, because if we don't by 2015 we will go from importing about 20 per cent of our needs in the 1990s to actually importing 80 per cent of our oil and related product needs, effectively contributing to a \$27 billion per year trade deficit.”*

<http://www.abc.net.au/7.30/content/2007/s2169087.htm>

And more recently:

TONY JONES: *Right now Australia imports 55 per cent of its oil needs. The latest report of the Jamison Group says that by 2020, that will rise to more than 80 per cent, representing a projected trade deficit of \$25 billion.*

*If they're right, Australia is rapidly heading for an oil crisis. Do you agree?*

MARTIN FERGUSON: *On the current trends, clearly we will be importing more. That is all related to whether or not we achieve further exploration development and actually therefore produce more of our own domestic alternatives.*

<http://www.abc.net.au/lateline/content/2010/s2842402.htm>

Australian crude oil decline coincides with a shrinking of global oil export volumes

**2013 Half of post 2005 net oil exports from top 5 exporters will be gone by 2013**

<http://www.crudeoilpeak.com/?p=649>

**2018 Oil exports from top 5 exporters may be gone**

The same author of the above paper, Geoff Brown, an oil geologist who helps his US clients to pump the last drop of oil from the stripper wells, writes:

*Once again, I'm looking at some numbers that scare the crap out of me. Let's follow the progression from conventional wisdom regarding oil supplies to what I shall call ELM 2.0.*

*Yergin and Lynch assert that the worst case is a production plateau many decades from now, either in the 21st Century or in the 22nd Century. The Peak Oilers say no, we have either peaked or we will shortly peak, and we are looking at a low single digit annual decline rate in global oil production. The Peak Exporters say no, we are looking at long term accelerating rate of decline in global net oil exports.*

*Incidentally, another metric is Chindia's net imports as a percentage of (2005) top five net oil exports; Chindia went from 19% of 2005 net exports to 27% of 2008 net exports (from the top five)-- a 12%/year rate of increase. Based on Sam's best case projection for the (2005) top five and based on the 2005-2008 rate of increase in net oil imports into Chindia, it appears that Chindia would be consuming 100% of net oil exports from Saudi Arabia, Russia, Norway, Iran and the UAE some time around 2018, eight years from now.*

<http://www.theoil Drum.com/node/6226#comment-591358>

## Australia has no Strategic Oil Reserve

**4 years ago:** Lucky Country is running out of oil

May 9, 2006

*DECLINING self-sufficiency in oil could force Australia to increase its strategic stockpile to meet International Energy Agency obligations.*

*Member countries are required to hold the equivalent of 90 days of net imports.*

*As a net exporter of oil in the past, Australia has not had to build a strategic reserve, other than account for products held at refineries, which the Federal Government, through the IEA, would control during times of serious supply disruptions.*

*IEA executive director Claude Mandil said yesterday the day was fast approaching when Australia would have to build a strategic reserve.*

<http://www.smh.com.au/news/business/lucky-country-is-running-out-of-oil/2006/05/08/1146940475375.html>

### **Saving Oil in a Hurry**

Published in 2005

“During 2004, oil prices reached levels unprecedented in recent years. Though world oil markets remain adequately supplied, high oil prices do reflect increasingly uncertain conditions. Many IEA member countries and non-member countries alike are looking for ways to improve their capability to handle market volatility and possible supply disruptions in the future.”

[http://www.iea.org/publications/free\\_new\\_Desc.asp?PUBS\\_ID=1474](http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=1474)



## Implications for transport policy

Both the Federal and State governments are working on projects which will NOT reduce our oil vulnerability. Here are 3 examples:

### **(a) Clem7 to open tonight 15/3/2010**

*Brisbane's new 6.8 kilometre Clem 7 tunnel will open tonight, Lord Mayor Campbell Newman's office has confirmed*

<http://www.brisbanetimes.com.au/queensland/clem7-to-open-tonight-20100314-q5xp.html>



← Future motorists – blissfully unaware of peak oil - have fun skating through the new tunnel. They don't know they will soon skate again, under different circumstances. Sunday driving bans, 1<sup>st</sup> oil crisis in 1973 →



When petrol rationing and mandatory car pooling has to be introduced, this tunnel will have the same destiny as the Lane Cove Tunnel in Sydney:

25/1/2010

Peak oil brought forward moment of truth for Lane Cove Tunnel

<http://www.crudeoilpeak.com/?p=998>

The Federal government is wasting money:

(b) 1/3/2010

Hunter Freeway: yet another peak oil ignorant project

<http://www.crudeoilpeak.com/?p=1203>

(c.) 18/2/2010

Anthony's Cutting upgrade: PM turns sod

## Ready in time for the next oil shock



PRIME Minister Kevin Rudd marked the start of a \$200 million upgrade of the Western Highway at Anthony's Cutting this morning.

The Prime Minister turned the first sod for the realignment project that will straighten and duplicate five kilometres of road between Melton West and Bacchus Marsh.

Victorian Roads Minister Tim Pallas and Ballarat MHR Catherine King joined Mr Rudd for the milestone.

The project is expected to be completed in **early 2012** - three months ahead of schedule.

<http://www.thecourier.com.au/news/local/news/general/anthonys-cutting-upgrade-pm-turns-sod/1754719.aspx>

What needs to be done:

27/2/2009

Electric Rail crash program: jobs for public transport

<http://www.crudeoilpeak.com/?p=38>

8/3/2010

Emergency Public Transport Planning

Submission to the Inquiry of the Sydney Morning Herald

<http://www.crudeoilpeak.com/?p=1231>