SENATE RURAL & REGIONAL AFFAIRS & TRANSPORT REFERENCES COMMITTEE

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Inquiry into Australia's transport energy resilience and sustainability

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AUSTRALIAN FUEL SECURITY AND THE INCREASING NEED FOR CLEAN PETROLEUM TANKERS

AN OVERVIEW OF MARITIME ISSUES IMPACTING THE SECURITY OF SUPPLY CHAINS

A report prepared for the Maritime Union of Australia
by Ocean Freight Management Pty Ltd
7th April 2015

INTRODUCTION

This report responds to a request from Maritime Union of Australia to prepare an overview of the following:

1. The fuel security risks of relying on international-flag ships on the spot market, as distilled from interviewing executives from commercial and security backgrounds.
2. An estimate of the number of tankers required to service Australia in the context of closing refineries.
3. A calculation of cost, per litre, created by employing Australian labour on import tankers across nominal voyages from Singapore, South Korea and Japan to central Queensland (in practice mainly diesel from Singapore), Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Darwin (diesel, petrol and kerosene/jet fuel)

This report has been commissioned in the context of the Australian crewed tanker fleet on long-term charter to Australian petroleum refiners declining from six ships in 2011 to three at the time of writing and possibly only two by the end of 2015 (Table 1). At the same time, reliance on shipping for imports of clean petroleum products ("CPP") is growing at a rapid rate following the closure of the refineries in Sydney and Botany and this trend is set to continue with the imminent closure of BP's Bulwer Island refinery in Brisbane in mid-2015.

This report aims to provide background to inform the debate on the merit of having some clean petroleum product import tankers sail under an Australian flag and with Australian crew.

Table 1: Reduction of Australian-crewed coastal clean petroleum tankers on long term contracts to Australian oil majors.

Year	Australian-crewed coastal clean petroleum tankers
April 2011	Araluen Spirit (Shell), Tandara Spirit (Shell, then Viva), Hugli Spirit (Caltex), Alexander Spirit (Caltex), British Loyalty (BP), British Fidelity (BP).
April 2014	Removal from the coast announced for May 2015: British Loyalty (BP). Still operating: Alexander Spirit (Caltex), British Fidelity (BP).

KEY FINDINGS AND RECOMMENDATIONS

1. Australia has an increasing reliance on tanker shipments for its supply of clean petroleum products, but significantly reduced opportunities for training people to staff tankers and import facilities due to the significant reduction in Australian-crewed coastal tankers.

2. Australian coastal clean product shipments involve multiple grades of cargo, particularly to smaller and regional ports. Current Australian-crewed tankers are specially modified and crew are trained to simultaneously deal with multi-grade loads and discharges without cross contamination.

3. Depending on the size of tanker used, based on current and announced refinery closures, the equivalent of between 53 and 64 full-time tankers will be required for clean petroleum imports by 2016/17.

4. Due to the use of the spot market, the actual number of tankers visiting Australia is much higher – we estimate over 600 tankers visted Australia in 2013. Approximately 54% of these tankers are inspected by the Australian Maritime Safety Authority.

5. Inquiries should be made with the Maritime Trade Office of the Royal Australian Navy in relation to their assessment of the extent to which the closure of Australian refineries and increased reliance on international spot market shipping affects the security of Australian fuel supply chains.

6. The analysis undertaken by Air Vice Marshall John Blackburn for the NRMA indicates that a thorough review of all the vulnerabilities the petroleum supply chain should be undertaken. In discussion, Blackburn confirmed that this should include the ownership, management and crewing of tankers.

7. The analysis in para 6 above could contribute to Blackburn's recommended benchmarking of Australian national and international supply chain security arrangements with that of comparable nations.

8. The cost per ship of employing Australian crew on clean petroleum import cargoes ranges from 0.49 cents per litre to 1.40 cents per litre, and depends on the size of the ship and the distance between the load and discharge ports. If a portion of the import fleet were crewed with Australians, the additional cost could be considered across the entire import volume to provide a modest cost per litre.

9. In 2016/17, projections show that 69% of total clean petroleum product imports will be to NSW and Queensland. With cargo sizes of 45,000 tonnes to Sydney and Brisbane, employing Australian crew costs only 0.87 to 1.06 the cents per litre. If LR1 tankers with 80,000 tonne cargoes are used, the cost drops to 0.49 to 0.59 cents per litre.

LOSS OF MARITIME SKILLS

In a recent review of Australian Coastal Shipping by Noetic Infrastructure Solutions,[1] (to which Ocean Freight Management contributed) it was noted that two critical impacts from the continued decline of the Australian coastal shipping industry was the loss of a sustainable maritime skills base to support a broad range of Australian industries and national economic development more broadly; and loss of supply chain security and service reliability (Figure 1).

A major practical concern for tanker operators in a rapidly shrinking segment of the coastal industry is not the possible shortage of replacement tankers on the spot market, it is the loss of operational skills that are so important for effective shore management of tanker operations at terminals and refineries, as well as on board ships. Handling homogeneous cargoes is relatively straightforward but handling multiple grade shipments, which form a major part of Australian coastal operations, requires significant operational skills and experience so that cargoes like jet fuel are not left off specification by dint of contamination from other cargo.

Opportunities to train crews on Australian ships are inevitably contracting in parallel with the rapid decline in Australian-crewed coastal trading tankers. Training, skills, and the particular challenges of Australian supply chains must be incorporated in any analysis of the cost and benefit of carrying part of the cargo in coastal and international CPP supply chains on Australian owned and crewed tankers.

Figure 1: Australian coastal fleet required to maintain Australian maritime skill base

Source: Number of ships required to maintain maritime skills from: Noetic Infrastructure Solutions, Review of the Australian Coastal Shipping Industry and Regulations (unpublished), p. A10, June 2014. The range in the minimum size fleet required depends on the growth in the maritime industry outside of the coastal fleet ranging from 0% to 8.7%. The actual number of Australian-flagged major costal trading ships has been updated to 2015.

NUMBER OF TANKERS REQUIRED TO SERVICE AUSTRALIA

The consequence of refinery closures on shipping movements has been to drive an increase in the number of clean petroleum tankers required in Australian import supply chains and a consequential reduction in the number of crude oil tankers supplying Australian refineries. Thus, any review of Australia's future fuel security must increasingly focus on CPP supply chains and the ships that carry these cargoes.

It has been estimated by consultants Hale & Twomey that by 2016/17 Australia is expected to require the equivalent carrying capacity of between 53 and 64 dedicated tankers depending on the size (deadweight) of vessels within the fleet.[2] Deadweight ('dwt') refers to the carrying capacity of a ship on a particular draft. It is usually measured in tonnes and includes fuel (bunkers) stores and fresh water as well as cargo. A dwt figure, without any reference to a draft, refers to the vessels carrying capacity on its maximum draft. Most of the CPP shipped to Australia has, in recent years, been moved in tankers of approximately 40/42,500 tonnes dwt.

This number of dedicated tankers (see Table 2 and assumptions below) represents a hypothetical number. The reason for that is that most import CPP and crude oil cargoes are shipped to Australia through the charter of a suitable vessel on the spot market. A vessel is suitable in an operational sense when it is available to load the cargo on the dates required by the shipper and can carry the amount of cargo required to the nominated discharge port(s) after any draft or physical restrictions are taken into account. One individual ship may carry one cargo per annum to Australia, while other ships may carry numerous cargoes to Australia over the same period. Tankers are 'tramp' ships and if they are not on a long-term time charter to an oil company or trader, their operators generally take the most profitable employment available at any given time.

In the Hale & Twomey report referred to above, the authors considered the opportunities for the use of larger vessels than the traditional ~40,000 dwt size and assessed the trend across four ship size scenarios to determine the number of tankers needed to service Australias import requirements.

The first scenario is founded on the current 40,000 dwt tanker; the second contemplated the use of 45,000 dwt tankers; the third assumes the use of 45,000 dwt tankers and some LR1's. The fourth scenario goes one step further to assume maximum use of LR1's. The third scenario appears to be the most likely because it is the intention of oil companies with closed refineries in NSW to operate the facilities as import storage terminals and the same is expected of BP at Bulwer Island.[3] This means that much of Sydney and Brisbane CPP imports will be accomplished in LR1's and this optimization of economies of scale reduces transport costs per litre of cargo.

Table 2: Projected number of full-time equivalent tankers required for imports of clean petroleum products to Australia

Case	1. No Change to tanker size	2. Larger MR tankers	3. Larger MR's and some LR1 tankers	Larger MR's and max LR1 tankers
Average cargo size in tonnes	40,000	45,000	50,200	53,750
2011/12	34	31	31	31
2016/17 with Clyde and Kurnell refineries closed	62	55	51	49
2016/17 with Clyde, Kurnell, and Geelong refineries closed	72	64	57	53

Source: Hale & Twomey "Australia's Maritime Petroleum Supply Chain" June 2013 p.30

While the bottom row in the Hale & Twomey table assumes Clyde, Kurnell and Geelong being closed in 2016/17, the actual number of tankers required in the case of Clyde, Kurnell and Bulwer Island being closed instead is unlikely to be markedly disfferent. They are both 4 refinery scenarios and provide a good, robust indication of the escalating number of tankers needed to service Australia's petroleum import requirements.

ACTUAL NUMBER OF SPOT MARKET TANKERS TRADING TO AUSTRALIA

The use of the spot market for clean petroleum imports means that that actual number of tankers trading to Australia will be far greater than the estimated full-time 53 to 64 tankers outlined in Table 2, as many may make only a single voyage to Australia in one year. Using data from the Port State Control reports of the Australian Maritime Safety Authority (AMSA),[4] we estimate that over 600 international tankers visted Australia in 2013.

Through its Port State Control function, AMSA collects information on ships trading to Australia and carries out inspections of these ships. It keeps statistics on the number of ships arrivals and the total number of ships this represents (accounting for multiple visits by a single ship). However, for specific ship types (in this case tankers carrying oil, chemicals and noxious liquid substances, it only keeps statistics on the number of inspections and detentions).

Average number of arrivals to Australia per individual ship in 2013: 4.7
Arrivals of oil and chemical tankers in 2013: 2,983
Estimate of 2,983/4.7 = 634 individual tankers visting Australia in 2013 if each ship makes 4.7 visits

Proportion of ships visiting Australia which AMSA is able to inspect: 54%
Number of oil, chemical and NLS tankers inspected in 2013: 388
Estimate of 388/0.54 = 718 individual tankers visiting Australia in 2013 if 54% are inspected by AMSA

Using two different methods based on Port State Control data, we estimate that between 634 and 718 individual international tankers visited Australia in 2013. It should be noted that chemical tankers could also be carrying other products, such as sulphuric acid. However, such tankers can also take on clean petroleum petroleum products, and frequently do. It is safe to say that at least 600 individual tankers visited Australia in 2013, yet it is likely that only 54% of these ships are inspected by AMSA safety authorities.

FUEL SECURITY RISKS

The question as to whether the security of Australian clean petroleum product supply chains is compromised by relying purely on foreign flagged tankers for CPP imports was discussed with executives from ship owning, ship management and shipbroking companies and then compared with the strategic view of a retired Air Vice Marshal from the RAAF.

The consensus commercial view was that the chartering of any overseas owned tanker for an inbound cargo was a commercial matter even though the contract of carriage might involve loading the vessel at a terminal with heightened security concerns. Availability of tankers on the spot market was considered unlikely to represent a major issue because a foreign flagged tanker operator could be expected to evaluate the carriage of a cargo out of, say, a war risks zone in a commercial way. If the freight rate offered was satisfactory, relative to earnings the vessel could secure elsewhere in the freight market, and any additional insurances were paid for by the charterer, an agreement would likely be concluded. Consultants Hale & Twomey, also consider the tanker market to be robust:

In reality it is difficult to envisage a scenario in which shipping is not available and historically we cannot point to an event which saw the collapse of the petroleum tanker market. Supply disruption affecting tankers is far more likely to arise as a result of other components in the supply chain (e.g. disruption to liquidity in the banking system, geopolitical events.)[5]

It was pointed out by a shipbroker that security issues that may surround the operation of ships on any particular trade involving Australia was the domain of Maritime Trade Operations ("MTO") branch of the Royal Australian Navy. MTO provides liaison between the RAN/ADF and the Australian shipping industry and seeks to "to optimise protection while minimising disruption to both military and civil maritime industry activities and resources".[6] The circumstances, if any, where access to Australian flagged tanker(s) might be seen as part of a prudent security management strategy should, according to the broker, be referred to MTO. Accordingly, it is recommended that inquiries are made with the MTO in relation to how the closure of Australian refineries and increased reliance on international spot market shipping affects the security of Australian fuel supply chains.

NEED FOR BROADER REVIEW OF SUPPLY CHAIN SECURITY

The views of Air Vice Marshall John Blackburn RAAF (Retired) are not confined to the availability of tonnage in the spot market. He takes a much broader strategic perspective and considers Australia to be critically exposed to disruptions in our CPP supply chains. The decline in refining capacity and the lack of any plan to cope with supply disruptions provide cause for concern.[7]

In his report to the NRMA, Blackburn pointed out that Australia is the only IEA member country that fails to meet its IEA net oil import stockholding level.[8] He said this is particularly concerning given that Australia is the only developed oil importing country in the world where there are no Government controlled stocks of crude or CPP; no mandated commercial stock requirements for oil companies; and no government involvement in oil markets. This has to be contrasted with the policies of the countries that supply us with CPP that have implemented fuel stockholding measures.[9]

In my discussions with Blackburn, he emphasized his concern that the vulnerabilities in the international and coastal CPP supply chains have not been analysed by Government. Many of the issues he raises are not directly transport related. However, he argues that a thorough analysis should cover all major elements of the petroleum supply chain including ownership, management and crewing of tankers. Blackburn argues that the origin/nationality of ship owners and crew are elements to be considered in any security assessment, whilst management (including the provision of quality marine training for crews) is the element of most concern in assessing marine safety risks, including marine environmental safety standards.

These three elements fall within Blackburn's proposed solution which is set out in Part 2 of his Fuel Security Report to the NRMA[10]. There, Blackburn argues that we should:

1) Reduce our national liquid fuel demand by adopting measures around fuel efficiency, public transport and alternative fuels.

2) Decide whether we want a proportion of our liquid fuel supply to be secure: if so, how much and for what purpose?

3) Determine the least costly way of achieving this level of security, considering both demand and supply related initiatives.

4) Institute measures to assure the appropriate secure sources of supply and ensure that sufficient refining, processing and storage capacity is retained in Australia to provide a secure source-to-consumer supply chain for a portion of our liquid fuel demands.

A satisfactory investigation into these issues should, in his view, lead Australia to then move from the current 'just in time' supply arrangement to a 'just in case' supply chain.[11]

AUSTRALIAN LABOUR COSTS ON AUSTRALIAN CREWED TANKERS

In discussion, Blackburn considers the appropriate way to address fuel supply chain security is to conduct a benchmarking exercise of Australian security arrangements with that of comparable nations.

A critical question to address in such a review will be how many ships in this supply chain should be Australian owned, flagged and crewed? Part of this exercise inevitably requires a cost analysis of Australian and international crewing arrangements to determine how the more expensive Australian crewing option directly impacts the retail price of the major petroleum products.

Blackburn doesn't confine this need for benchmarking to import supply chains. He stresses that benchmarking must include coastal supply chains. Given the very modest fuel stocks in Australia, the coastal movement of these stocks, particularly in a national emergency, is heavily dependent on secure access to clean tankers given that there is no road and rail capacity to provide viable alternative transport arrangements.

The cost per litre of fuel of introducing Australian crewed and flagged tankers into Australia's international CPP supply chain is estimated below. The cost differential between operating a Medium Range ("MR") tanker of 40,000 – 45,000 deadweight tonnes[12] or a Large Range 1 ("LR1") tanker of 75-80,000 deadweight tonnes with an Australian crew compared to a typical international crew is approximately A$6.0 million per annum.[13] All the other costs incurred in operating a ship such are broadly comparable, regardless of crew origins.

The Australian crew cost premium analysis in this report addresses the three sizes of vessel documented in Table 2 developed by Hale & Twomey. A summary of costs impacting petrol imports from Japan, South Korea or Singapore is given in Table 3.

Table 3: Cost of employing Australian crew on a fuel import tanker in cents per litre of petrol carried from primary source countries to primary Australian import ports. Details in Appendix 1.

Loading petrol at	Discharge port	Aust Crew premium in cents per litre if petrol is imported in 40,000 dwt cargoes	Aust Crew premium in cents per litre if petrol is imported in 45,000 dwt cargoes	Aust Crew premium in cents per litre if petrol is imported 80,000 dwt cargoes
Kawasaki	Brisbane	0.98	0.87	0.49
	Sydney	1.08	0.96	0.54
	Melbourne	1.20	1.07	
	Adelaide	1.29	1.15	
Ulsan	Brisbane	1.09	0.97	0.55
	Sydney	1.19	1.06	0.59
	Melbourne	1.32	1.17	
	Adelaide	1.40	1.25	
Singapore	Brisbane	1.00	0.89	0.50
	Sydney	1.09	0.97	0.55
	Melbourne	1.01	0.89	
	Adelaide	0.95	0.84	
	Darwin	0.60	0.53	
	Fremantle	0.67	0.59	

The total cost per litre of petrol ranges from 0.49 cents per litre to 1.40 cents per litre, and depends on the quantity of cargo carried and the duration of the voyage. Note that this cost is per ship, so that if a portion of the import fleet were crewed with Australians, the additional cost would be spread across the entire import volume..

According to modelling carried out by Hale and Twomey,[14] the areas of greatest increase in fuel imports will be NSW and Queensland. They project that 69% of total clean petroleum product imports will be to those two states in 2016-17 (Table 4). Given the required volumes to NSW and Queensland, it would be logical for importers to increase the size of cargoes. With cargo sizes of 45,000 tonnes to Sydney and Brisbane, employing Australian crew costs only 0.87 to 1.06 the cents per litre. If LR1 tankers with 80,000 tonne cargoes are used, the cost drops to 0.49 to 0.59 cents per litre.

Table 4: Projected states with the most clean petroleum imports, and total Australian clean petroleum imports.

	2010-11 (seven refineries)	2016-17 (four refineries)	% of total imports in 2016-17	% increase in imports
Products imported to Qld (ML)	4,293	9,312	25%	117%
Products imported to NSW (ML)	3,827	16,537	44%	332%
Products imported to Qld and NSW	**8,120**	**25,849**	**69%**	**218%**
Total products imported (all states)	16,831	37,420	100%	122%

Source: Hale and Twomey, "National Energy Security Assessment (NESA) Identified Issues: Competitive Pressures on Domestic Refining, June 2012, p. 31-33.

CALCULATION METHODS

In Appendix 1, a spreadsheet sets out nominal voyages from Singapore, Kawasaki and Ulsan across three different cargoes: petrol, diesel/gas oil and kerosene/jet fuel. The three load ports of Singapore, Ulsan and Kawasaki were selected because Singapore, Japan and South Korea are major sources of imported CPP.[15] While it is not expected that cargoes will move across all of the nominal trades, the critical issue is to examine how the extra cost of employing Australian crews varies according to the distance between load ports and discharge ports, impacting the duration of the voyage, and the size/density of cargoes carried.

The time taken, at 12.5 knots, to cover the round voyage steaming distance[16] combined with the time typically taken in port to load and discharge a CPP cargo produces the total time per voyage.[17] The annual cost is then accounted for over the duration of the voyage to allow the additional cost to be apportioned across each litre of fuel carried by the ship.

Because the Australian crew cost is the same for 40,000 dwt, 45,000 dwt and 80,000 dwt vessels, the substantial savings that can be achieved by utilizing LR1 tankers is readily apparent. However, where the cargo from 40/45,000 dwt vessels is discharged at two ports instead of one, the Australian crew premium is slightly larger because there is an extra day in port and slightly longer steaming distances are involved. Some examples of two-port discharges are given in Appendix 2.

ENDNOTES

1 Review of the Australian Coastal Shipping Industry and Regulations – A Report for the Maritime Union of Australia by Noetic Infrastructure Solutions – July 2014 pp 26-34

2 See generally Hale & Twomey "Australia's Maritime Petroleum Supply Chain" prepared for the Department of Resources, Energy and Tourism, June 2013

3 "Closure of the Bulwer Island Refinery – Some Facts" – BP Communications and External Affairs – March 2014.

4 Australian Maritime Safety Authority, *Port State Control 2013 Report Australia.*

5 Hale & Twomey "Australia's Maritime Petroleum Supply Chain" prepared for the Department of Resources, Energy and Tourism, June 2013

6 http://www.defencejobs.gov.au/navy/jobs/MaritimeTradeOperations/ (Accessed 23 March 2015)

7 Blackburn J "Benchmarking Australia's Transport Energy Policies: A Report for the National Roads & Motorists' Association." www.mynrma.com.au/media/Benchmarking_Australias_Transport_Energy_Policies_Report-December_2014 (Accessed 25 March 2015) Additional reports by Blackburn on Australia's liquid fuel security are available from the NRMA http://www.mynrma.com.au/about/australias-liquid-fuel-security.htm

8 Ibid p.3

9 Ibid p.3

10 Blackburn J "Fuel Security Report, Part 2" A report for the NRMA p.15

11 Ibid p.21

12 Deadweight tonnes represent the lifting capacity of a vessel on a given draft. This is generally expressed as a ship's maximum lifting capacity and includes cargo, fuel, water, stores and furniture etc.

13 Teekay Shipping (Australia) Pty Ltd. point out that the $6 mill figure is a rule of thumb and that the exact differential varies according to the prevailing US dollar exchange rate. ASP Ship Management agreed with this cost assessment.

14 Hale and Twomey, "National Energy Security Assessment (NESA) Identified Issues: Competitive Pressures on Domestic Refining, June 2012, p. 31-33.

15 Department of Industry and Science – Australian Petroleum Statistics – Issue 221 – December 2014.

16 http://ports.com/sea-route/ (Accessed 15 March 2015 onwards)

17 ASP Ship Management were consulted on steaming speed and time in port. While a modern MR might achieve 13 knots laden in good weather, 12.5 knots would probably be nominated as vessel's guaranteed speed in any time charter agreement. The 2 days for loading and discharging are rules of thumb. Actual time in port depends on terminal performance and a variety of operational factors.

APPENDIX 1 Additional cost per litre of petrol, diesel and jet fuel to be carried on ships with Australian crew

PETROL

Loading ports	Discharging ports	Steaming Distance (nautical miles)	Days at Sea including ballast @12.5 knots	Days in Port	Total days for R/V	Aust Crew premium/ voyage @ $6M pa	Aust Crew premium apportioned over 40,000 mt cargo (cents/litre - 1,351 kl/mt)	Aust Crew premium apportioned over 45,000 mt cargo (cents/litre - 1,351 kl/mt)	Aust Crew premium apportioned over 80,000 mt cargo (cents/litre - 1,351 kl/mt)
Kawasaki	Gladstone	4,045	26.97	4	30.97	$509,041	0.94	0.84	
	Brisbane	4,236	28.24	4	32.24	$529,973	0.98	0.87	0.49
	Sydney	4,711	31.41	4	35.41	$582,027	1.08	0.96	0.54
	Melbourne	5,339	35.59	4	39.59	$650,849	1.20	1.07	
	Adelaide	5,759	38.39	4	42.39	$696,877	1.29	1.15	
Ulsan	Gladstone	4,595	30.63	4	34.63	$569,315	1.05	0.94	
	Brisbane	4,786	31.91	4	35.91	$590,247	1.09	0.97	0.55
	Sydney	5,261	35.07	4	39.07	$642,301	1.19	1.06	0.59
	Melbourne	5,889	39.26	4	43.26	$711,123	1.32	1.17	
	Adelaide	6,308	42.05	4	46.05	$757,041	1.40	1.25	
Singapore	Gladstone	4,126	27.51	4	31.51	$517,918	0.96	0.85	
	Brisbane	4,317	28.78	4	32.78	$538,849	1.00	0.89	0.50
	Sydney	4,791	31.94	4	35.94	$590,795	1.09	0.97	0.55
	Melbourne	4,363	29.09	4	33.09	$543,890	1.01	0.89	
	Adelaide	4,061	27.07	4	31.07	$510,795	0.95	0.84	
	Fremantle	2,686	17.91	4	21.91	$360,110	0.67	0.59	
	Darwin	2,359	15.73	4	19.73	$324,274	0.60	0.53	

DIESEL/GAS OIL

Loading ports	Discharging ports	Steaming Distance (nautical miles)	Days at Sea including ballast @12.5 knots	Days in Port	Total days for R/V	Aust Crew premium/ voyage @ $6M pa	Aust Crew premium apportioned over 40,000 mt cargo (cents/litre - 1,192 kl/mt)	Aust Crew premium apportioned over 45,000 mt cargo (cents/litre - 1,192 kl/mt)	Aust Crew premium apportioned over 80,000 mt cargo (cents/litre - 1,192 kl/mt)
Kawasaki	Gladstone	4,045	26.97	4	30.97	$509,041	1.07	0.95	
	Brisbane	4,236	28.24	4	32.24	$529,973	1.11	0.99	0.56
	Sydney	4,711	31.41	4	35.41	$582,027	1.22	1.09	0.61
	Melbourne	5,339	35.59	4	39.59	$650,849	1.37	1.21	
	Adelaide	5,759	38.39	4	42.39	$696,877	1.46	1.30	
Ulsan	Gladstone	4,595	30.63	4	34.63	$569,315	1.19	1.06	
	Brisbane	4,786	31.91	4	35.91	$590,247	1.24	1.10	0.62
	Sydney	5,261	35.07	4	39.07	$642,301	1.35	1.20	0.67
	Melbourne	5,889	39.26	4	43.26	$711,123	1.49	1.33	
	Adelaide	6,308	42.05	4	46.05	$757,041	1.59	1.41	
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	Darwin	2,359	15.73	4	19.73	$324,274	0.68	0.60	

KEROSENE/JET FUEL

Loading ports	Discharging ports	Steaming Distance (nautical miles)	Days at Sea including ballast @12.5 knots	Days in Port	Total days for R/V	Aust Crew premium/ voyage @ $6M pa	Aust Crew premium apportioned over 40,000 mt cargo (cents/litre - 1,240 kl/mt)	Aust Crew premium apportioned over 45,000 mt cargo (cents/litre - 1,240 kl/mt)	Aust Crew premium apportioned over 80,000 mt cargo (cents/litre - 1,240 kl/mt)
Kawasaki	Gladstone	4,045	26.97	4	30.97	$509,041	1.03	0.91	
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	Sydney	4,711	31.41	4	35.41	$582,027	1.17	1.04	0.59
	Melbourne	5,339	35.59	4	39.59	$650,849	1.31	1.17	
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	Brisbane	4,786	31.91	4	35.91	$590,247	1.19	1.06	0.60
	Sydney	5,261	35.07	4	39.07	$642,301	1.29	1.15	0.65
	Melbourne	5,889	39.26	4	43.26	$711,123	1.43	1.27	
	Adelaide	6,308	42.05	4	46.05	$757,041	1.53	1.36	
Singapore	Gladstone	4,126	27.51	4	31.51	$517,918	1.04	0.93	
	Brisbane	4,317	28.78	4	32.78	$538,849	1.09	0.97	0.54
	Sydney	4,791	31.94	4	35.94	$590,795	1.19	1.06	0.60
	Melbourne	4,363	29.09	4	33.09	$543,890	1.10	0.97	
	Adelaide	4,061	27.07	4	31.07	$510,795	1.03	0.92	
	Fremantle	2,686	17.91	4	21.91	$360,110	0.73	0.65	
	Darwin	2,359	15.73	4	19.73	$324,274	0.65	0.58	

NOTES:

- Conversion factors for tonnes to kilolitres are taken from www.bp.com
- Marine distances are from http://ports.com/sea-route/
- Assumptions regarding tanker steaming speeds have been reviewed with ASP Ship Management
- Estimate of the annual premium cost to employ an Australian crew compared to an equivalent crew on a foreign flag tanker was secured from Teekay Shipping (Australia) Pty Ltd and confirmed by ASP Ship Management. The actual differential is contingent on the USD exchange rate.

APPENDIX 2 Examples of additional costs for 2-port discharges of ships carrying petrol and employing Australian crew

PETROL

Loading ports	Discharging ports	Steaming Distance (nautical miles)	Days at Sea @12.5 knots	Days in Port	Total days	Aust Crew premium / voyage @ $6M pa	Aust Crew premium apportioned over 40,000 mt cargo (cents/ litre - 1,351 kl/mt)	Aust Crew premium apportioned over 45,000 mt cargo (cents/ litre - 1,351 kl/mt)	Aust Crew premium apportioned over 80,000 mt cargo (cents/ litre - 1,351 kl/mt)
Kawasaki	**Gladstone**	4,045	13.48						
Gladstone	**Brisbane**	302	1.01						
Brisbane	Kawasaki	4,236	14.12						
Total			**28.61**	**5**	**33.61**	**$552,493**	**1.02**	**0.91**	
Ulsan	**Brisbane**	4,786	15.95						
Brisbane	**Sydney**	475	1.58						
Sydney	Ulsan	5,261	17.54						
Total			**35.07**	**5**	**40.07**	**$658,740**	**1.38**	**1.23**	**0.69**
Singapore	**Sydney**	4,791	15.97						
Sydney	**Melbourne**	628	2.09						
Melbourne	Singapore	4,356	14.52						
Total			**32.58**	**5**	**37.58**	**$617,808**	**1.25**	**1.11**	

For further information please contact:

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Ocean Freight Management Pty Ltd
Telephone: 0408 465 690
Email: Maritime1@mac.com

NRMA Case Study - Israel's Approach to Energy Security

Transport Fuels for the Future

- While the geography and geo-political environments differ quite markedly between Australia and Israel, they provide an excellent case study in the critical role of Government in securing the social, economic and physical security of a modern nation reliant on liquid fuels.

- The Israeli Ministry of National Infrastructures, Energy and Water Resources states that:

> 'Fuel is the driving force behind the Israeli economy … Israel is a fuel-poor country, and is forced to refine most of the fuel products it requires using imported raw petroleum, or otherwise to import ready-made fuel products. **Due to its dependence on importation, as well as to the significant role fuel plays in the economy**, and the complex safety and environmental aspects of its use, **the Israeli fuel economy is subject to comprehensive governmental regulation**.'
>
> '… The frequent vicissitudes and crises in our region enhance our strategic need for finding alternative energy sources that are more reliable and cost-effective. **The Israeli government strives to decrease our petroleum dependency**, as petroleum remains a resource mostly produced in countries that are unfriendly or even hostile towards us. It attempts to do so by way of utilizing natural gas, solar energy, and other energy sources, instead of fuel.'

- Israeli energy consumption is based on two primary sources: electricity and fuel (petroleum products). Petroleum products constitute approx. 75% of general consumption, used in part also for electricity generation.

- Given Israel's reliance on oil imports, the significant role petroleum products play in the national economy, and the vulnerability of their supply chains, the Israeli Government maintains strong control and oversight of this sector.

  - Petroleum & Energy Infrastructures Ltd (PEI) is Israel's national infrastructure company for the Israeli energy economy (100% government-owned). This company handles port services for importation and exportation; storage, conductance and supply of fuels, mostly of distillates, to all parts of the country; handling raw fuel products and distillates, and issuing to mobile containers. Oil Products Pipeline Ltd. (OPP), a subsidiary of PEI, deals with planning, establishing, operating and maintaining distillate conductance systems.

  - PEI's main activities include:

    - **Storage**: PEI stores crude oil, fuel oil, gas oil and refined oil products in underground and above-ground fuel reservoirs. These reservoirs are constructed and operated by the company, which takes great care in ensuring complete separation between different products.

- **Piping**: Crude and refined products are conveyed via a nationwide network of pipelines. PEI pumps fuel and pipes it to various customers such as refineries, airports, the Israel Electric Corp. (IEC), power stations and distribution terminals for road tankers.
- **Marine** : Crude oil and refined products are loaded and unloaded by the company at fuel ports and access piers, preserving the environment by treating ballast and bilge water discharged by ships. PEI separates oil from water and returns water, cleansed and clear, to the sea.
- **Strategic Reserves**: ***PEI stores fuel inventories for the State of Israel and supplies refined products to road tankers in times of emergency***.

- The centrality of energy resilience and sustainability to Israel's way of life is further evidenced by the number of Israeli Government departments involved in all aspects of 'energy' management, regulation, and planning. An extract from the Ministry website states that:

  'The **complexity and vitality of the fuel economy necessitate extensive regulation, which ensures regular and reliable fuel supplies, especially during emergencies**. Following are the chief regulatory organizations:

  - Ministry of Energy and Water Resources
  - Ministry of Transport and Road Safety
  - Ministry of Finance
  - Ministry of Environmental Protection
  - Ministry of Industry, Trade and Labor
  - Ministry of the Interior
  - Standards Institution of Israel'

- The **Israeli Government is committed to ongoing research and development** as another plank to deliver the vision of an energy secure Israel. The Chief Scientist Office recognises that '**energy and infrastructure requirements pose an existential threat to the State of Israel**' – a number of fields of study are funded and supported such as:

  - Energy Efficiency
  - Smart Grids
  - Oil alternatives – especially in the transport sector
  - Fourth-generation nuclear power plants
  - Renewable energy (solar, wind, biomass and others)
  - Clean and efficient fossil technologies
  - Switching, storage and control technologies
  - Carbon capture and storage (CCS)

  - A 2011 OECD report ranked Israel as No 1 in the world in expenditure on R&D as a percentage of GDP.

NRMA Fuel Security Case Study: Finland

Finland provides an example of a collaborative Government - Industry cooperation approach designed to address identified supply risks.

An excellent example is Finland's National Emergency Supply Agency (NESA). The NESA website defines security of supply as:

> *society's ability to maintain the basic economic functions required for ensuring people's livelihood, the overall functioning and safety of society, and the material preconditions for military defence in the event of serious disruptions and emergencies*[1].

The website further notes:

> *Security of supply is grounded in well-functioning markets and a competitive economy. The markets, however, may not always be sufficient to maintain society's fundamental economic and other critical functions amid disruptions and emergencies. For this reason, diverse security of supply measures are employed to ensure the continuity of national critical infrastructure and services under all circumstances.*[2]

Finland's approach to supply security is based on co-operation between the administration and the business community. The core elements are of the Finnish approach are:

The National Emergency Supply Organisation (NESO) is a network that maintains and develops security of supply (of fuel and other essential goods) in Finland on the basis of public–private partnership initiatives. Its primary objective is to ensure the conditions necessary for the operations of organisations that are critical to security of supply. Hundreds of enterprises, government authorities, and associations from various sectors of society are active in NESO. The NESO consists of the National Emergency Supply Agency, the National Emergency Supply Council, and the individual NESO sectors and pools.

The National Emergency Supply Agency is tasked with planning and measures related to developing and maintaining security of supply. The statutory duties of the agency include providing support for the pools' and sectors' operations.

The National Emergency Supply Council is a body that assesses and reviews the general state of security of supply.

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[1] www.nesa.fi
[2] ibid

The general mandate for the NESO sectors is to steer, co-ordinate, and monitor preparedness in their respective fields and to determine the goals for the pools.

The business-driven NESO pools are responsible for operational preparedness in their fields. The pools are tasked with monitoring, analysing, planning, and preparing measures for the development of security of supply within their individual industries, as well as with determining which enterprises are critical to security of supply.

The operation of Finland's NESA is funded by a €0.68/Litre (approx. AU 1cents/litre) levy on fuels and other energy sources.

Case Study – Norway

The contrast is stark between Australia and Norway when it comes to energy security, the operation of the energy sector in a broad sense, and the role of Government in delivering energy sustainability and resilience for their respective nations. They understand that Government intervention and activism is necessary, while respecting the place of the market in a modern globalised trading model.

- They stockpile petroleum products even though they are a net exporter because they understand the risk high impact, low probability events that could undermine the functioning of the Norwegian society.
- They believe in supporting the development of alternative transport energy sources.
- Norway has chosen to save rather than spend the revenue from their resources sector.
- They are unafraid of taxing heavily as necessary to ensure the national wealth stays onshore.
- They see the risks of climate change and are taking steps to do something.

Norway is Europe's largest oil producer, the world's third-largest natural gas exporter, and an important supplier of both oil and natural gas to other European countries.

The Norwegian Government plays an active role in the energy sector of the nation. Norway's Ministry of Petroleum and Energy (MPE) is responsible for overseeing the country's energy resources. The Norwegian Petroleum Directorate (NPD) reports to the MPE as an advisor, manages resources, and collects and analyzes data. The largest energy company operating in Norway is Statoil ASA, controlling 70% of Norway's oil and gas production. Statoil ASA was created by the merger of Statoil and Norsk Hydro in October 2007. **Norway's government is the largest shareholder of Statoil, owning 67% of the international energy company**.

As a net oil exporter, Norway is not bound by the IEA 90-day stockholding commitment. That said, as a nation they have in place a framework and legislation to ensure stocks are held and available for use when / if needed in an oil emergency.

Fuel / Oil Security - Regulatory Framework

In an emergency, the formal decision arising from an IEA collective action will be made by the Minister of Foreign Affairs after consultations with the Minister of Petroleum and Energy (MPE). The other cabinet members will be informed in an appropriate way.

Depending upon the actual situation, a decision on Norwegian participation might be made within 24 hours after receipt of a proposal for an IEA collective action. Following the decision to participate in an IEA collective action, the MPE decides on the measures to be taken in an emergency.

Under the compulsory stocks regime, companies are required to release their stocks in an effective manner and immediately. The stockdraw process (release of industry stocks) will formally be headed by the MPE who will use the Oil Emergency Board (OEB) to administer the process; the OEB is made up of high-ranking representatives

from Norwegian oil companies and chaired by the MPE. The operational stock release is undertaken by Statoil ASA or Esso Norway (the two refining companies).

The administration indicates that, on request, Statoil ASA's or Esso Norway's stockholding commitments of petroleum products can be lowered progressively, in line with the stockdraw rate and the sales process.

Stockholding Structure

Despite being a net exporter, Norway held government stocks until 2006, based on laws established in 1956 (the Act of Supply and Contingency Measures, subsequently amended in 1975).

In August 2006, Norway introduced new legislation with the Act of Petroleum Product Storing for Emergency Purposes, which imposed an obligation on companies to hold stocks of products equivalent to 20 days of their sales/imports in the domestic market, and also an obligation to implement stockdraw upon the government's request, should a situation of supply deficit occur. The Act was provided with supplementary regulations, instituted in September 2006.
As stipulated in the Royal Decree (para. 10):

> 'Compulsory stockholders or anyone storing petroleum products on behalf of the compulsory stockholder are bound to provide the ministry with information about imports, sales and stocks, etc. on a specific scheme. The report must be submitted four times a year (i.e. before 15th January, 15th April, 15th July and 15th October).
>
> 'The new legislation includes provision for fines of up to EUR 1.25 million (NOK 10 million) per infringement of the obligation.'

As a consequence of this new legislation, the government stocks were sold in 2007.

The new regulations give the government control of company stocks during peacetime in the event of a supply disruption. The new stocks legislation covers only petroleum products; however, in wartime the government can take control of all crude oil stocks as well as industry-held product stocks.

Energy Sector – General Observations

- With only 5 million people, Norway is reported to have more than 3000 oil service companies, which have grown on the back of the country's oil and gas industry. Its success in leveraging its oil and gas riches for the long-term benefit of the population has not been replicated by other resource rich nations, such as Australia. Norway has the largest sovereign wealth fund (the Government Pension Fund Global) in the world with assets of around $US838B.

- The Governor of the Norwegian Central Bank, Mr Oystein Olsen, worked on the establishment of the GPFG and is reported as saying that **the fund's size simply reflects Norway's success in extracting a large share of the economic rent from its resources sector**: 'The government receives about three-quarters of the net profit from the petroleum industry.' Mr Olsen says

that the fund embodies the key to good management of petroleum resources because it disconnects the spending in the national budget from oil and gas revenue. All petroleum revenues bypass consolidated revenue and are allocated to the GPFG.

  - Interestingly, the GPFG has just rid itself of investments in Australian coal companies highlighting the environmental impact of the production of the commodity.

- Despite the success of the Norwegian oil industry, and the vital role the Government played in establishing it, Statoil continues to invest heavily in developing technical expertise spending more than $600m (AUD) a year on research and development.

- The are many Norwegian businesses currently operating across the energy sector in Australia. A Woodside representative, Mr Tore Moe, told The Australian newspaper in April 2014, that he sees **a lack 'strategic thinking and policy development' in the oil and gas sectors in Australia**. Whereas the mining industry has nurtured a strong domestic supply chain and technology development, the same impetus is missing in oil and gas. Mr Moe suggests that 'without a national operator which has an additional agenda, you probably wouldn't get there'.

- The Norwegian Government, the Norwegian Royal family and Norwegian energy sector companies work collaboratively to ensure that this successful sector of their economy continues to grow. For example, in February 2015 a Norwegian delegation headed by the king and queen, visited Australia to look for opportunities for trade and investment in the Australian petroleum industry.

  - During that visit, the Norwegian Petroleum and Energy Minister, Mr Tord Lien, is reported as saying that this collaborative approach has been fundamental to the country's success. Further, **the Government incentives for R&D in oil and gas technologies has been one of the key drivers of this collaboration and a trigger for the success. Mr Lien said that he thinks this is an area where Australia could do more**.
  - Mr Lien is quoted as saying 'We are more than happy to talk to people from authorities and organizations about how we have developed our system …'. The Australian newspaper journalist reporting on the visit, observed that 'so far, Australian politicians especially have shown little interest in learning more about the secret to Norway's success…'

- Regardless of the success of the Norwegian oil and gas sector, the Government understands that these resources will not last forever and that alternative energy sources need to be considered. The Norwegian Government also understands that anthropogenic climate change needs to be managed and have voluntarily decided to stand with the EU on setting (and achieving) emissions reductions targets.

  - A Government media statement issued in February 2015 noted: 'The Government has already introduced specific instruments and measures that will reduce domestic emissions. Our spending on railways and

public transport is at a record level, we have **made it more attractive for business to develop new climate technologies and we are building more renewable energy…**'.

- A Norwegian Government White Paper, *The Long Term Perspectives on the Norwegian Economy 2013*, under the chapter heading *Development within a Sustainable Framework*, reported that:

  'The objective is the long-term restructuring of Norway into a low-emission society. The Government will strengthen the use of national measures to achieve this goal. … As of 2013, around 80% of all emissions in Norway are subject to quotas or taxation …New technology is necessary to solve the climate challenge … **The costs of investing in energy efficiency, renewable energy production and technology development may be large, but the costs of inaction may be even larger**.'

- Chapter 13 of the 2015 Norwegian Budget Proposal from the Ministry of Foreign Affairs, *Norwegian policy and the new development goals for 2015-2030*, reports that:

  'Advantageous taxation rules for electric vehicles resulted in a doubling of the number of electric passenger cars registered in Norway, from about 8000 at the beginning of 2013 to 17700 at the end of the year. The proportion of buses in the larger towns that run on hydrogen fuel cells, biogas or electricity is increasing.'

- The Australian newspaper reported this increase in electric vehicle registrations in April 2014 and noted the Government incentives encouraging environmentally friendly cars. Incentives such as exemptions from high car taxes, toll-free driving, free public parking and use of public transport lanes. There are critics who believe that promoting clean cars is proving costly (and clogging up bus transit lanes), but the Norwegian Government has apparently pledged to keep incentives in place until the end of 2017 or until 50000 cars have been sold!

- Hydropower is the principal source of Norway's electricity supply, accounting for 97% of total net generation.

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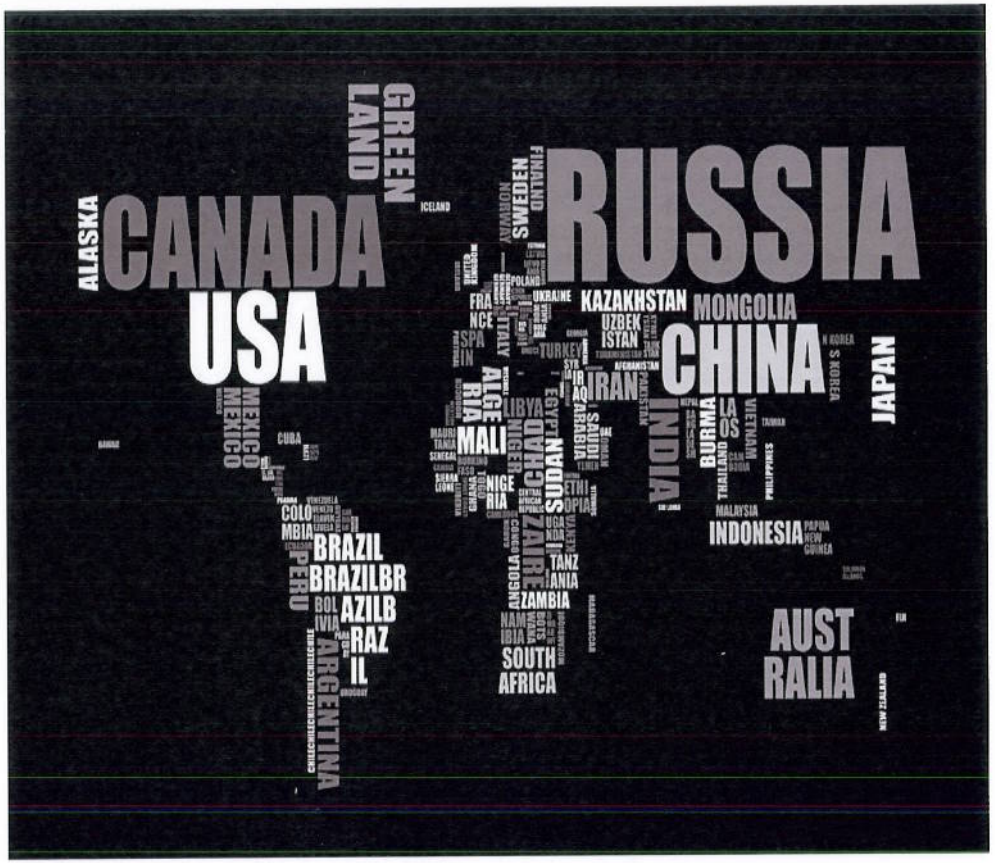
PETROLEUM MARKET IN AUSTRALIA & THE APAC REGION

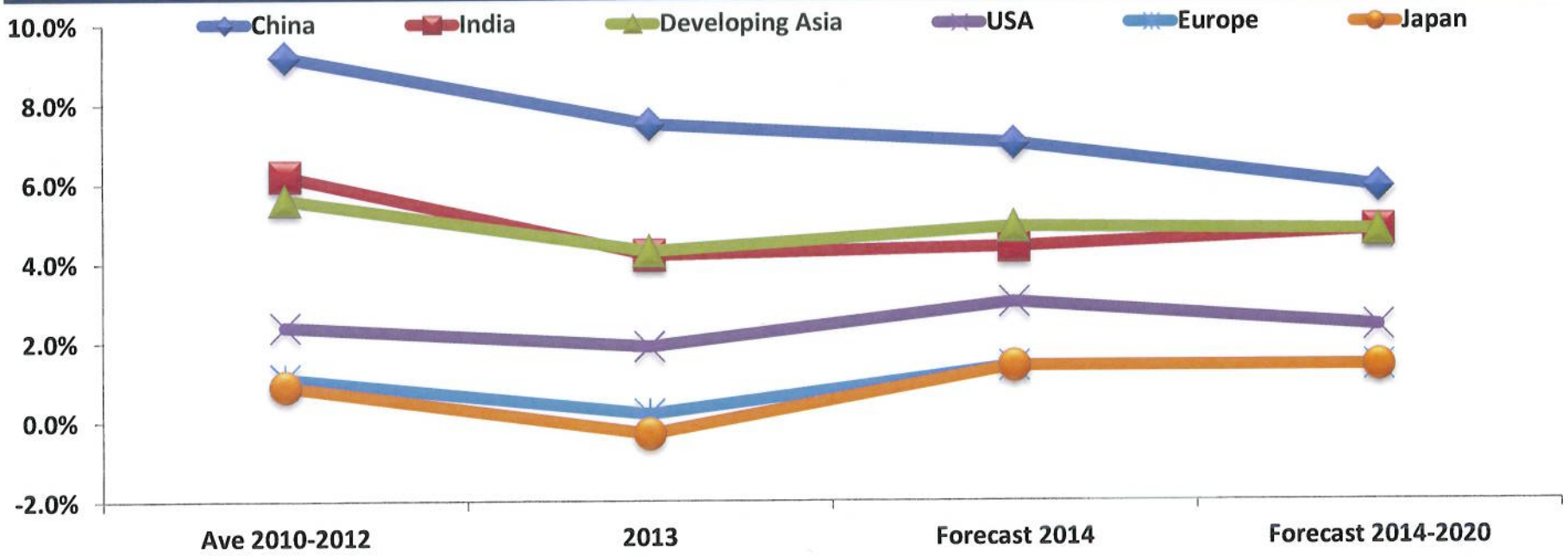
AUSTRALASIAN CONVENIENCE AND PETROLEUM MARKETERS ASSOCIATION (ACAPMA)
SEPTEMBER 2014 (MODIFIED APRIL 2015)

GLOBAL CONTEXT



Led by China, developing APAC countries lead economic growth to 2020 while the US and Europe see slow recovery after 2013...

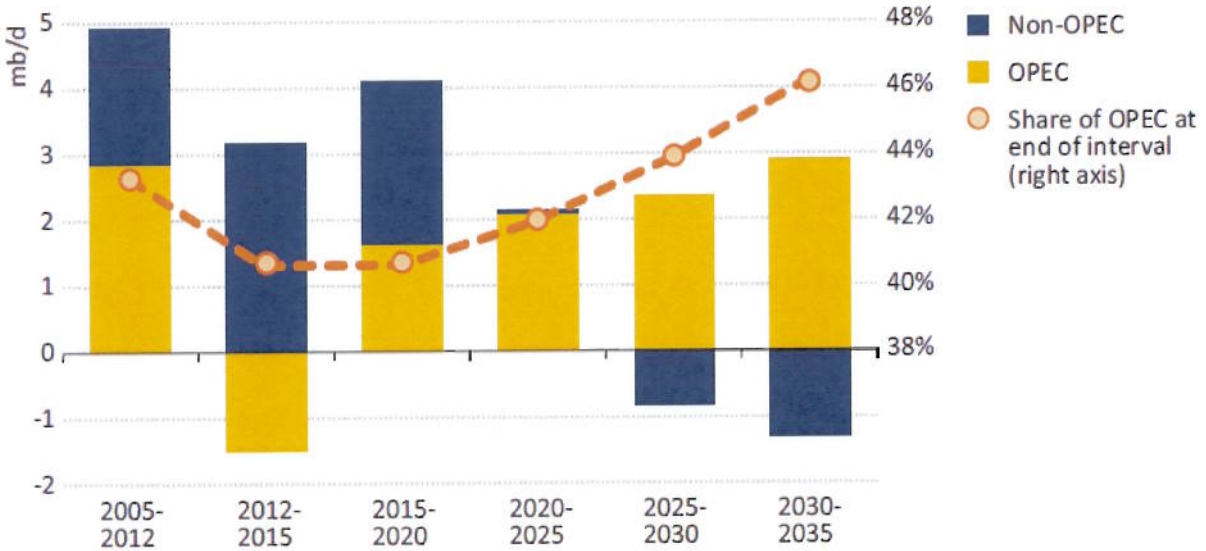
Global Outlook for Growth of Gross Domestic Product to 2020



Source: The Conference Board Global Economic Outlook 2014, February 2014 update

Medium term, Non-OPEC supply is sufficient to meet the lion's share of growth in world demand...

Oil production changes by OPEC / Non-OPEC grouping

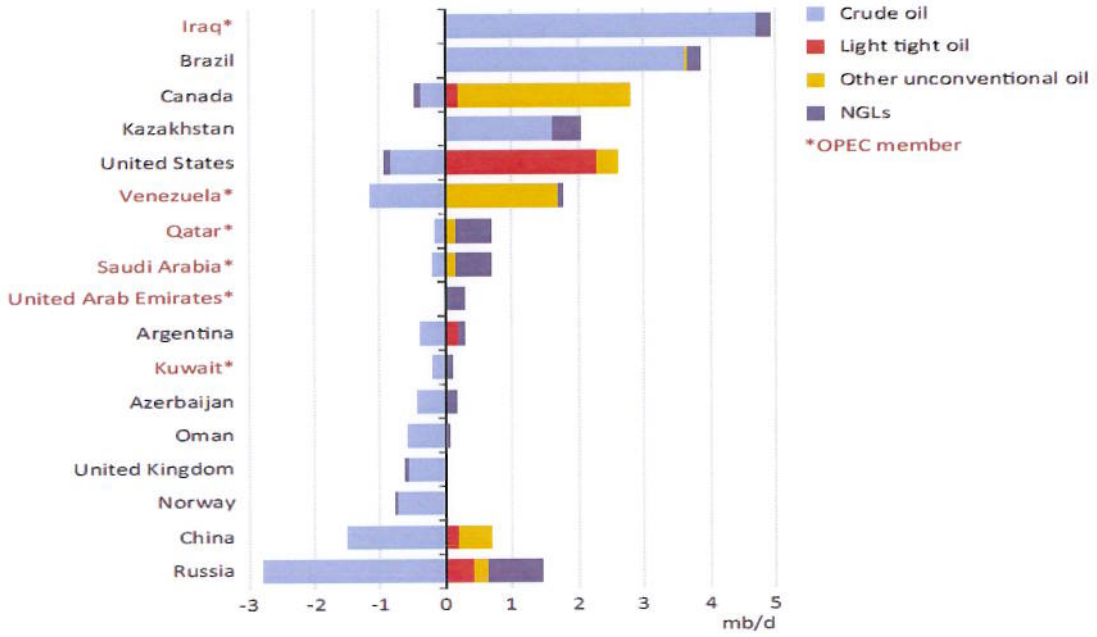


Note: Share of OPEC is for the end of the interval shown, *i.e.* for 2012 in the first column, for 2015 in the second, and so on.

Source: IEA, World Energy Outlook 2013

OPEC's role quenching world's thirst for oil is temporarily reduced over the next decade, due to rapid growth in LTO & unconventional oil...

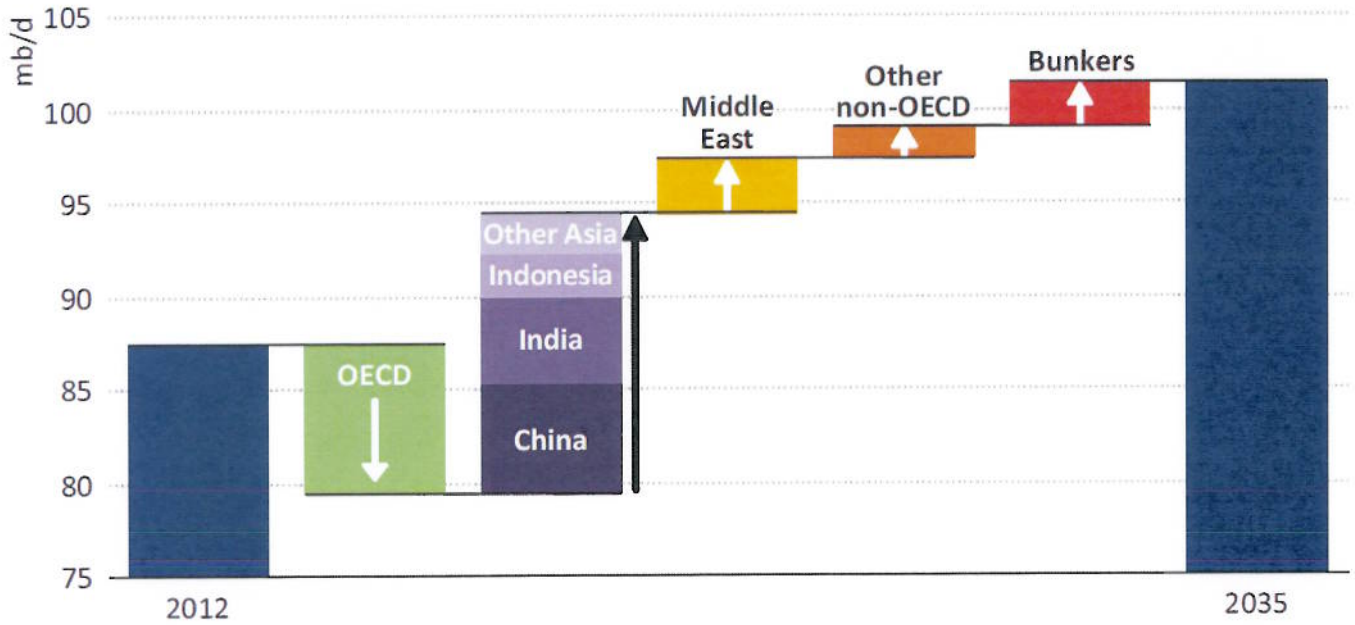
Change in oil production in selected countries 2012-2035



Source: IEA, World Energy Outlook 2013

Pushed by the developing powerhouses in APAC region, world oil demand reaches 101 mb/d by 2035…

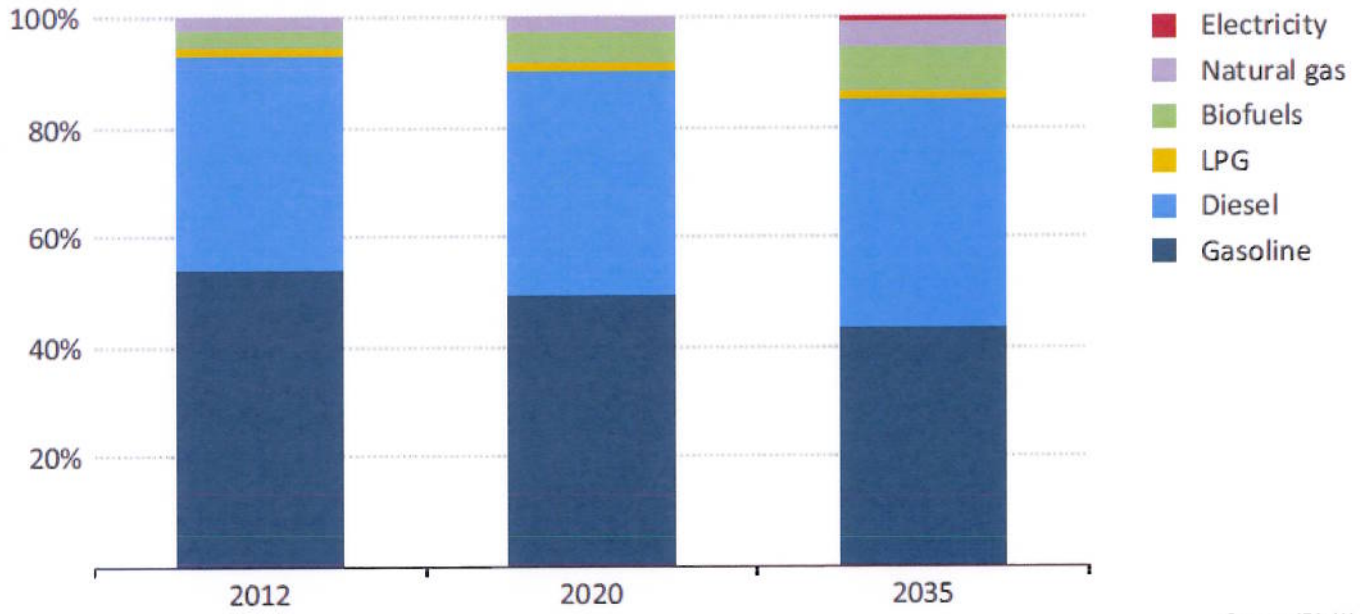
Growth in world oil demand by region 2012-2035



Source: IEA, World Energy Outlook 2013

Beyond biofuels, the main alternatives to oil as a transport fuel in the medium to long-term are natural gas and electricity...

Changes in road-transport energy fuel mix (global)



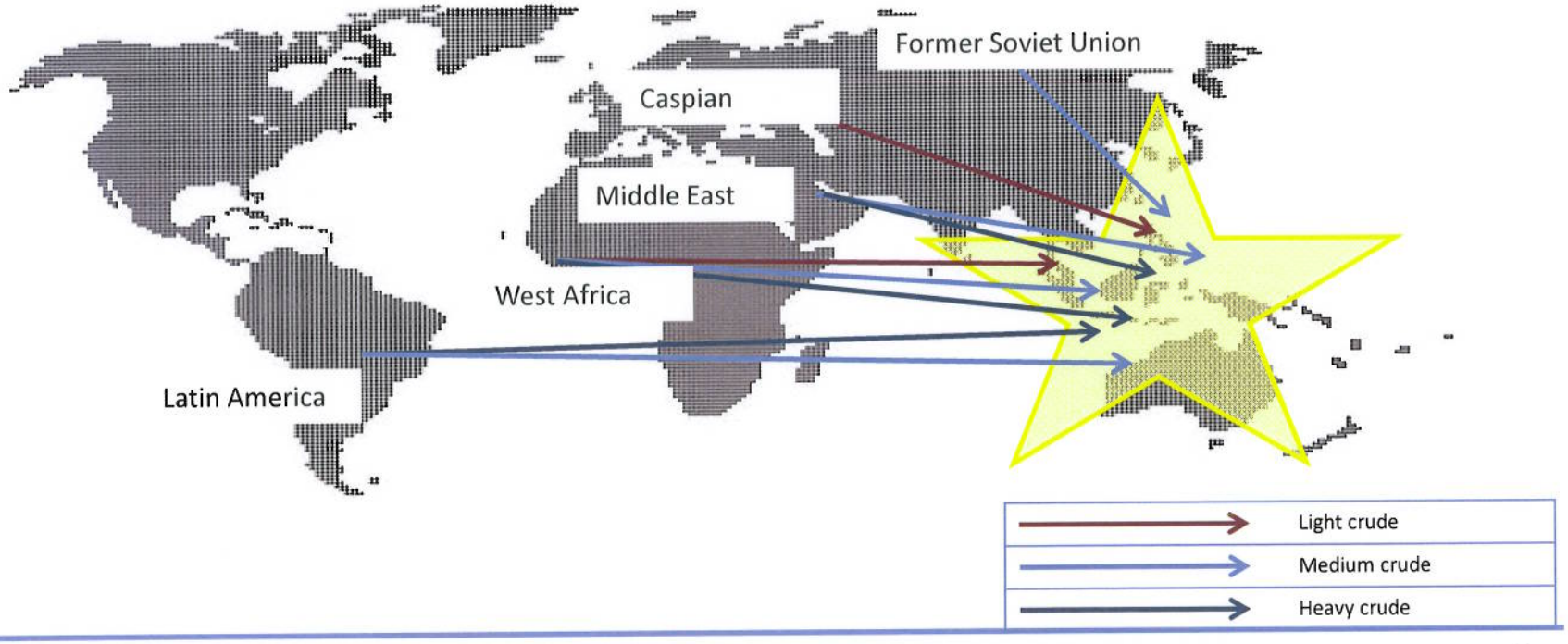
Source: IEA, World Energy Outlook 2013

APAC

REGIONAL DYNAMICS

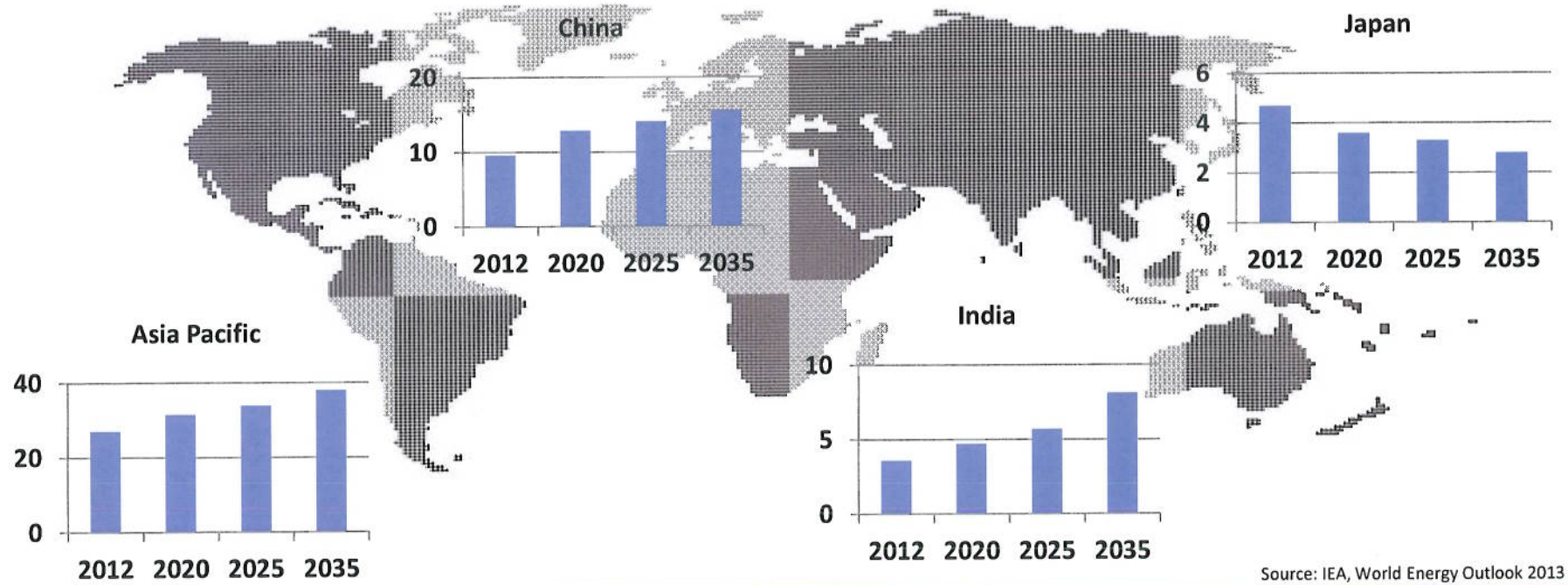
Crudes to Asia will be mainly medium gravity and via long haul supply chains…

Incremental crude oil trade flows into Asia 2012-2018



China contributes 70 per cent of total crude oil demand growth in APAC region...

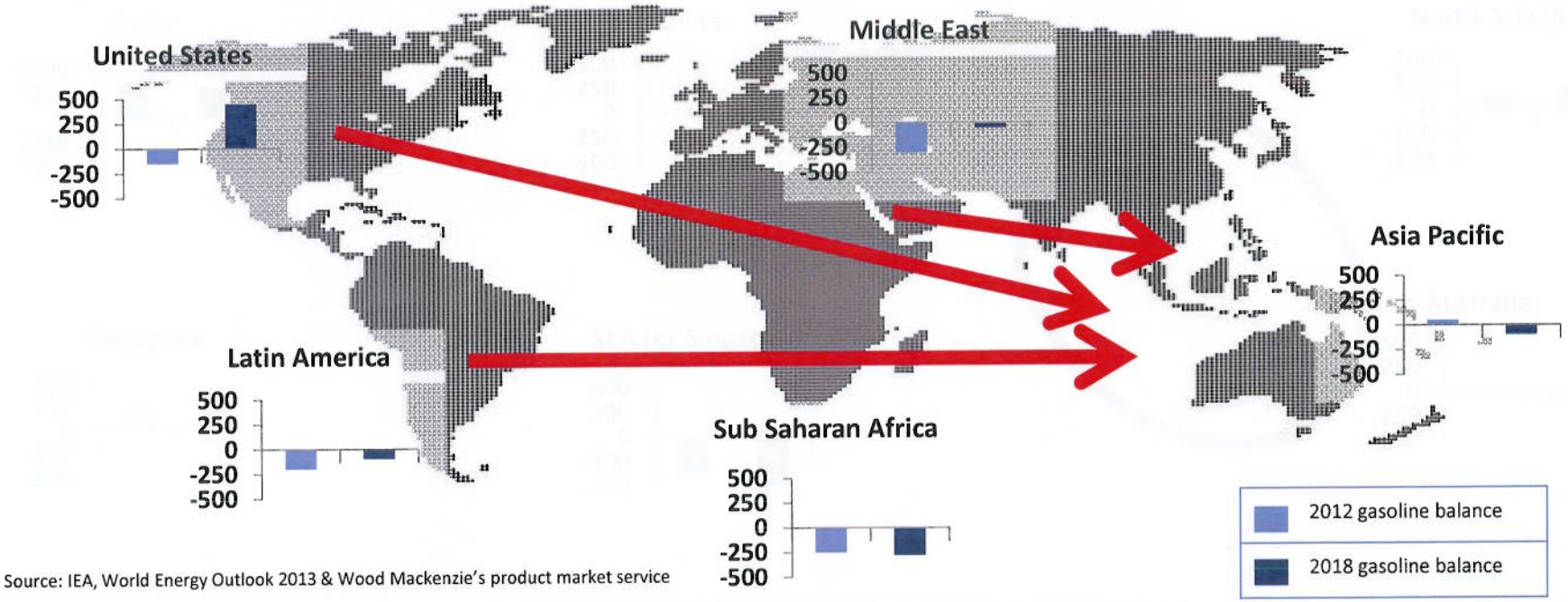
Asia Pacific oil demand by selected countries, mb/d



Source: IEA, World Energy Outlook 2013

Asian gasoline will be pushed back from traditional markets in the US and the Middle East...

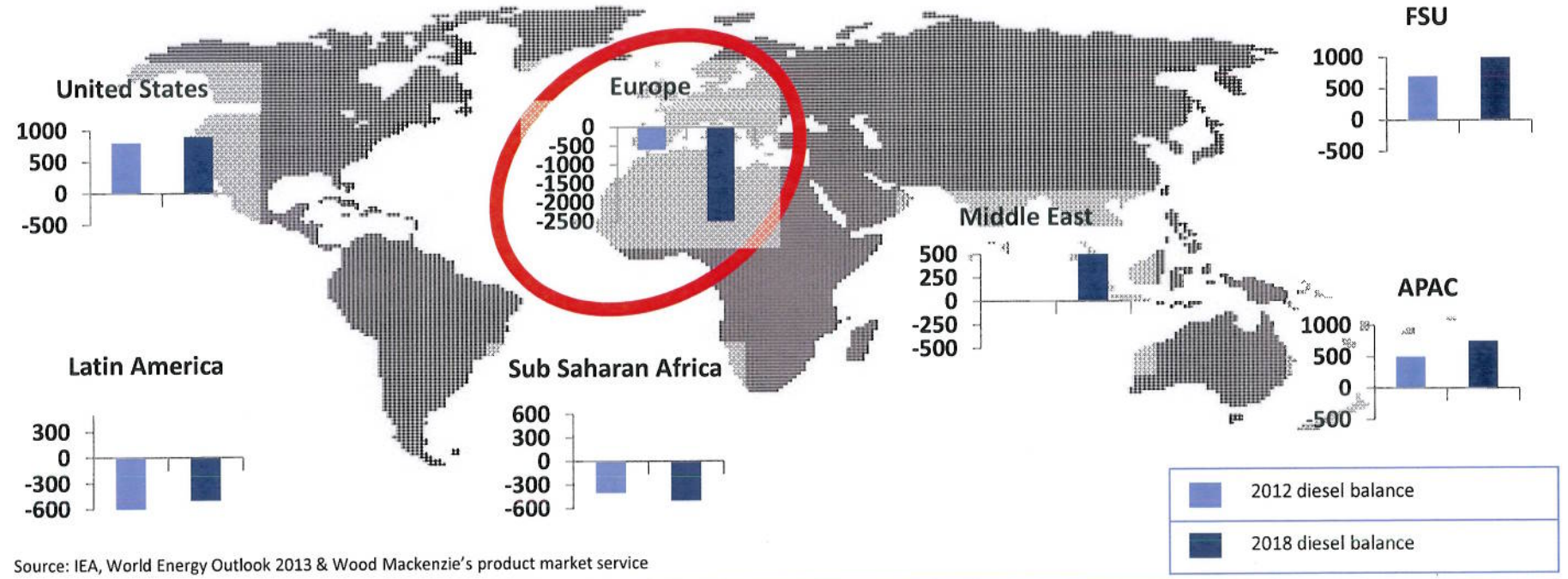
Gasoline balance, kb/d



Source: IEA, World Energy Outlook 2013 & Wood Mackenzie's product market service

If not China, all eyes will be set on increasing European diesel deficits...

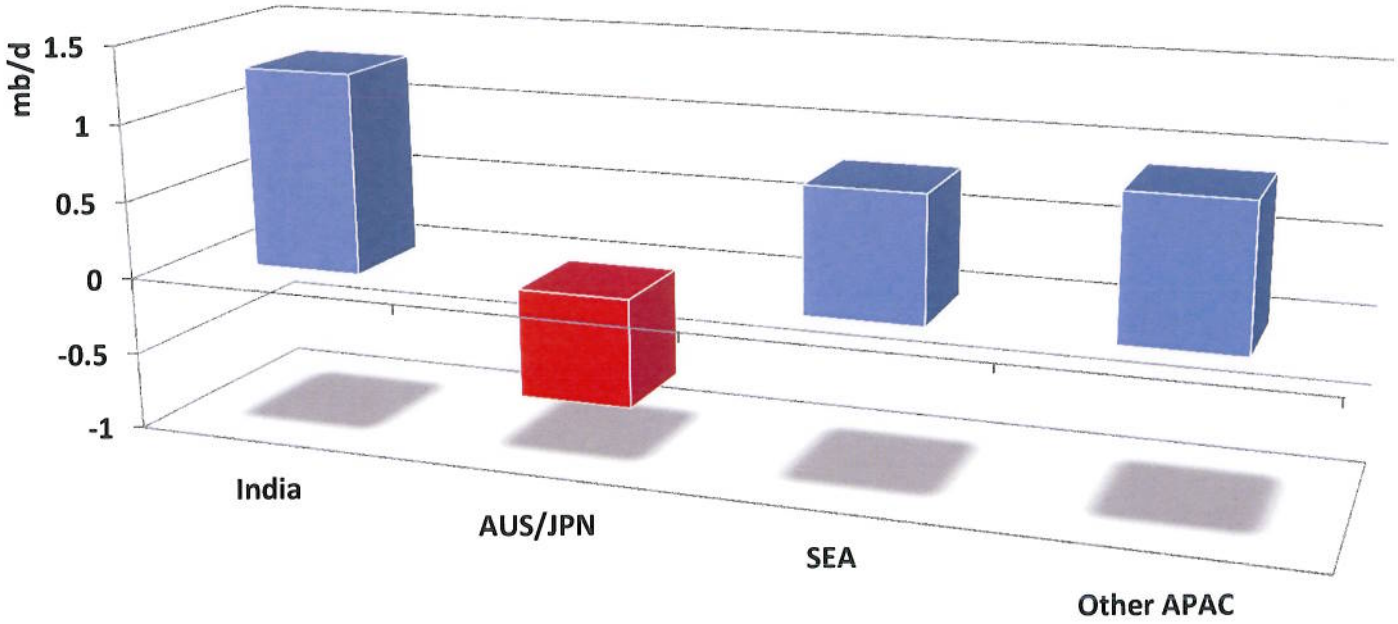
Diesel balance, kb/d



Source: IEA, World Energy Outlook 2013 & Wood Mackenzie's product market service

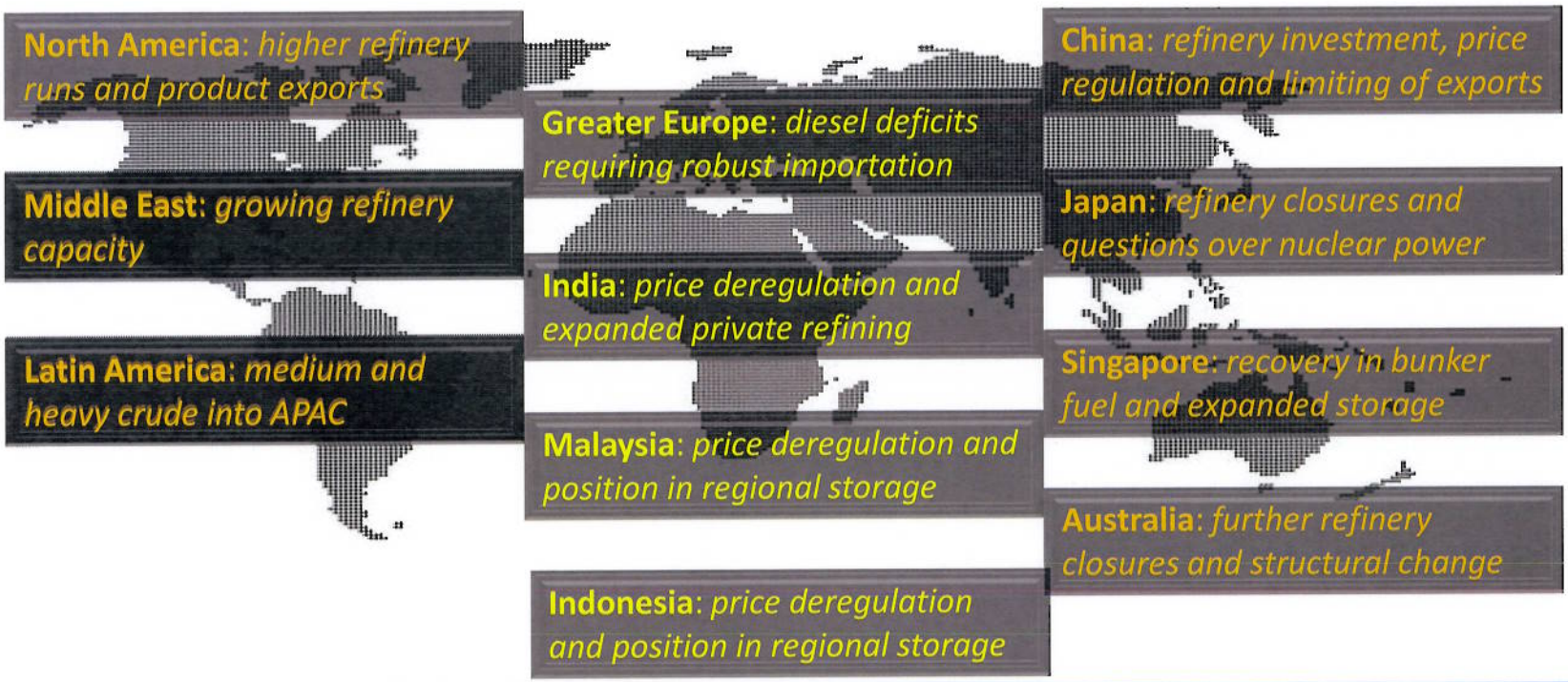
Investments outside China are happening mainly in India, while Australia and Japan continue closures…

Rest of APAC investments in mb/d, 2013-2018



Source: Wood Mackenzie, view of "Firm" investments

Whilst influenced by global developments, APAC planning and development will change regional dynamics...

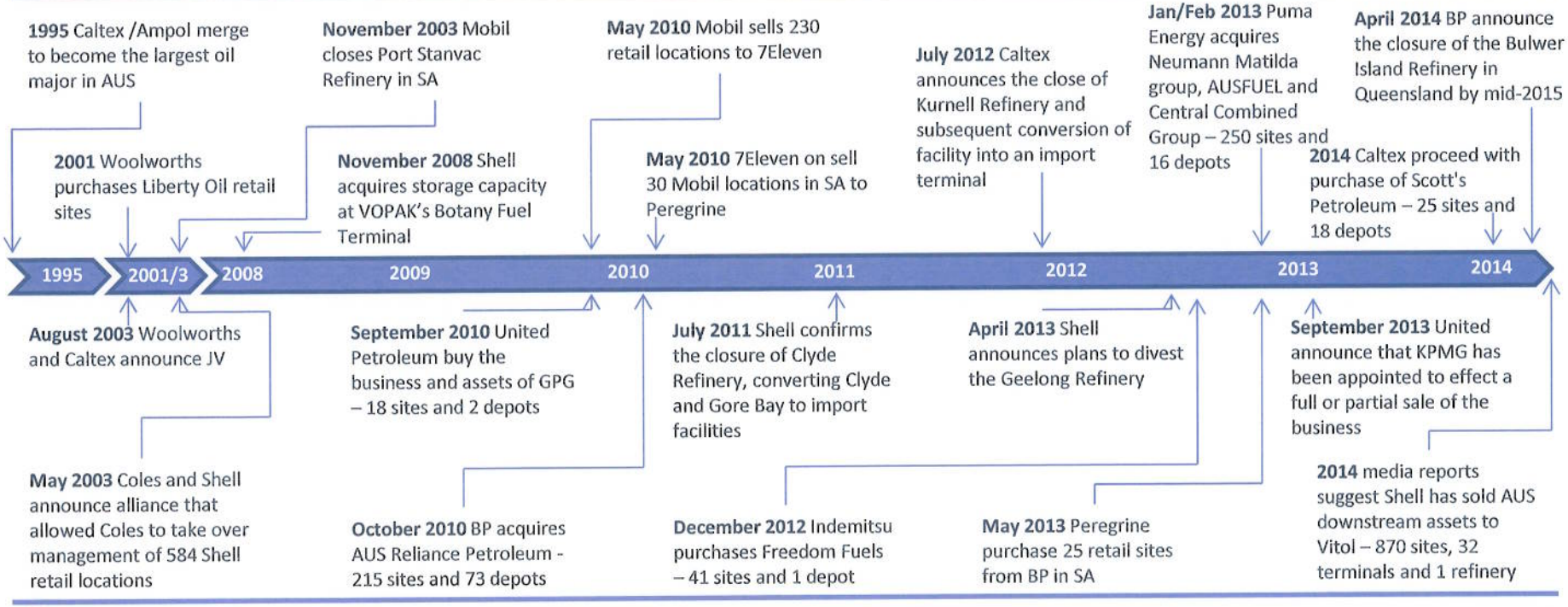


AUSTRALIA

COUNTRY DYNAMICS

There has been a decade or more of constant evolution in the Australian markets…

Timeline of change in Australian market in the 20 years



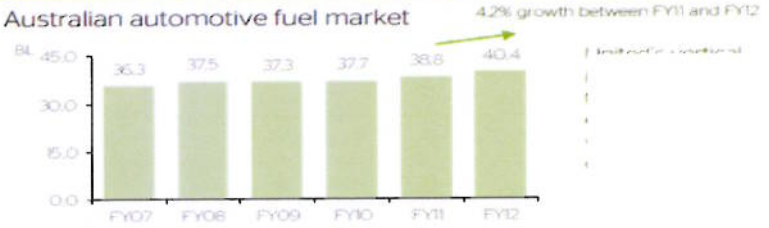
The Australian fuel industry has very strong fundamentals, with growth driven by a strong economy...

Key economic highlights

Growing fuel market

2.2% CAGR for the Australian fuel market between FY07-FY12

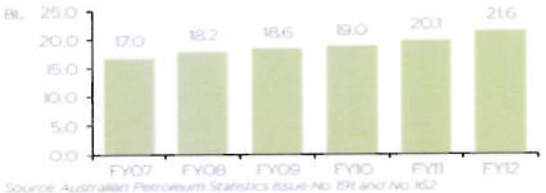
Australian automotive fuel market



Source: Australian Petroleum Statistics Issue No 191 and No 162

4.5% CAGR forecast for diesel volumes FY11-FY15

Australian automotive diesel market



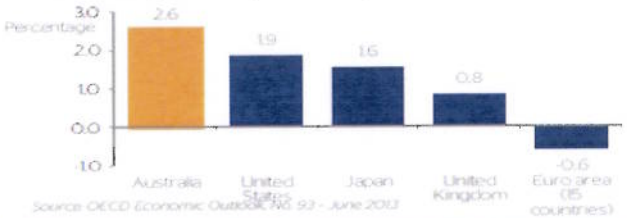
Source: Australian Petroleum Statistics Issue No 191 and No 162

United continues to

Australian economy is outperforming many other OECD countries

2.6% GDP growth (2012-2013)

GDP change from previous year

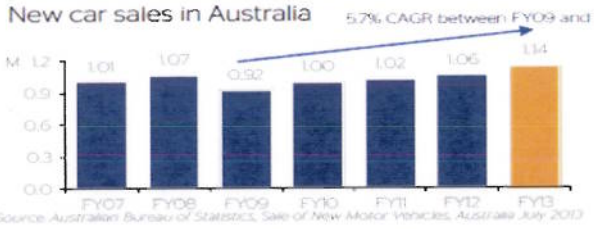


Source: OECD Economic Outlook No 93 - June 2013

Australia has recorded strong GDP growth resulting from the resources boom

1.14m new vehicles purchased in FY13

New car sales in Australia



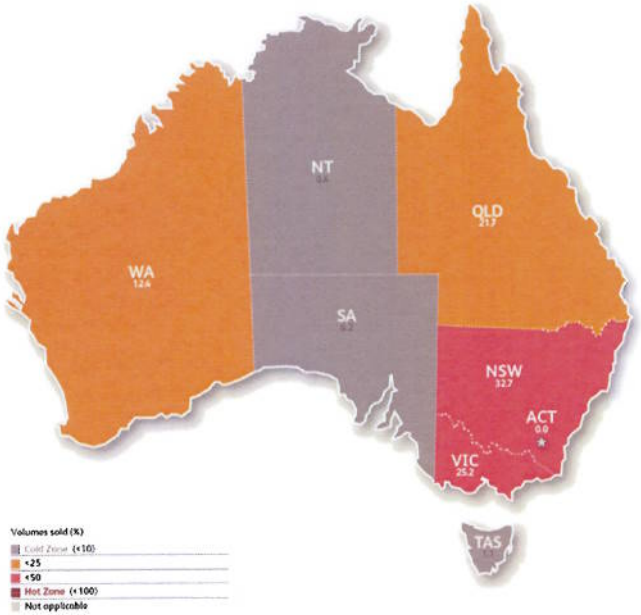
Source: Australian Bureau of Statistics, Sale of New Motor Vehicles, Australia July 2013

Record new car sales in Australia is driving longer term growth in retail fuel requirements

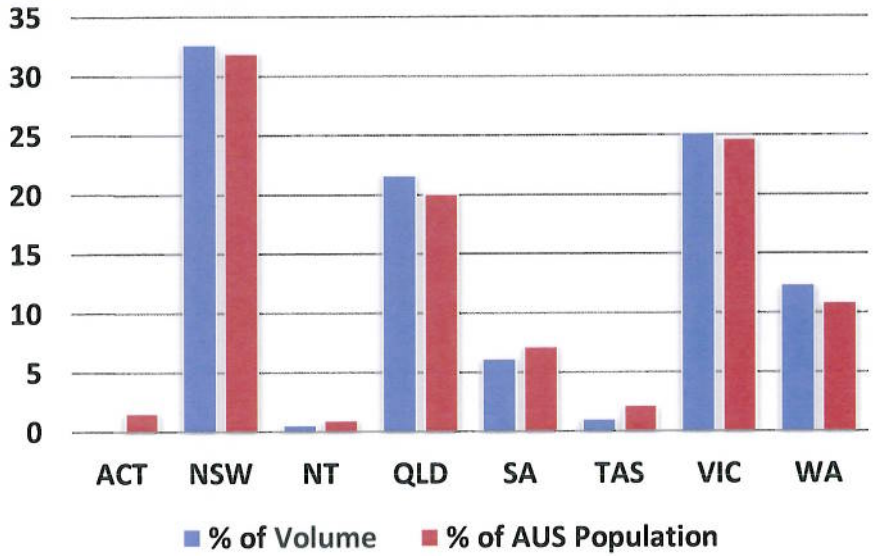
Source: KPMG

The Australian Eastern States still dominate in total volume, while residents of WA and QLD buy more fuel on average than those living in other States...

Percentage of fuel volume sold by State



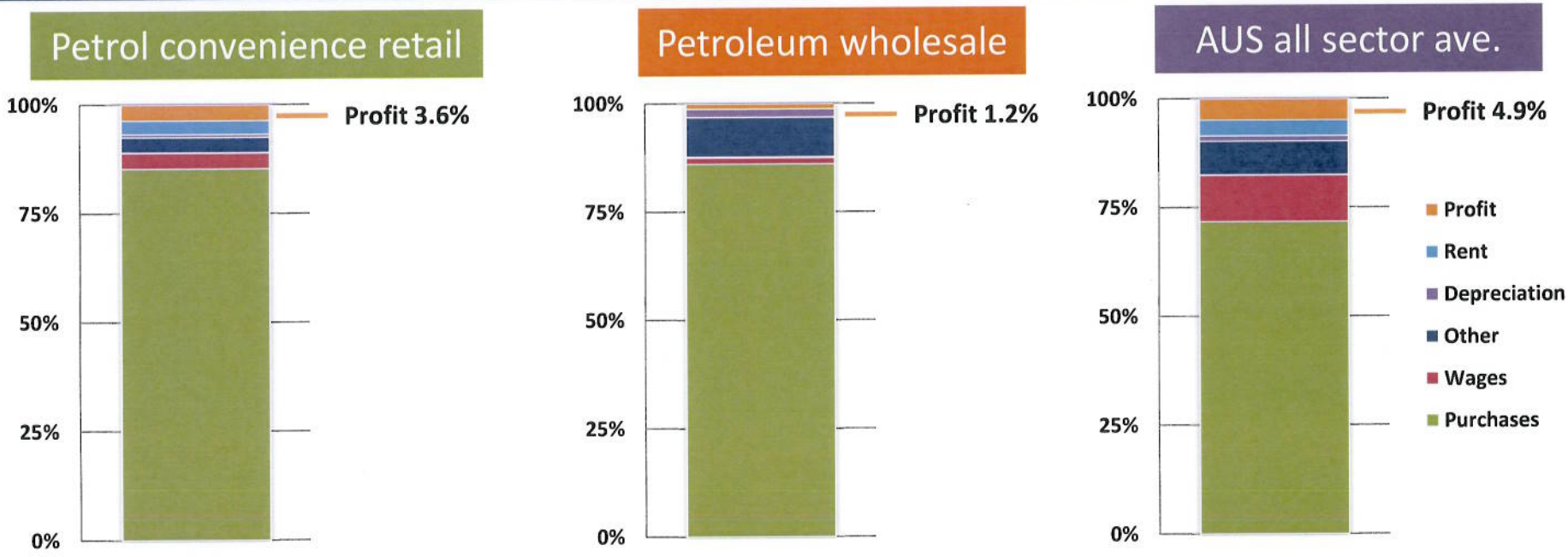
Distribution of volumes sold v's population



Source: WWW.IBISWORLD.COM.AU

Average profitability for the petroleum wholesale and petrol convenience industries are lower than the Australian all sector average...

Key industry costs

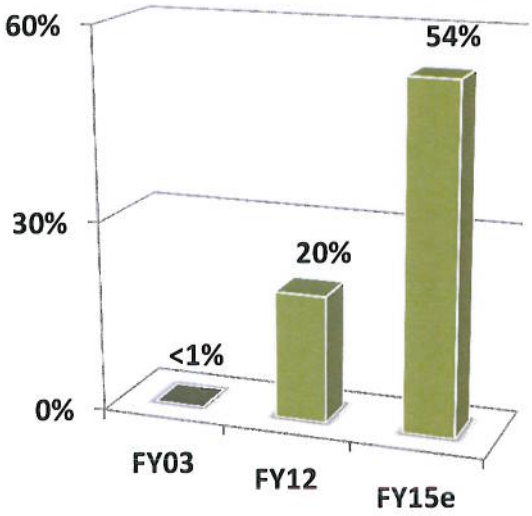


Source: IBISWorld.com.au

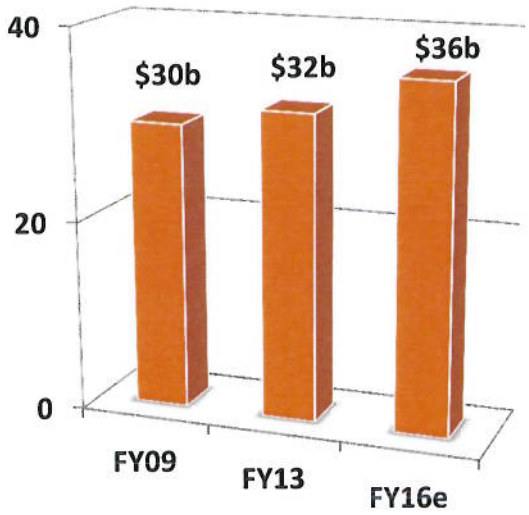
Australia's refinery closures and steady demand growth requires additional importation...

Key downstream petroleum industry highlights

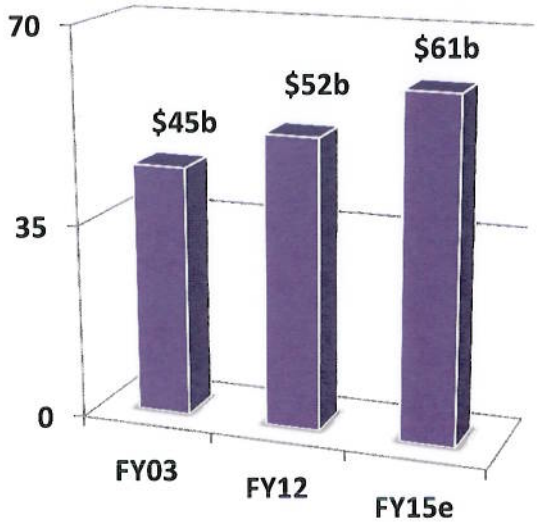
Fuel importation



Retail fuel sales



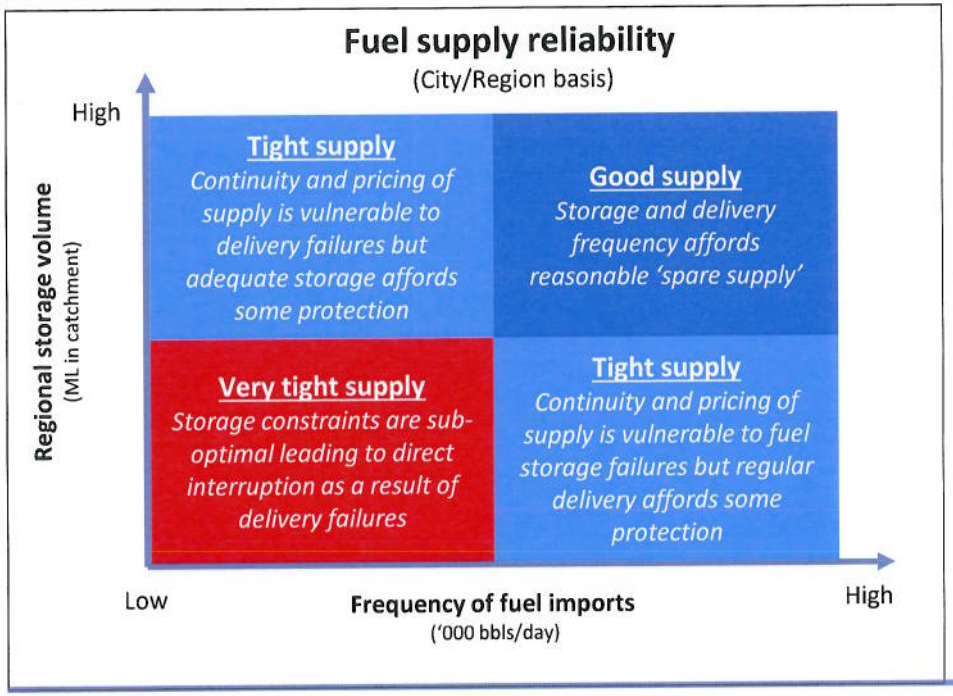
Wholesale fuel sales

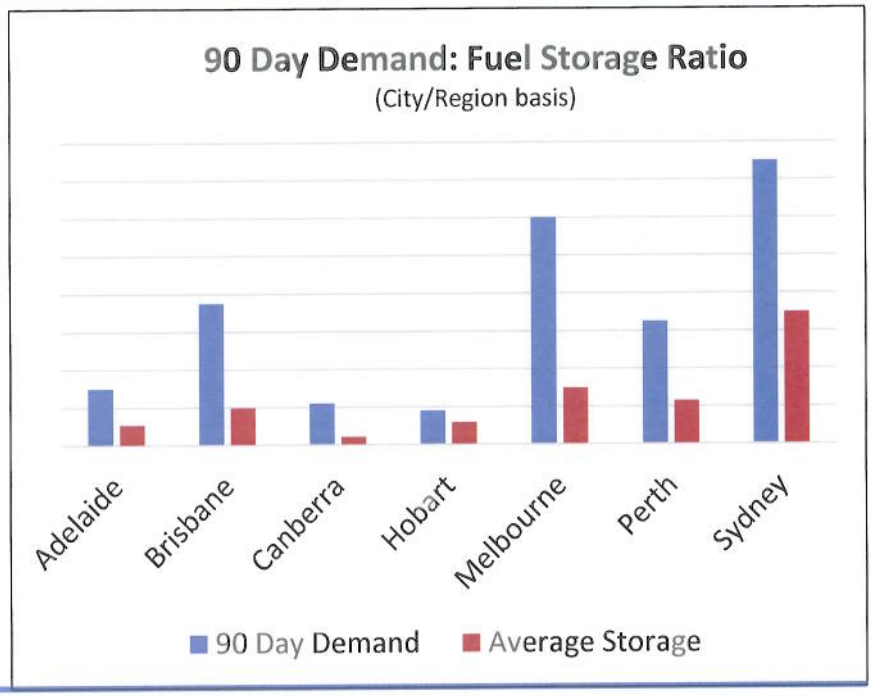


Source: KPMG

In considering Australia's future importation regime, consideration should be given to the current dynamics of Australia's internal fuel supply

Assessing reliability of Australia's internal fuel supply (Indicative only)



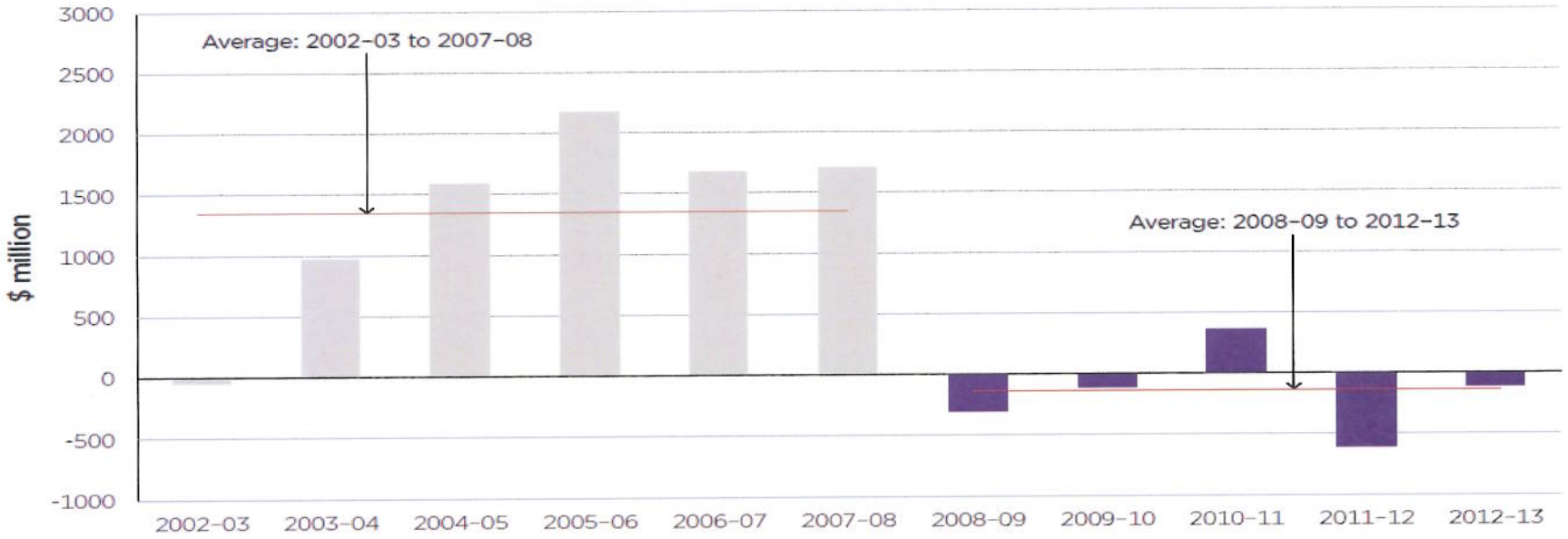


AUSTRALIA

WHOLESALE DYNAMICS

Volatile nature of profits in Australian downstream petroleum is reflected in the variable performance of refineries in the last decade…

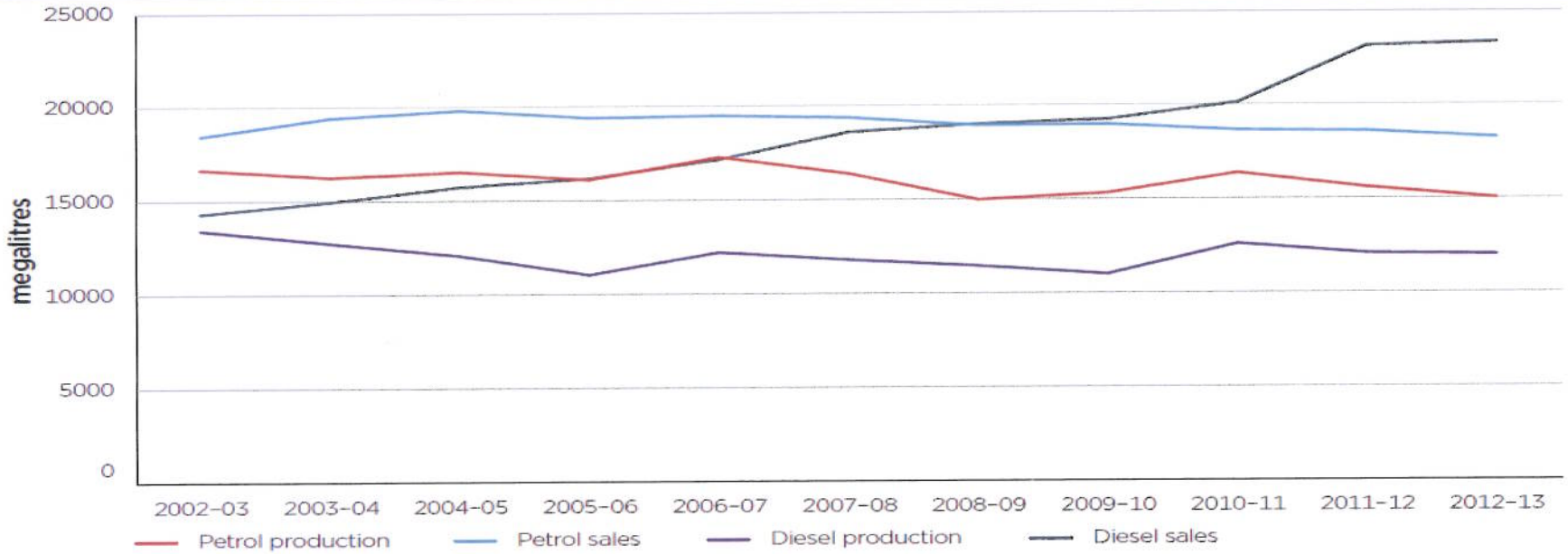
Refinery sector net profit in real terms, all products 2002-03 to 2012-13



Source: ACCC, Monitoring of the Australian Petroleum Industry 2013, Chart 24

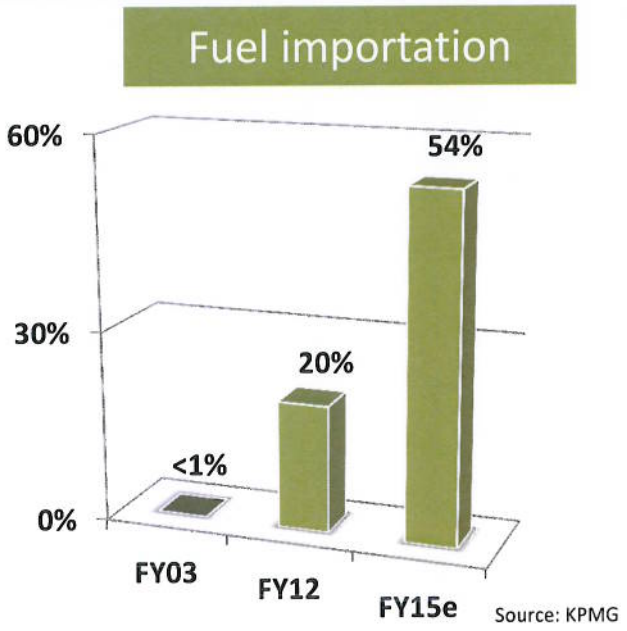
Demand growth in the Australia, especially for diesel, has meant that the market has been short of refined products for over ten years...

Production and sales of petrol and diesel in Australia, 2002-03 to 2012-13



Source: ACCC, Monitoring of the Australian Petroleum Industry 2013, Chart 3.3

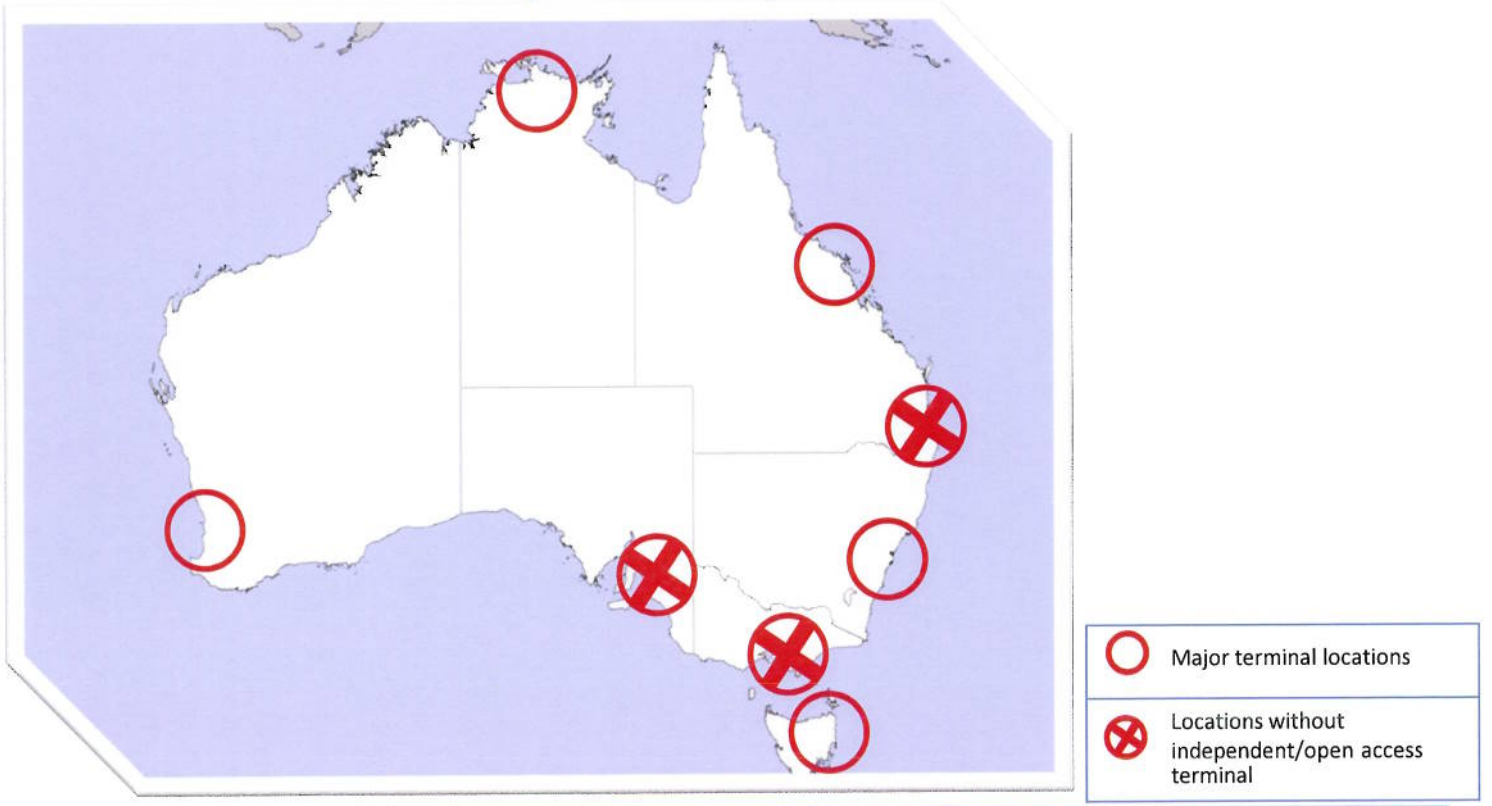
Australia's refinery under margin pressure and steady demand growth requires additional importation...



With a positive medium term outlook for the supply of refined fuels in Asia, refinery margins will continue to be under pressure.

In this climate, the challenges faced by the older and higher cost refineries such as those still operating in Australia are likely to intensify.

Independent and open access terminals in key locations will be important to the unlocking of the Australian fuel landscape for independents...



Regional refiners and commodity traders see Australia as an attractive market for supply and their investments are being made where terminal access is available...

Acquisitions made by International companies

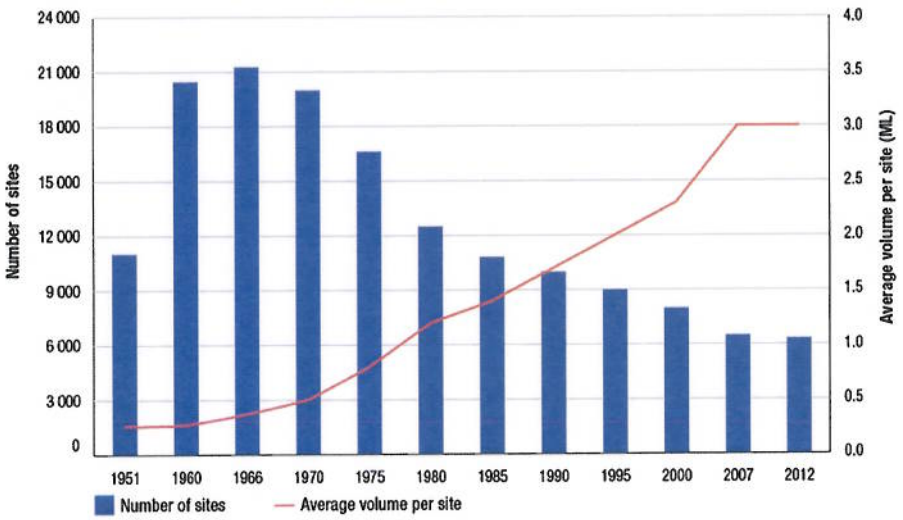
AUSTRALIA

RETAIL DYNAMICS

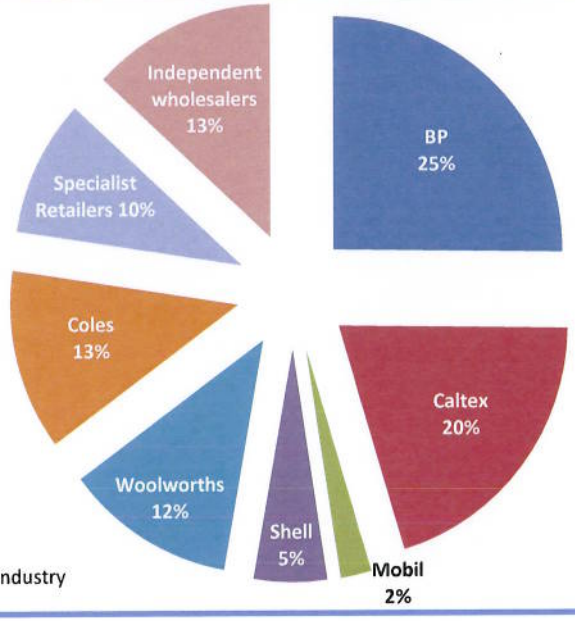
The drive of Coles and Woolworths into the retail sector has attributed to a reduction of retail service stations...

Australian service station ownership

Number of sites against ave volume per site



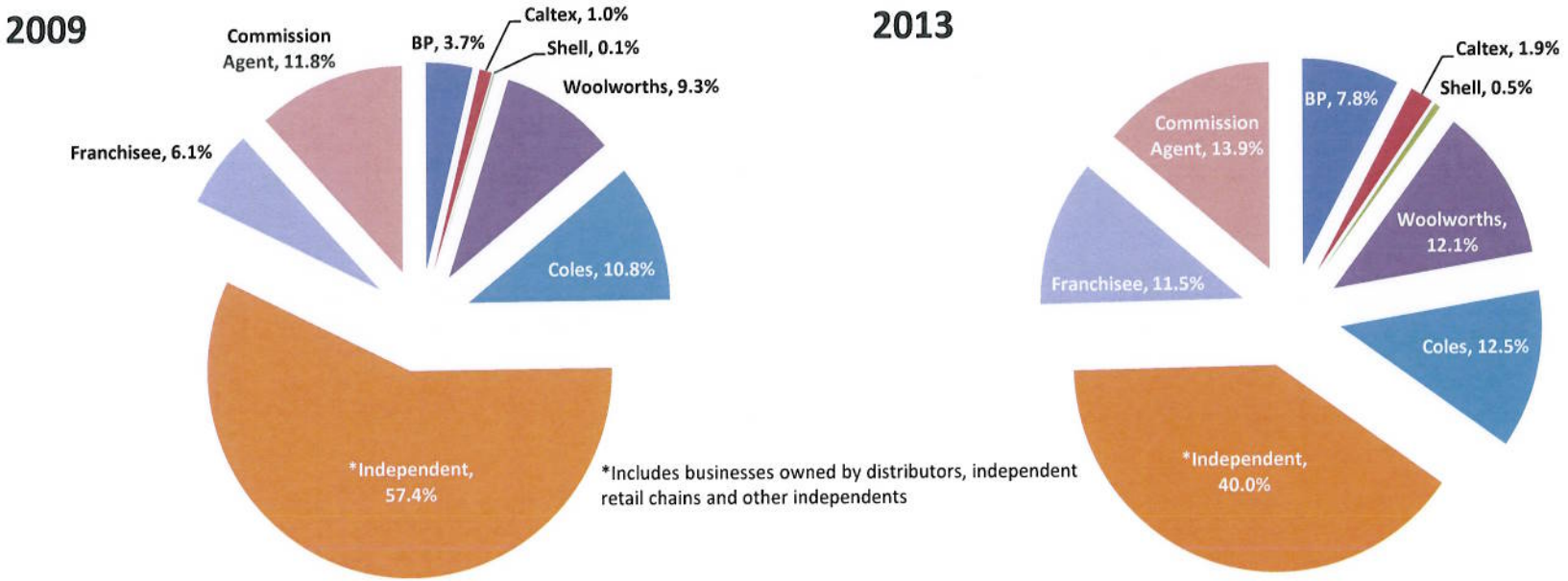
Percentage retail sites by brand: 2011–13



Source: ACCC, Monitoring of the Australian petroleum industry

The independent operator has been the only business type to decline in the last five years...

Percentage of service stations by business operator 2009 and 2013

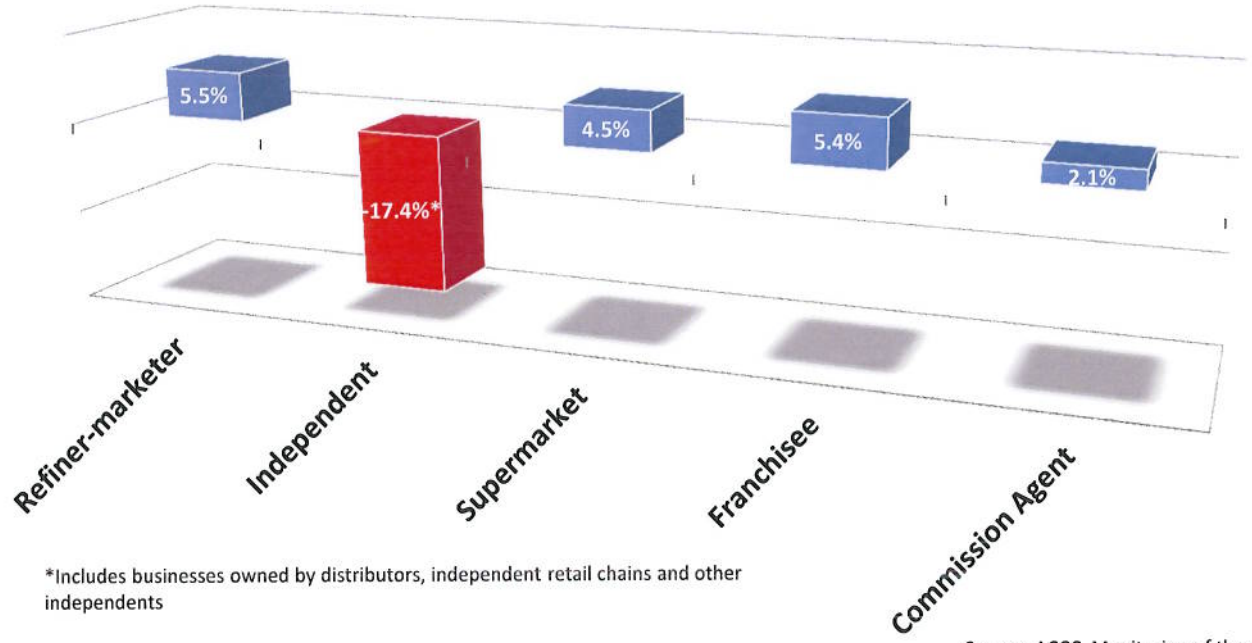


*Includes businesses owned by distributors, independent retail chains and other independents

Source: ACCC, Monitoring of the Australian petroleum industry

The independent operator has been the only business type to decline in the last five years...

Change in the percentage of service stations by business operator 2009-2013

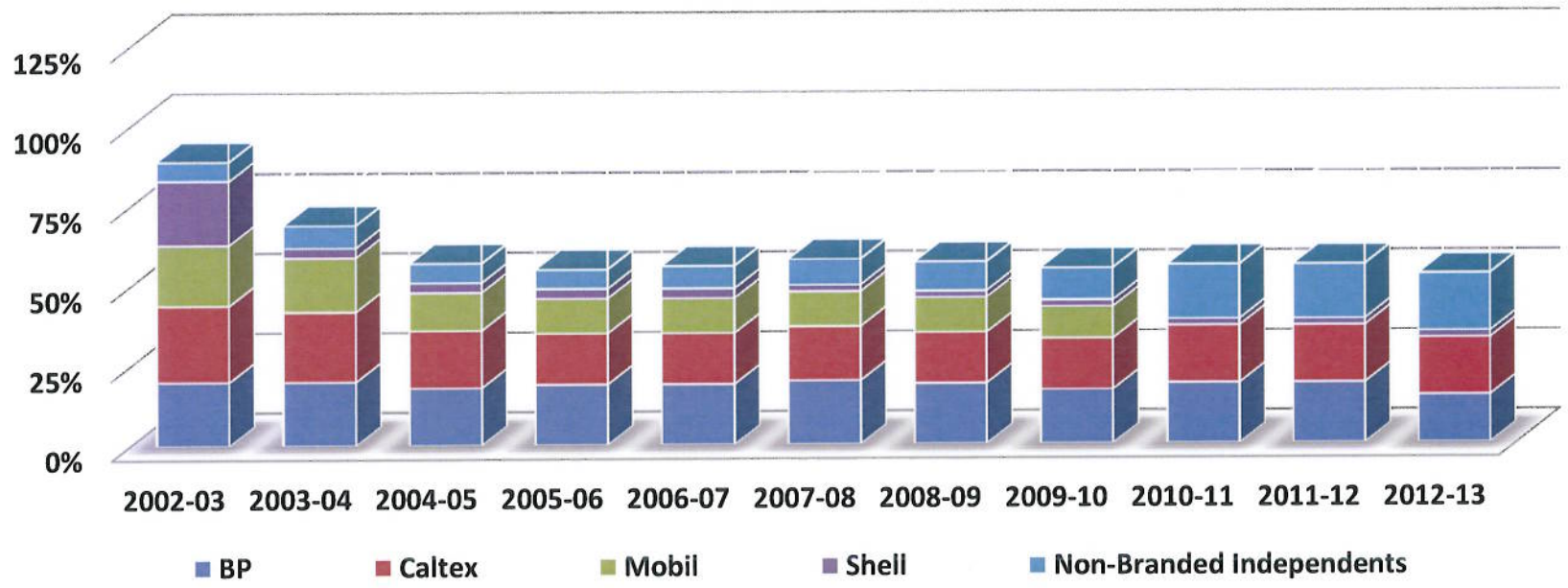


*Includes businesses owned by distributors, independent retail chains and other independents

Source: ACCC, Monitoring of the Australian petroleum industry

What is regarded as the traditional fuel business now only sells 50 per cent of all the retail fuel in Australia...

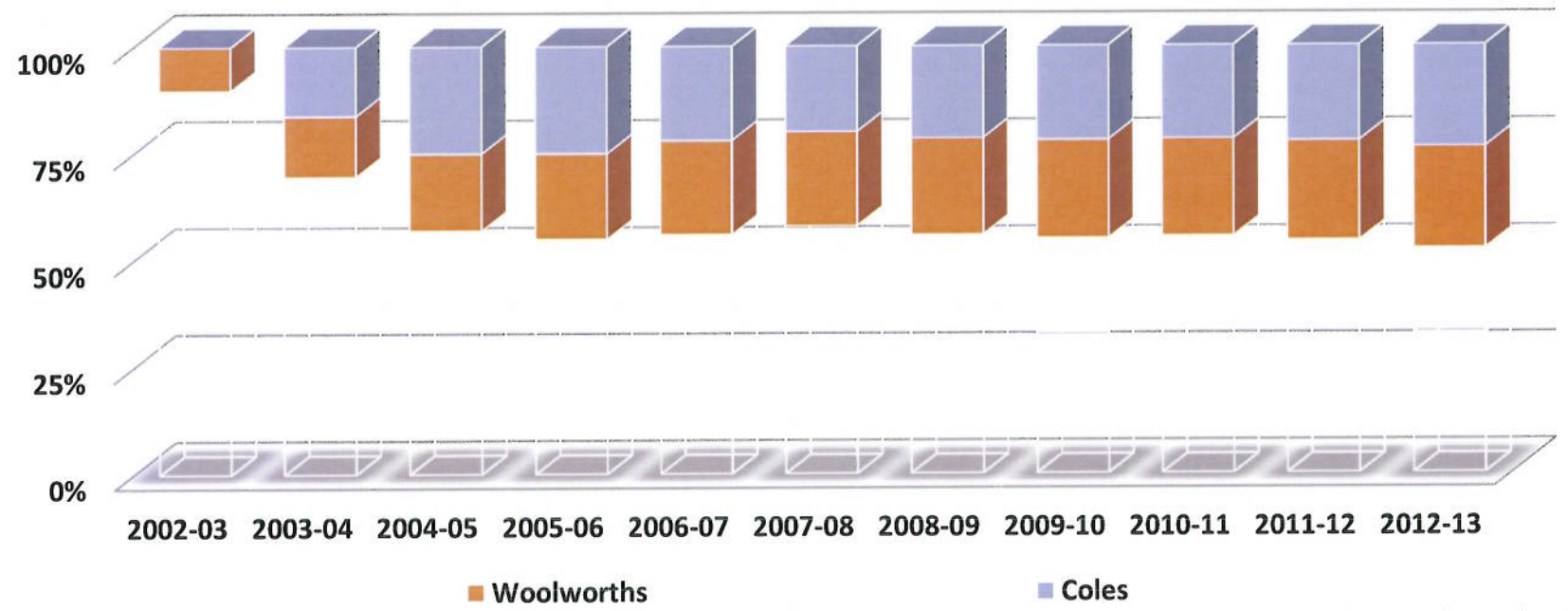
Share of volume of retail petrol sales by brand 2003-2013



Source: ACCC, Monitoring of the Australian petroleum industry

The supermarket chains, with their alliance service stations, have been the big winners over the last decade...

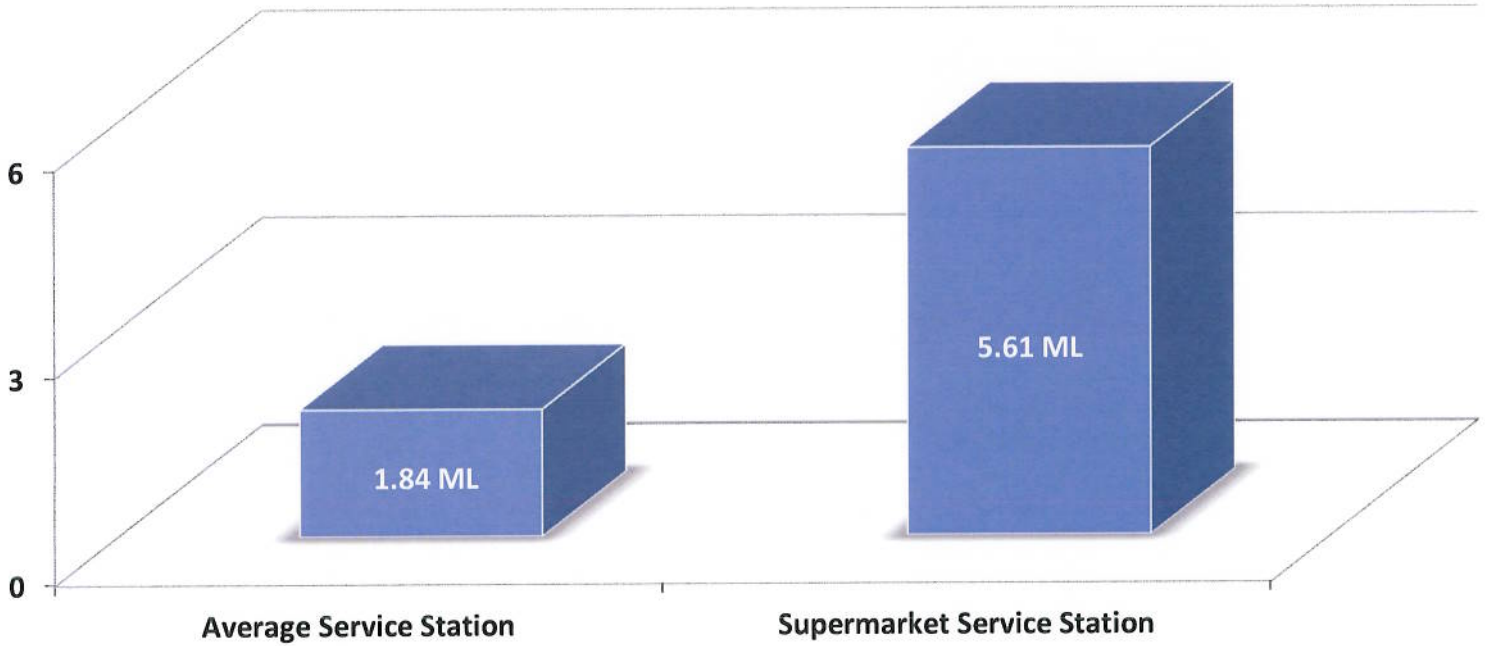
Share of volume of retail petrol sales by brand 2003-2013



Source: ACCC, Monitoring of the Australian petroleum industry

The supermarket chains, with 24 per cent of sites and 48 per cent of volume, have been the big winners over the last decade...

Average fuel volume sold per site per annum

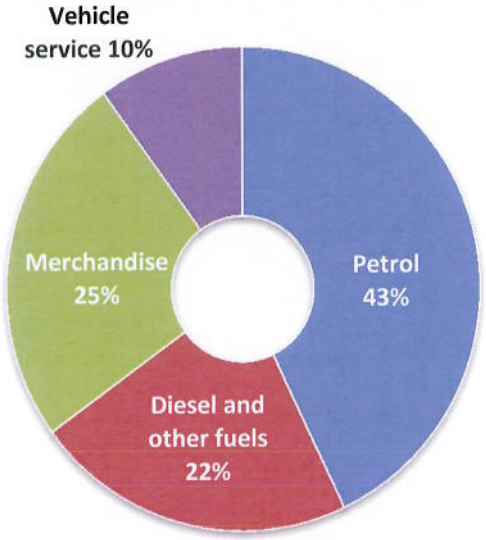


Source: ACAPMA

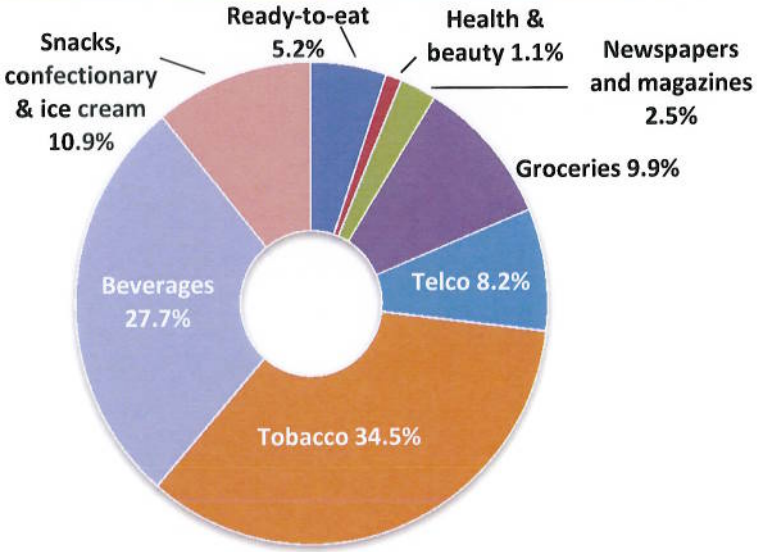
Petroleum sales dominate overall gross revenue, with tobacco still the largest contributor to merchandise sales...

Petrol convenience products and services segmentation 2013-14

Total business sales $39.4 billion



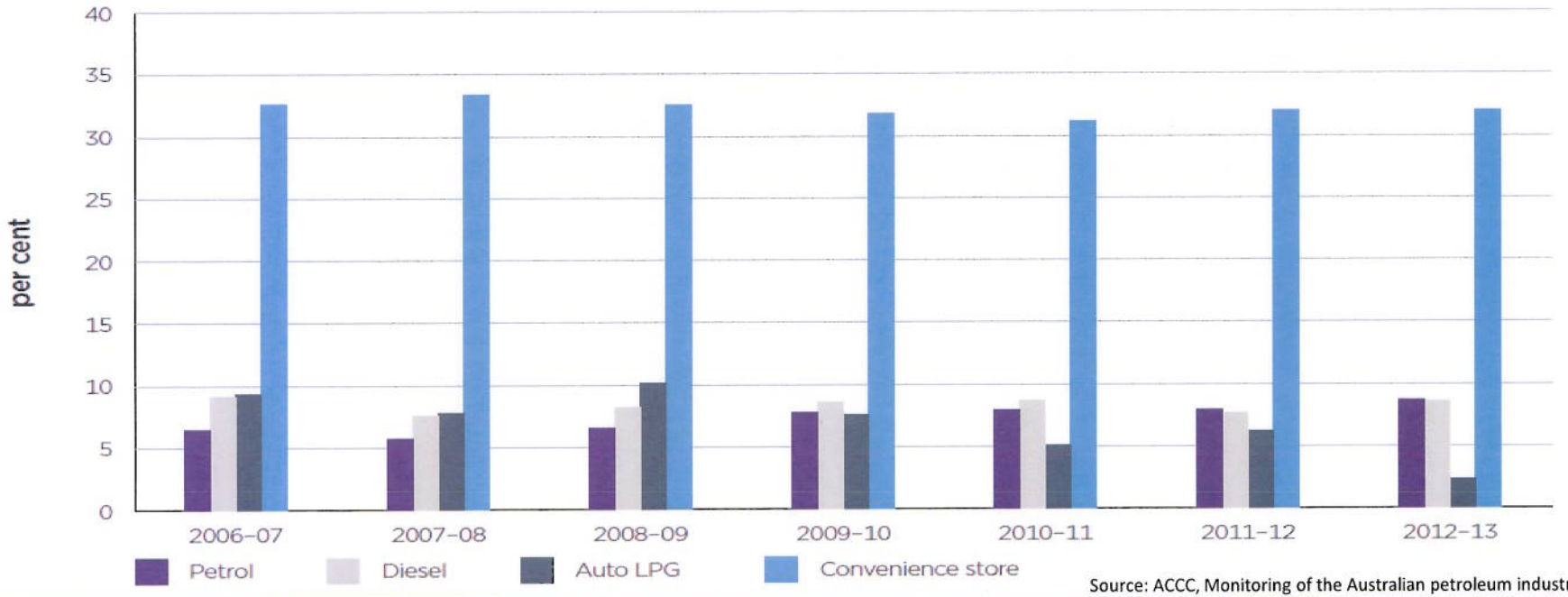
Merchandise sales $9.8 billion



Source: WWW.IBISWORLD.COM.AU

Convenience store sales have a higher gross margin than petroleum products...

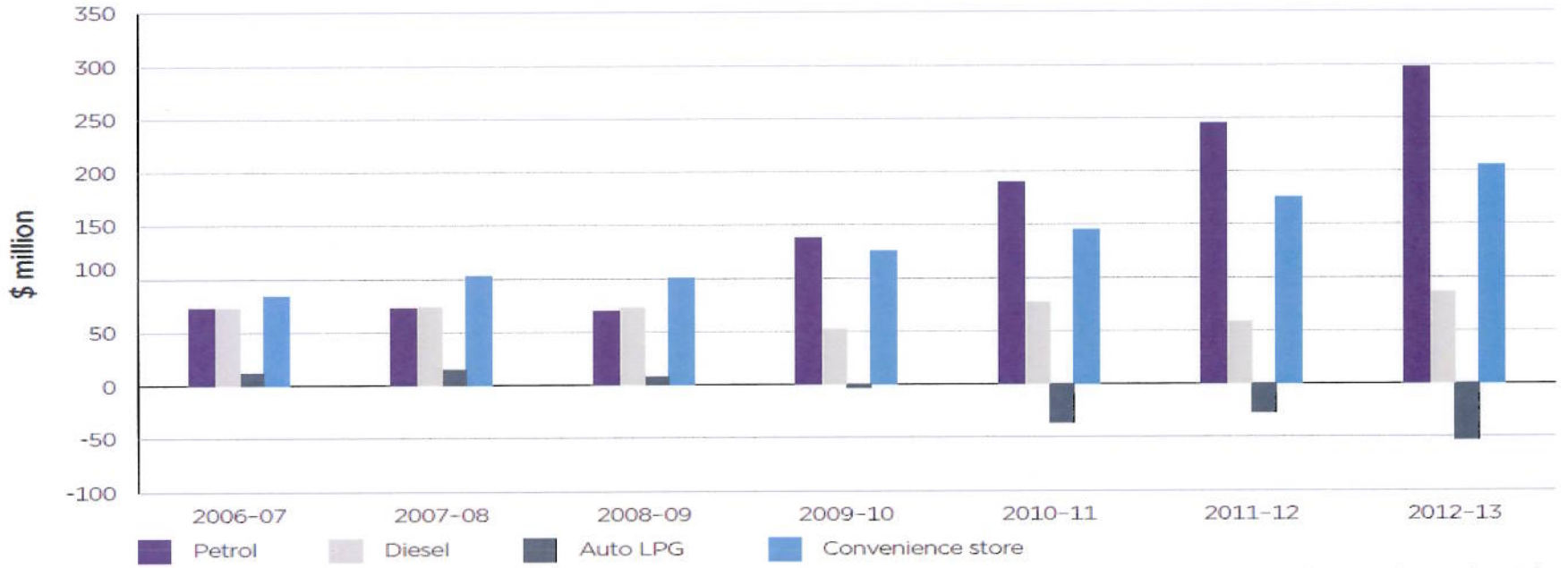
Retail sector gross profit margins 2006-07 to 2012-13



Source: ACCC, Monitoring of the Australian petroleum industry

At $205.2 million convenience store net profit accounted for around 38.4 per cent of total retail profits...

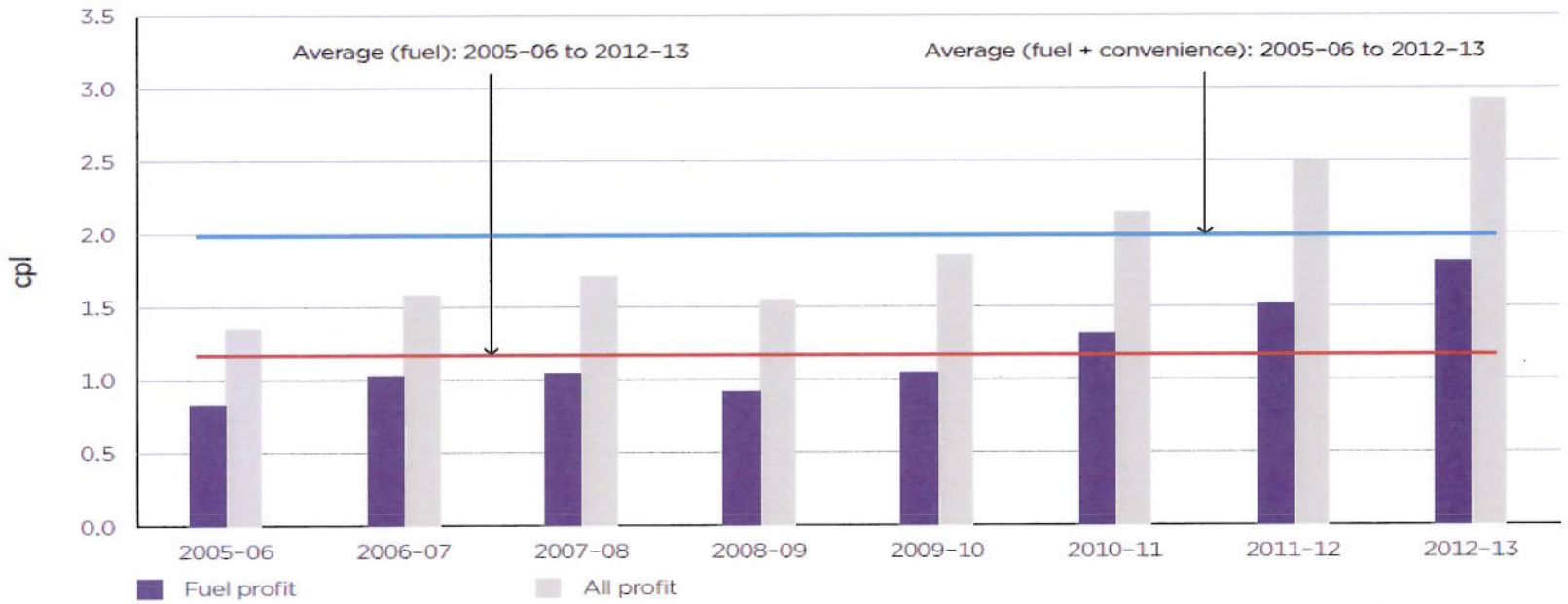
Retail sector net profit in dollar terms 2006-07 to 2012-13



Source: ACCC, Monitoring of the Australian petroleum industry

In 2012-13 convenience store sale contributed 1.1cpl to the overall unit net profit of 2.9cpl across all products and services...

Retail sector cents per litre (cpl) net profit 2005-06 to 2012-13

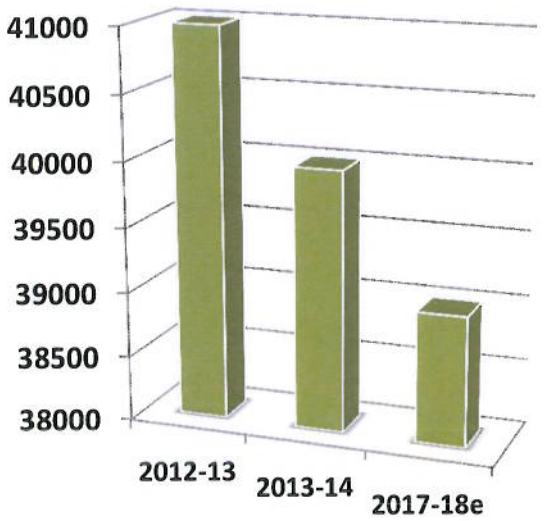


Source: ACCC, Monitoring of the Australian petroleum industry

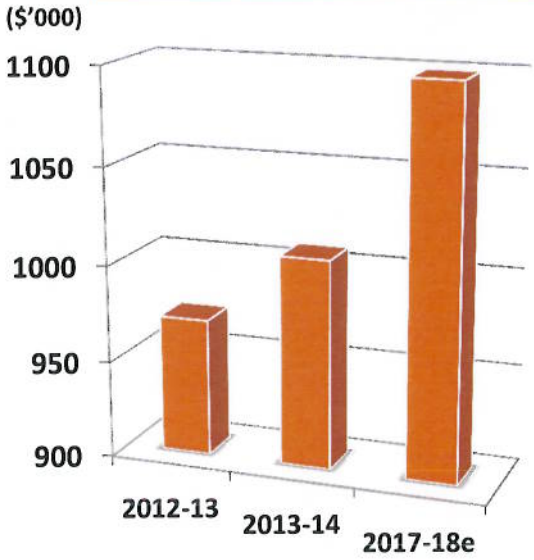
A reduction in the number of service stations will lead to higher ave. fuel sales requiring flexible work arrangements to achieve productivity levels...

Key service station employment data

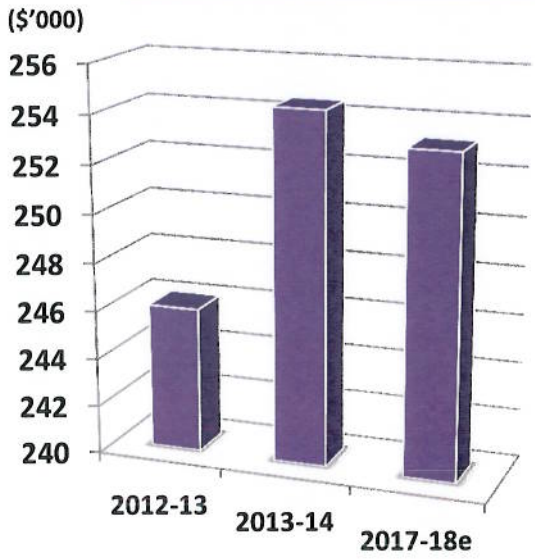
Total employees



$sales per employee



Ave wages per Est.



Source: IBISWorld.com.au

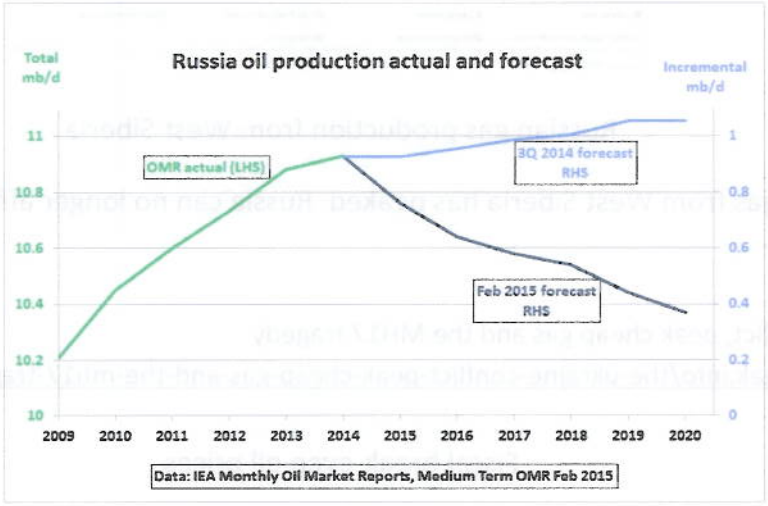
http://crudeoilpeak.info

Crude Oil Peak

#1 in Monitoring the Global Crude Oil Peak

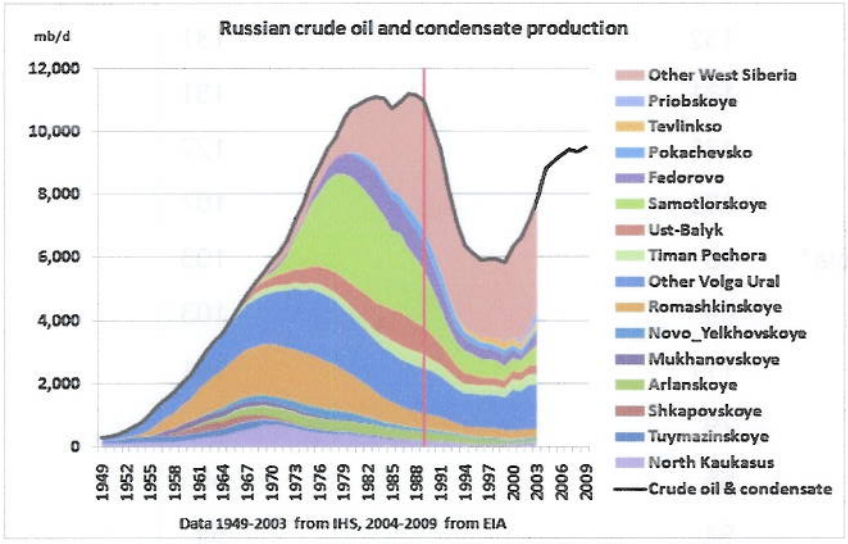
Additional Information to the Senate Inquiry on Transport Energy Resilience

Russia peak oil



Russia's 2nd and last oil peak http://crudeoilpeak.info/russia-peak

Russia expects decline of oil export revenue in 2016
7/7/2014
MOSCOW, July 07. /ITAR-TASS/. Russian finance ministry predicts a 156.4 billion roubles ($4.5 billion) decline in 2016 oil export revenue from the earlier figure stipulated in the federal budget law for 2014 and the planned period 2015 and 2016, says the Ministry's draft federal budget for 2015-2017. http://en.itar-tass.com/economy/739324

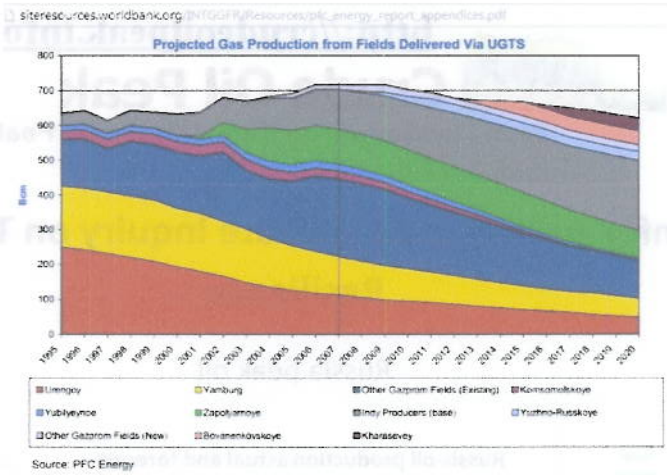


1st Russian peak in West Siberia

Read how Gorbachev knew about the peaking fields in West Siberia

Russia's oil peak and the German reunification

http://crudeoilpeak.info/russia%E2%80%99s-oil-peak-and-the-german-reunification



Russian gas production from West Siberia

Russia's cheap gas from West Siberia has peaked. Russia can no longer afford to export cheap gas to Ukraine

The Ukraine conflict, peak cheap gas and the MH17 tragedy
http://crudeoilpeak.info/the-ukraine-conflict-peak-cheap-gas-and-the-mh17-tragedy

Fiscal break-even oil prices

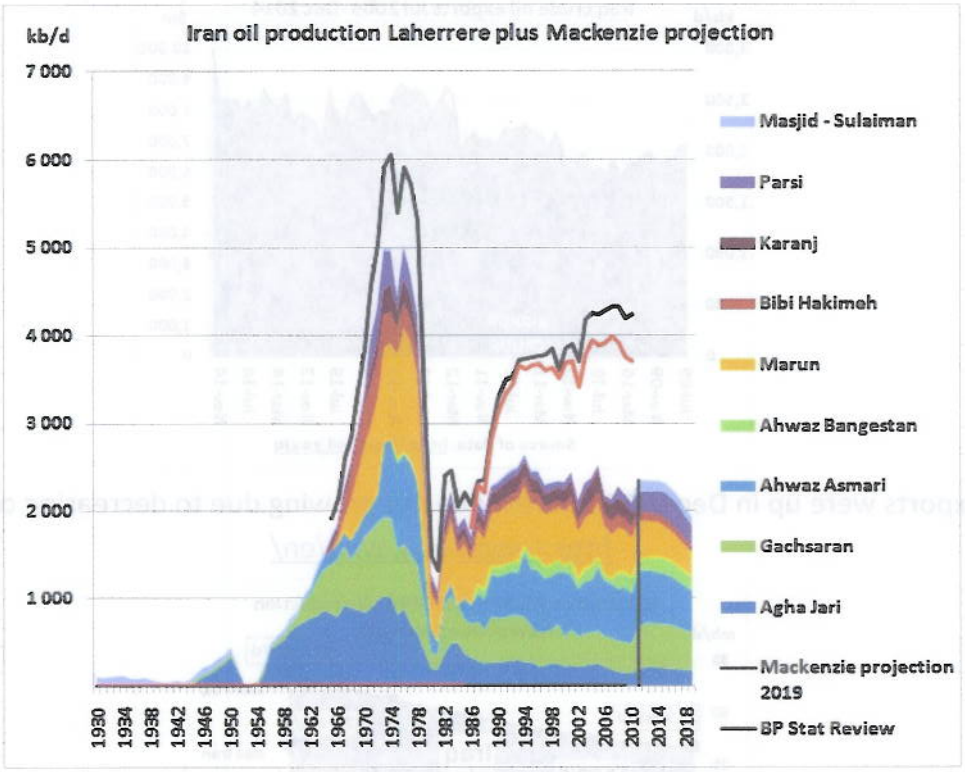
www.marketwatch.com/story/iran-venezuela-russia-may-face-pain-from-cratering-oil-prices-2014-12-01

Country	2014 fiscal breakeven oil price	2015 fiscal breakeven oil price
Libya*	317	184
Venezuela*	161	151
Yemen	160	145
Algeria*	132	131
Iran	131	131
Bahrain	125	127
Russia	105	107
Saudi Arabia*	98	103
Oman	99	103
Iraq*	111	101
UAE*	79	77
Quatar*	55	60
Kuwait*	54	54

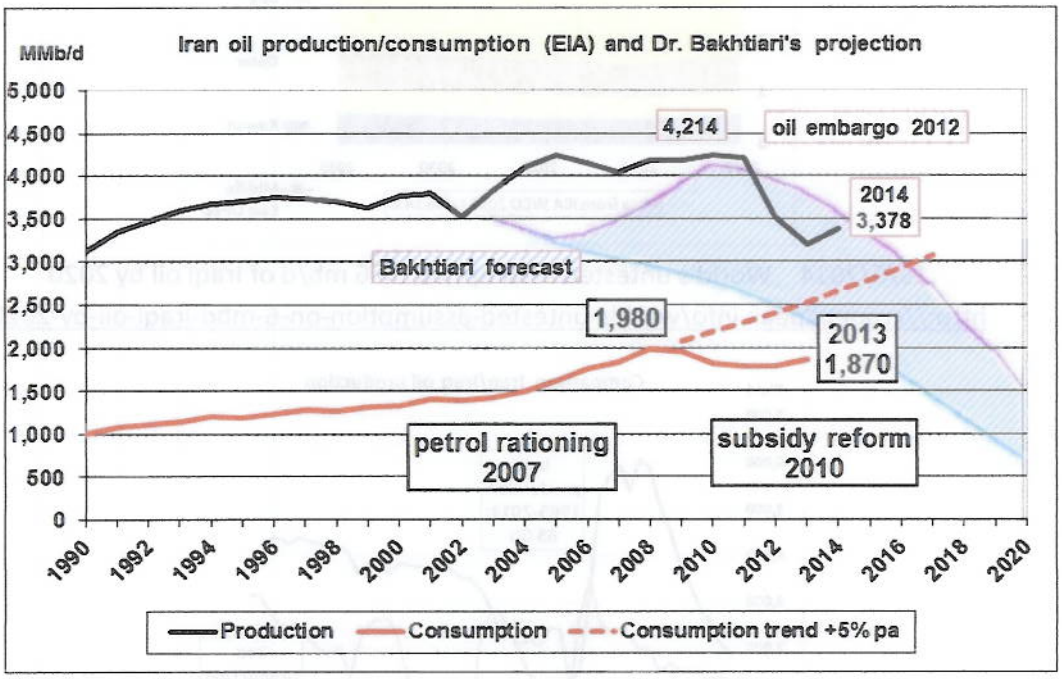
*OPEC member

http://www.marketwatch.com/story/iran-venezuela-russia-may-face-pain-from-cratering-oil-prices-2014-12-01

Iran

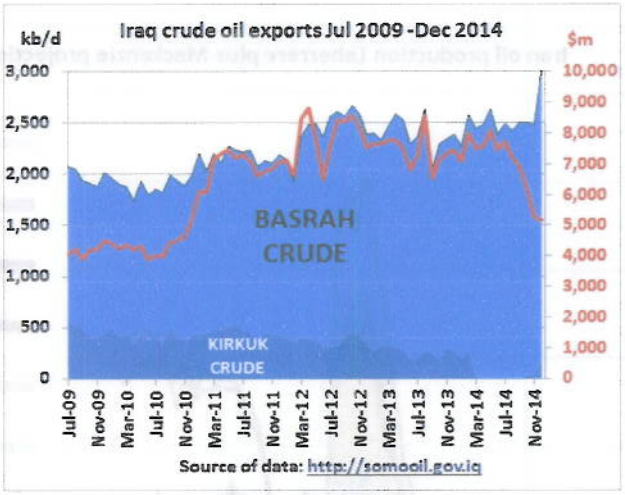


Peak oil in the mid 70s before the revolution contributed to the down fall of the Shah



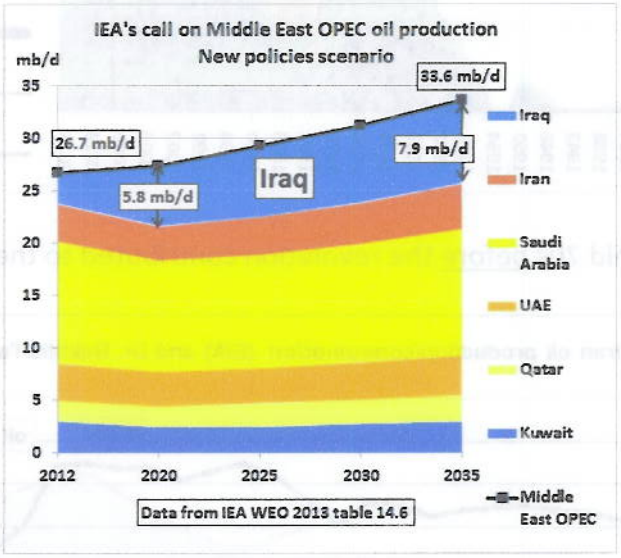
If sanctions are lifted a production bounce is uncertain as condition of oil fields is unknown and oil fields are mature. If economy picks up, so will oil demand. Depending on refinery capacity and usage, the need for imported fuel may increase. Net impact may be smaller than expected. If there is a tug-of-war when nuclear inspections are done, sanctions may be re-imposed. There is a possibility that analysis of nuclear material hints to hidden nuclear facility. Many uncertainties there.

Iraq



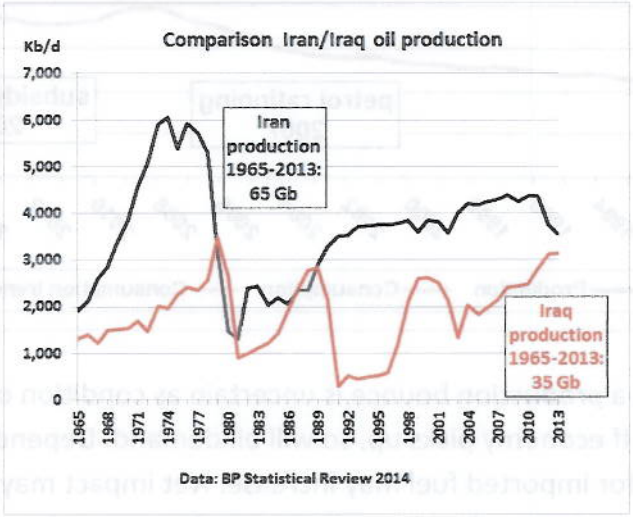
Exports were up in Dec 2014 but revenue not growing due to decreasing oil prices

http://somooil.gov.iq/en/



15/6/2014 World's untested assumption on 6 mb/d of Iraqi oil by 2020

http://crudeoilpeak.info/worlds-untested-assumption-on-6-mbd-iraqi-oil-by-2020

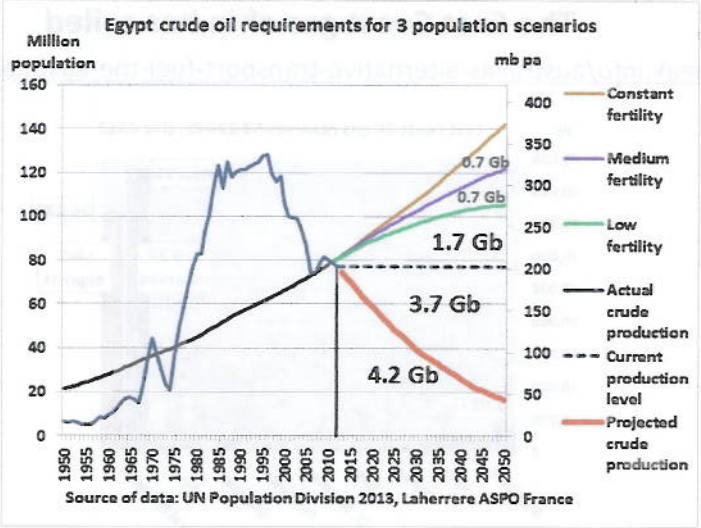


Iraq and Iran claim almost the same oil reserves (BP Stat. Review) but Iraq under-produced (Iran-Iraq war, UN sanctions) so that Iraq's depletion level is lower than Iran's.

See also http://crudeoilpeak.info/opec-paper-barrels

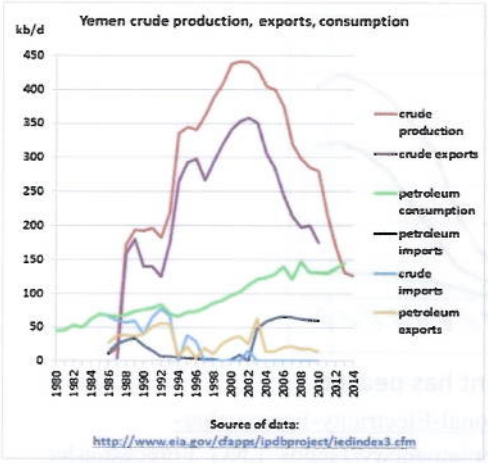
Peak oil in countries with civil unrest or civil wars

Declining oil revenue is key driver for governments to lose control

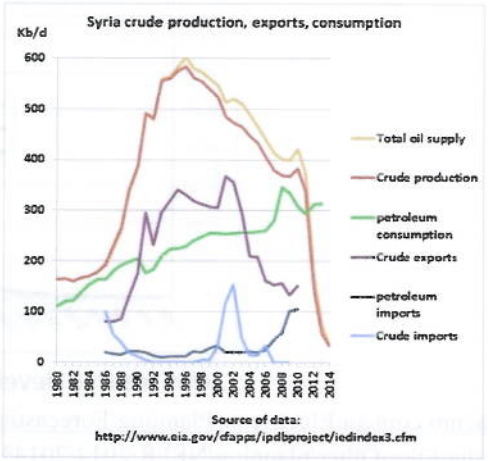


6/7/2013 Egypt's future crude oil import requirements for 3 population scenarios
http://crudeoilpeak.info/egypts-future-crude-oil-import-requirements-for-3-population-scenarios

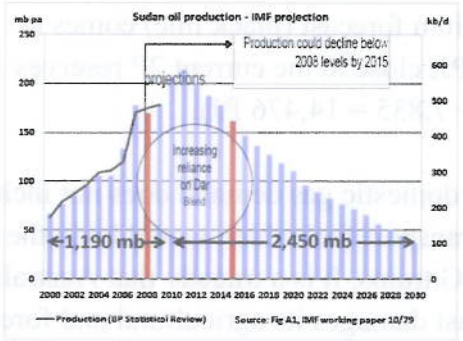
Imports will come from Saudi Arabia and UAE, oil which will not go to Asia



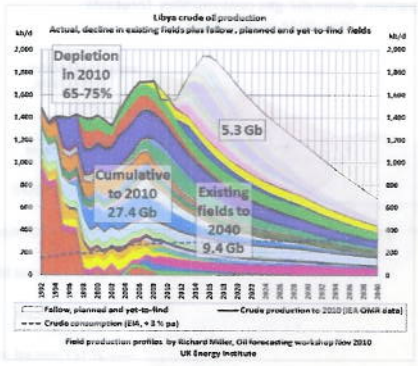
Peak oil in Yemen



and Syria



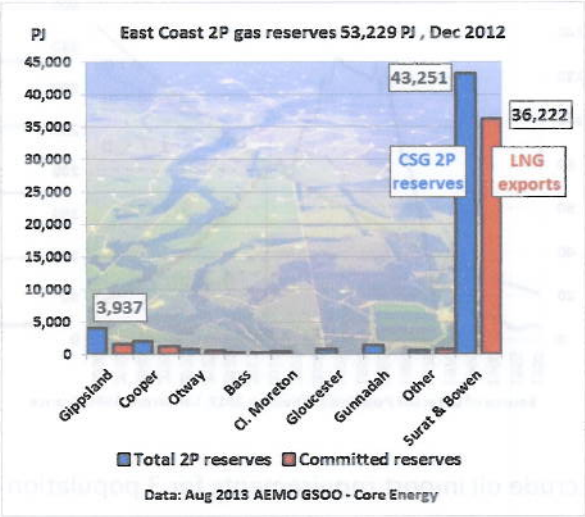
Peak oil Sudan (IMF)



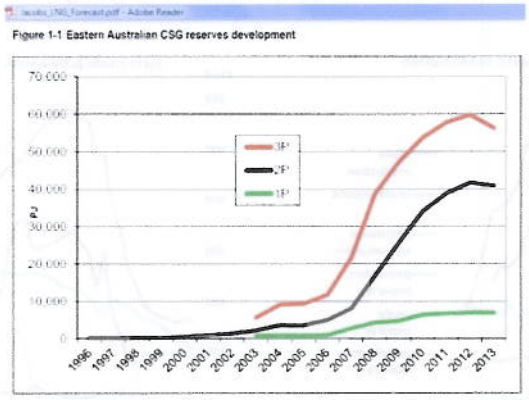
Libya peak oil 2006/2008. Gaddafi needed Western technology to stop decline in mature fields. That explains handshake with Tony Blair in 2004 who looked for a job for BP

Australia's alternative transport fuel:
The East Coast gas-ship has sailed

http://crudeoilpeak.info/australias-alternative-transport-fuel-the-east-coast-gas-ship-has-sailed

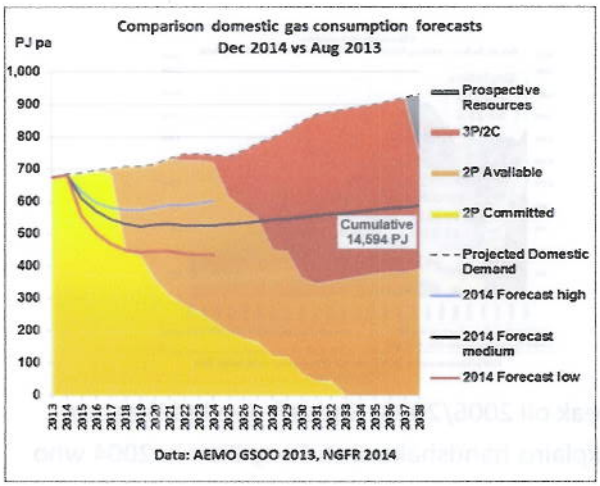


2/3 of proved and probable gas reserves on the East Coast are committed for LNG exports



Gas reserve development has peaked

http://www.aemo.com.au/Electricity/Planning/Forecasting/National-Electricity-Forecasting-Report/~/media/Files/Other/planning/NEFR/2014/2014%20Supplementary/Jacobs_LNG_Forecast.ashx



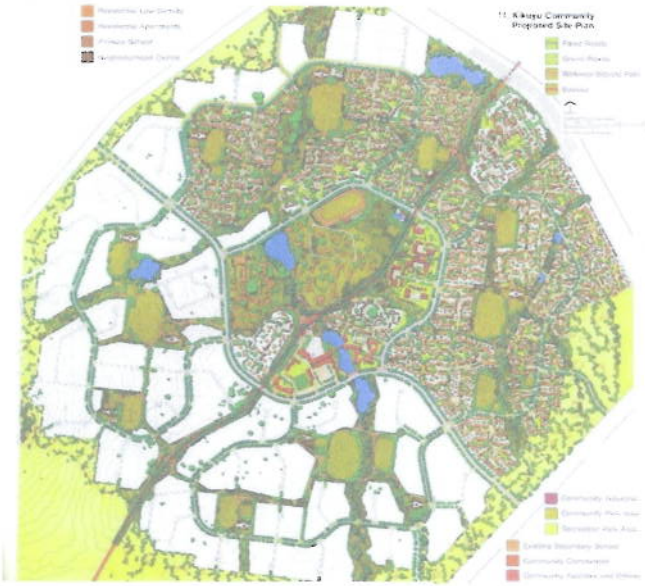
<<< The cumulative production 2013-2038 of the medium forecast (black line) comes to 14,594 PJ, close to the current 2P reserves (6,641 + 7,835 = 14,476 PJ).

Current domestic gas demand does not include gas as transport fuel which would be in the order of 5 LNG trains. It is a tragedy that Australia's East coast damages its agricultural and forest land while not even benefitting from using this precious energy to get away from oil and capture its value.

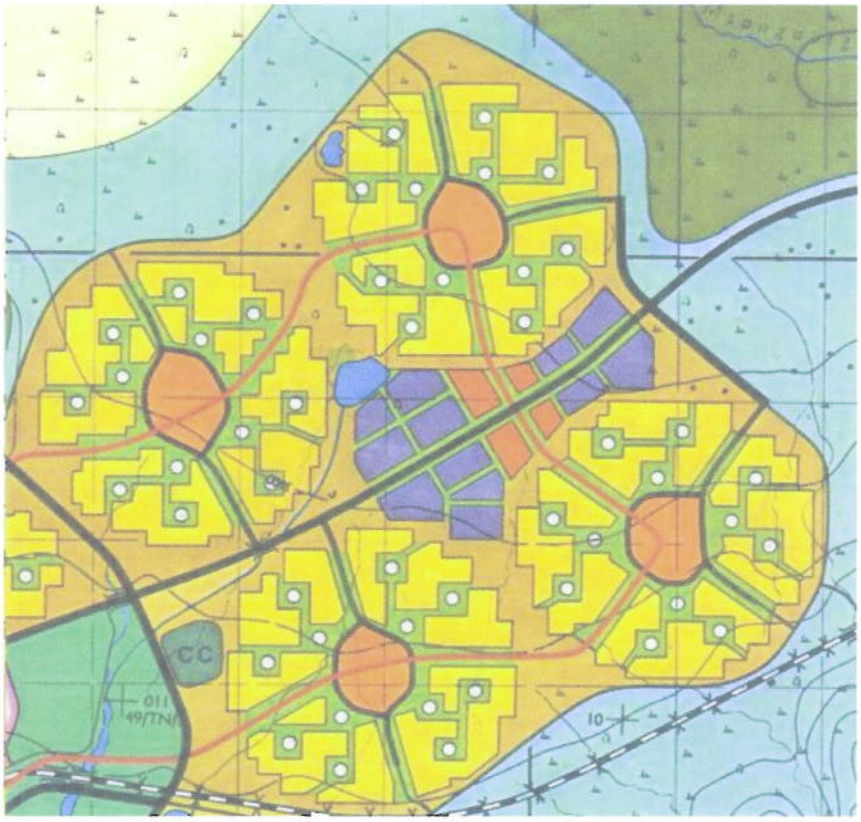
Sustainable Cities Master Plan

http://crudeoilpeak.info/sustainable-cities-master-plan

Sustainable (energy frugal) cities will not have more than 200 K population



30-40 K community with commercial and light industrial area on 300-400 ha
Mostly 2 story terrace housing. Walkable neighbourhoods



4 communities grouped around common city centre with higher level jobs, hospital. 1 ring and 2 radial bus or light rail lines are sufficient to serve this type of city
Design can also be done for 5 communities

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