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# **Import Parity Pricing for LPG into Western Australia**

**A report prepared for the Office of Energy**

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**Economic Research Associates Pty Ltd  
A.B.N. 90 009 383 173  
97 Broadway  
Nedlands WA 6009  
Phone: +61 8 9 386 2464  
Fax: +61 8 9 386 3202  
Email: era@daa.com.au**

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## **1 Introduction**

LPG is a naturally occurring gas and can be produced either through the processing of crude oil and natural gas or as a product of petroleum refining. In Western Australia LPG is sourced from the natural gas flows coming through the Dampier-Bunbury Pipeline and from the BP Kwinana petroleum refinery. LPG is exported from Western Australia. Western Australia does not import LPG. LPG is imported into the eastern states during the winter months.

LPG has a number of uses including:

- transport fuel (Autogas)
- industrial equipment (for example as a fuel for forklifts)
- commercial and industrial applications (for example, pottery kilns and commercial ovens)
- residential uses (cooking, heating and hot water systems)
- leisure uses (barbeques, camping and patio heaters)

Residential uses of LPG in Western Australia are essentially for non metropolitan regions. LPG is supplied to households in standard 45 kg containers. Some areas have reticulated LPG.

Automotive LPG can be a mixture of propane and butane, while bottled gas sold for domestic purposes (such as cooking and heating) is normally propane.

LPG prices are not regulated. The ACCC monitors petrol, diesel and LPG retail prices in metropolitan centres and 110 country locations. It can publicize cases where price fluctuations do not reflect world price movements. The focus is automotive activities not domestic use sales of LPG.

In Western Australia, Autogas is covered by the FuelWatch system, under which petrol, diesel and Autogas retail prices are nominated for the next trading day and then held constant for a 24 hour period by retailers. The main benefit of this system appears to be that consumers receive some price certainty under this approach. FuelWatch does not regulate prices. Price levels are set via competition. Terminal gate prices are published in Western

Australia for unleaded petrol, premium unleaded and diesel. Terminal gate prices are not available for Autogas or domestic LPG.

Motor fuels in Australia are subject to import parity pricing rules. Import parity pricing policy to determine national pricing levels for all motor fuels has operated since 1977.

Import parity pricing can be defined as the price that a purchaser pays or can expect to pay for an imported good. It is the cif. price plus any applicable tariffs, terminal handling and storage costs plus transport cost to the purchaser's location. Combined with export parity pricing, this defines a range of the possible equilibrium prices for an equivalent domestically produced good.

Under Australia's import parity policy, Singapore is used as the price benchmark for most motor fuel. This is because of its proximity to Australia and its position as the largest refining centre in the region. However, the LPG price benchmark is set in Saudi Arabia, the Saudi Aramco price. This is because Saudi Arabia is the largest source of imported LPG for Australia and because the Saudi Aramco price is the global benchmark price for LPG and is used as the basis for most international contract sales of LPG.

Economic Research Associates was commissioned by the Office of Energy to evaluate how a wholesale price for LPG in Western Australia might be estimated using the basic idea of import parity pricing and to consider the relationship between the estimated wholesale price and the Saudi Aramco price. The focus of the analysis is domestic use LPG not Autogas, although as Autogas is already covered by FuelWatch, some relevant comparative analysis is possible.

## **2 Overview of LPG market and pricing**

In 1991, as part of the reforms within the LPG industry, the wholesale price of LPG was deregulated. Prior to this, a maximum price was set through the Prices Justification Tribunal. Since deregulation LPG prices have been set through the market.

LPG is a traded good for Australia. During 2007-08, Australia produced 5,386 megalitres (ML) of LPG, of which about 74 per cent or 3,971 ML was associated with crude oil and natural gas production, while about 26 per cent

or 1,415 ML was produced in refineries. Of this, around 48% or 2,589ML was exported. The largest export markets are Japan, China and the Republic of Korea. Around 967ML of LPG was imported in 2007-08. The balance is used for domestic consumption. Of domestic consumption, automotive use (56%) dominates. Commercial and industrial uses (32%) are the next largest category. Residential use sales equal just 8%.

Western Australia does not import LPG. It is a net exporter. Export sales may therefore be regarded as the opportunity cost of domestic LPG sales for Western Australia producers. .

### **3 Indicative price and volume data**

There is no public source for domestic LPG prices in Western Australia. Indicative wholesale and retail prices need to be inferred from relevant available information. The model discussed in Section 4 below starts with the Saudi Aramco price as the base and infers a domestic wholesale LPG price using 3<sup>rd</sup> party estimates of insurance, transport and terminalling costs. As noted above the Saudi Aramco price is the global reference for LPG trade and contracts.

Saudi Aramco prices are the basis for Autogas import parity pricing and comparison between the two is a starting point for thinking about margins and modelling.

Table 9-1 in Appendix B gives Saudi Aramco prices in Australian dollars since 2000 as well as Perth average LPG (Autogas) prices. Saudi Aramco Propane and Perth LPG (Autogas) prices in cents/litre are shown in Figure 1. The two track each other closely and the difference between them can be interpreted as the market determined “markup” which includes transport and handling costs, distribution costs, retailing costs, wholesale and retail margins. The “markup” is shown in Figure 2 in cents per litre, and while it fluctuates month on month, the magnitude has been relatively constant over 2007 and 2008. In competitive markets, where imports are important, retail prices and Saudi Aramco prices would track each other and the difference would be stable, at least over short periods of time.

Figure 1: Saudi Aramco Propane and Perth LPG (cents/litre)

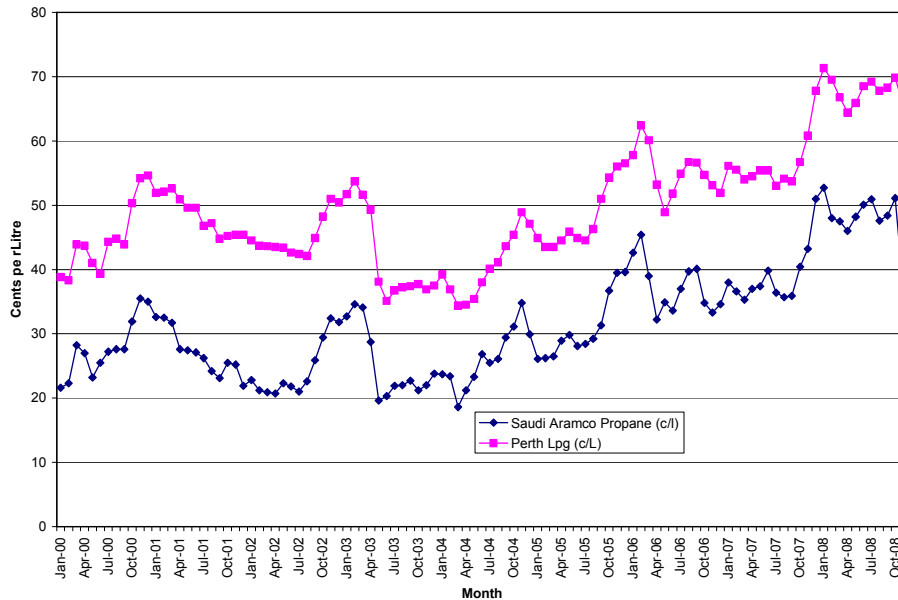
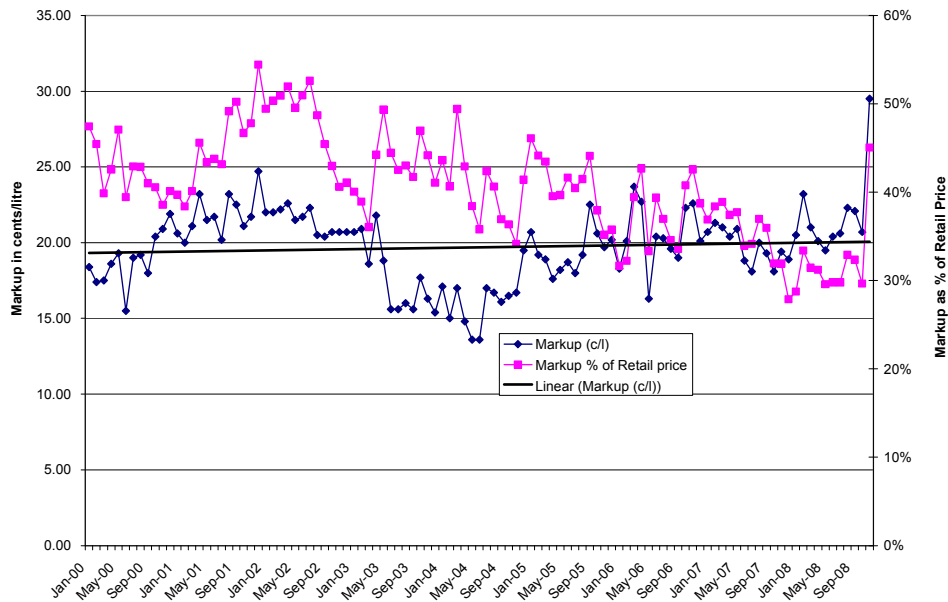


Figure 2: LPG Markup in Cents per Litre and as Percent of Retail Price



Over 2007 the difference between the Saudi Aramco price and retail price in Perth averaged 35% of the retail price and 51% of the Saudi Aramco price. Over 2008 it averaged 32% of the retail price and 46% of the Saudi Aramco price. The Saudi Aramco price accounted for 69% of the retail price in 2007 and 71% of the retail price in 2008. As already noted, there are no terminal gate prices for Autogas in Western Australia. However, the December 8 2008

metropolitan delivered price (MDP) from BP for Autogas was 42.9 cents per litre and since December 8 average the retail price has been around 52 cents.

### **3.1 Other LPG Reference Prices**

Without published market prices for domestic LPG price inferences must be based on other available reference points. A number of these exist.

Western Australia is an LPG exporter and the value and volume of exports can be used to infer the unit export price. Table 3-1 shows recent export data for LPG from Western Australia and the implied price per litre. Over the period 2005-06 to 2007-08 the per unit export price ranges from 34 cents/litre to 43 cents /litre.

Australia imports LPG into the eastern states market, although not into Western Australia. Customs values are recorded for these imports Customs values approximate free on board (fob) prices in the port of origin and do not include insurance and freight. Table 3-2 shows imports of LPG at customs prices. Over the period 2005-06 to 2007-08 the per unit import price ranges from 33 cents/litre to 45 cents /litre. The export and import prices are very close and also close to estimated Saudi Aramco prices. This indicative of the influence of the Saudi price and is broadly what we would expect in a globally competitive market.

Australian exports to Japan in 2007-08 totaled 1587 megalitres with a value of approximately \$725 million. This equates to around 45.7 cents per litre.

**Table 3-1: Implied Unit Price for Export LPG**

Year	Exports (tonnes)	Export Value (\$)	\$/tonne	Cents/litre
2005-06	871,983	\$ 654,000,000	\$ 750.01	\$ 0.38
2006-07	899,000	\$ 606,000,000	\$ 674.08	\$ 0.34
2007-08	818,390	\$ 683,000,000	\$ 834.57	\$ 0.43

Source: Department of Industry and Resources

**Table 3-2: Imports of LPG and Customs values**

Year	Imports (ML)	Import Customs Value	\$/tonne	Cents/litre
2005-06	599	\$198,000,000	\$647.88	\$0.33
2006-07	748	\$261,000,000	\$683.90	\$0.35
2007-08	967	\$436,000,000	\$883.72	\$0.45

Source: ABARE and ABS Cat. 5439.0 International Merchandise Imports, Australia

## **4 Structure of Model**

Table 4-1 shows the basics of the import parity price calculation. The final column shows the indicative data sources used to develop the estimates.

The formula for estimating the price is:

$$\text{Import Parity Price} = \text{CP}(\$/\text{US}/\text{t})/\text{EER} + \text{F}(\$/\text{US}/\text{t})/\text{EER} + \text{TC}(\$/\text{AUS}/\text{t}) \dots \dots \dots (1)$$

Where;

CP = Saudi Aramco Price in  $\$/\text{US}/\text{t}$

F = insurance and freight in  $\$/\text{US}/\text{t}$

TC = terminalling costs in  $\$/\text{AUS}/\text{t}$  = wharfage + terminal costs+margin

EER =  $\$/\text{US}/\text{\$/AUS}$  exchange rate

#### **4.1 Saudi Aramco Prices**

The base international price is the Saudi Aramco price. Saudi Aramco prices in  $\$/\text{US}/\text{tonne}$  are shown in Table 9-1. These are converted to  $\$/\text{AUS}$  equivalents using the  $\$/\text{US}/\text{\$/AUS}$  exchange rate for the previous month as shown in Table 9-1. Table 9-2 shows the Saudi Aramco prices for butane and propane in  $\$/\text{AUS}$  cents/litre compared to the Perth LPG Autogas price as recorded by FuelWatch. This allows some idea of the gap between the international fob price and the retail price. This gap is graphed in Figure 1 in absolute terms and in Figure 2 as a percent.

#### **4.2 Freight**

In the November edition of LPG Facts (Department of Resources Energy and Tourism, 2008) a figure of  $\$/\text{US} 45/\text{tonne}$  is quoted as the approximate cost of importing LPG to Australia. This allows for the costs of importing, insurance and loss, storage and handling, terminalling and other costs. This is indicative as costs vary with location. It is a starting point for thinking about the wholesale price. At  $\$/\text{US}45 /\text{tonne}$  and using the November exchange rate of .66 US dollars and 1960 litres of propane per tonne, this is effectively only 3.5 cents per litre. This implies an indicative November 2008 wholesale propane price of 41 cents/litre. The indicative October 2008 wholesale propane price would be 54 cents/litre and for December 2008 it would be 30 cents/litre.

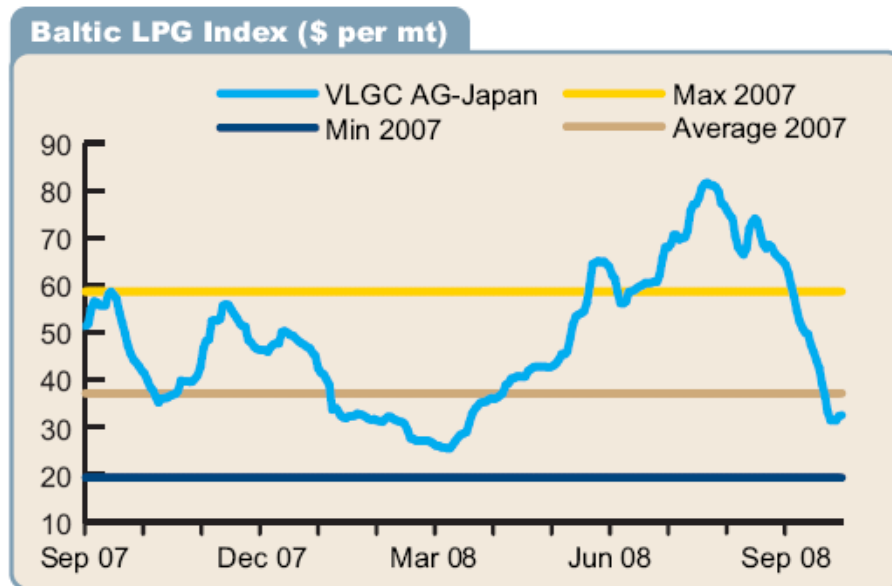
While a useful starting point, a more realistic price will be based on component estimates where possible. At the very least it would be desirable to separate out a freight component, terminal cost component and profit markup component as set out in Table 4-1 and equation (1).

**Table 4-1: Import Parity Pricing Calculation**

STEP	DATA	PROCESS	Data
International Prices	F.o.b. price at point of export	Given	Saudi Aramco price in \$us/tonne
	Freight to point of import	Given	LPG Insight Monthly spot prices. AG-Japan
	Insurance	Given	
	C.i.f. at point of import	F.o.b + Freight + Insurance.	
Currency Conversions	Foreign exchange rate	Given	Reserve Bank Monthly Exchange Rate Data \$US/\$AUS
	C.i.f. in domestic currency	EER * C.i.f at point of import	
Volume Conversions	Volume conversion factor	Given	1960 litres per tonne for propane
	C.i.f. in domestic currency and volume	C.i.f. in domestic currency. / volume conversion factor	
Terminal storage and handling costs	Local terminal and handling costs	Given	% markup based on Waterborne US terminal costs study (2005), ARGUS Media Price Methodology (2008) and LPG Facts (2008)
Result	Import parity value at terminal gate	C.i.f. in domestic currency + terminal and handling costs	
Distribution between port & wholesale market.	Local transport & marketing costs to wholesale market	Given	NA
Result	Import parity value at wholesale buyer gate	Import parity value at wholesale terminal gate + distr. costs to buyer (Deduct if output; Add if input)	NA

Table 9-3 shows indicative freight rates for the period January 2007 to September 2008. These are based on export of LPG from the Middle East (Ras Tanura) to Japan (Chiba). The rates are for VLGC vessels, which account for 50% of world LPG shipping and dominate long haul freight of LPG. In Australian dollar terms the freight rate ranges from 2 to 4 cents/litre over 2008. During 2008 the average for propane is 2.4 cents per litre. For 2007 it is 2.3 cents/litre. However the LPG freights are subject to considerable variability (both within and between months) as Figure 3 shows.

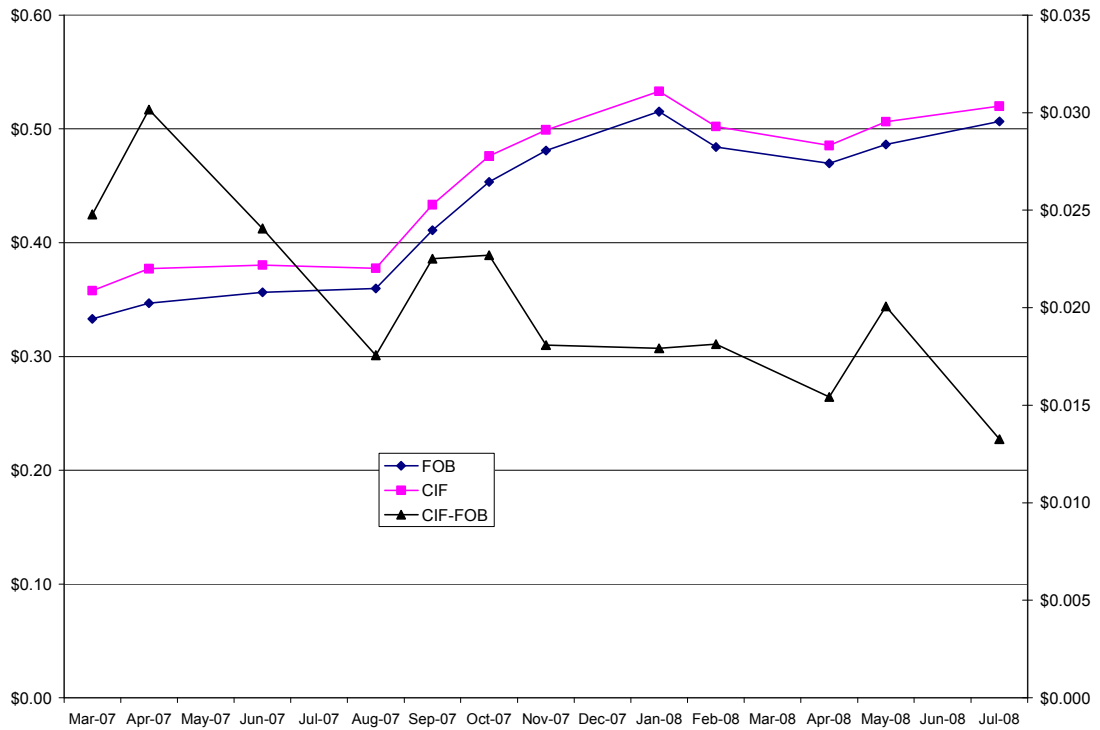
**Figure 3: Variation in LPG Freight Rates**



Source: LPG Insight. Various Issues October 2008.

A further insight into the insurance and freight markup can be obtained by comparing fob (free on board) or customs values with cif (cost insurance freight) values for LPG imports into Australia. This price comparison is given in Table 9-4. The fob and cif values in cents/litre along with the difference between them are shown in Figure 4. Only months with significant trade volumes (around 40,000,000 kgs or more) are included in the graph. The average difference over the period is 2 cents/litre.

Figure 4: F.o.b and C.i.f Values for LPG Imports.



### 4.3 Terminal Margins

Terminal costs are added to estimated cif prices to determine approximate terminal gate prices. These can be interpreted as approximating import parity prices. Buyers will then have to road freight to their nominated destination. Road freight costs for LPG will vary by volume and distance.

Public information on terminal cost is not readily available. Inferences need to be made from a variety of third party sources.

However, there is a perception that such terminalling costs do not add significantly to the cif price. The available data suggests that this is the case.

A logical starting point for the recent past is to consider the \$US 45 per tonne estimate quoted in the November edition of LPG Facts. This estimate allows for the costs of importing, insurance and loss, storage and handling, terminalling and other costs. As noted in 3.1, this is effectively only 3.5 cents per litre as at November 2008. In Section 4.2 it was estimated that insurance and freights costs over 2008 were around 2 cents/litre based on either LPG freight rates or the difference between reported cif and customs (fob) import

values. If the \$US 45 per tonne figure is taken as a guide, it would imply terminalling costs (storage and handling, and other costs) and other costs of around 1.5 cents per litre.

This figure needs to be considered against any further benchmarks.

Two other benchmarks are the terminalling costs used in LPG benchmark prices and quoted terminalling costs. Both types of data are available – typically for the US, NW Europe and Japan.

The Argus price methodology for the US (Argus Media Group, March 2008) incorporates terminalling costs of \$US 9.128/ tonne for propane imports and \$US 18.0768/tonne for butane imports. These can be adjusted to \$AUS using the appropriate exchange rate. As of March 2008 these estimates imply terminalling costs of around 1 cent per litre for LPG. As at November 2008, with a lower exchange rate, the implied terminalling cost is just over 1 cent/litre.

The 2005 Waterborne LPG Report (Commercial Service Company, 2005) quoted the terminalling charges for imports into the US (from Ras Tanura to USGC) at \$US 7.82 per tonne. Table 4-2 shows that Australian equivalent. This translates to around 1 cent/litre in \$AUS or just over 2% of the Saudi Aramco price in \$AUS at this time.

**Table 4-2: Terminalling Costs in Relation to Saudi Aramco Price – Ras Tanura to US Gulf Coast.**

Saudi Aramco Price \$USA /tonne	Saudi Aramco Price \$AUS /tonne	Waterborne Terminalling Cost Estimate \$US/tonne	Terminalling Cost \$AUS /tonne	Terminalling Cost \$AUS cents/litre	Terminalling Cost as % of Saudi Aramco Price
\$365	468.5494	7.82	\$10.098	\$0.01	2.16%

In broad terms, the various approaches agree with each other. Terminalling costs are likely to be in the order of 1-2 cents/litre.

The indicative figure of 2% is consistent with submissions made to the Western Australian Parliamentary Inquiry into the Affordability of Bottled Liquefied Petroleum Gas (LPG) for Household Use (2007) regarding terminal margins in South Australia.

## **5 Estimated Wholesale Prices**

The various components can be combined as per the formula set out in Table 4-1. The results for the period January to November 2008 are shown in Table 5-1. The LPG price based on a butane/propane mix of 25%/75% is between 46 and 61 cents per litre. For propane the price is between 44 and 58 cents per litre. The fluctuations in the estimated monthly price are shown in Figure 5 which shows the estimated prices over the longer period January 2007 to November 2008. The fluctuations are driven by fluctuations in the Saudi Aramco price and to a lesser extent freight rates.

The wholesale price of LPG is not public information. Neither is the retail price. The retail price of Autogas is recorded as part of FuelWatch. The estimated terminal wholesale price is compared to the Autogas retail price in Table 5-2. The difference is around 13 cents per litre.

**Table 5-1: Estimated Terminal Wholesale Price Based on Application of Absolute Terminalling Costs**

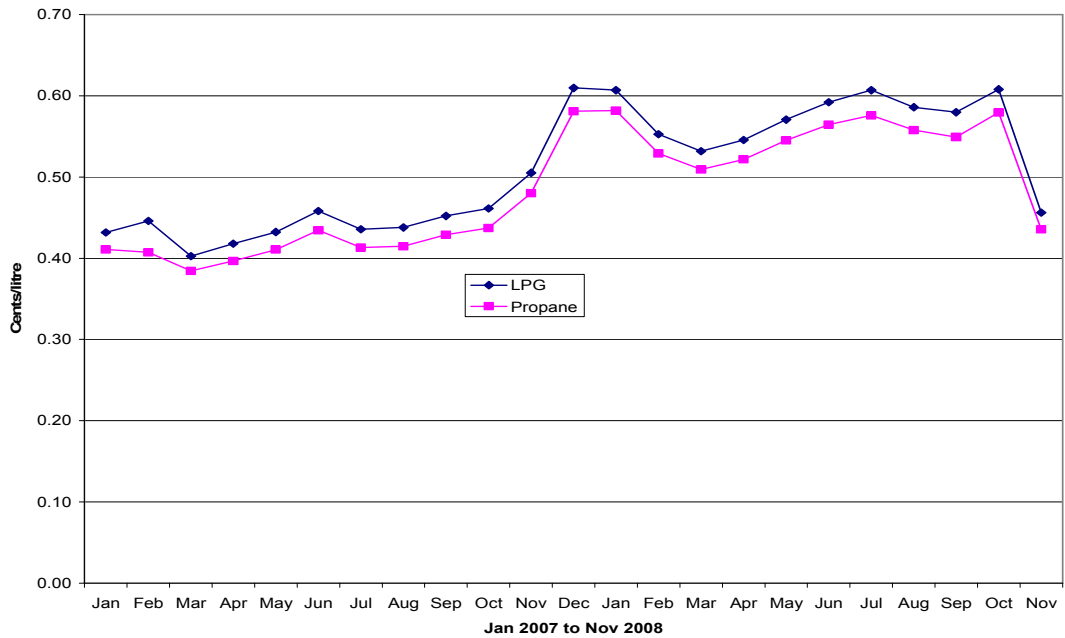
Based on \$ Calculation of Wholesale/ terminal Margin												
	2008											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Calculation of the LPG Import Parity Price												
F.o.b. (\$US/ton)												
Saudi Contract Price												
Butane	\$875	\$805	\$825	\$815	\$860	\$920	\$950	\$890	\$840	\$810	\$490	
Propane	\$870	\$800	\$820	\$805	\$845	\$895	\$905	\$860	\$800	\$790	\$490	
US/\$AU exchange rate	0.8816	0.8884	0.9466	0.9180	0.9337	0.9559	0.9626	0.9434	0.8639	0.7996	0.6680	
Fob (\$AU/ton)												
Butane	\$992.51	\$906.12	\$871.54	\$887.80	\$921.07	\$962.44	\$986.91	\$943.40	\$972.33	\$1,013.01	\$733.53	
Propane	\$986.84	\$900.50	\$866.26	\$876.91	\$905.00	\$936.29	\$940.16	\$911.60	\$926.03	\$987.99	\$733.53	
Fob (cents/litre)												
Butane	\$0.58	\$0.53	\$0.51	\$0.51	\$0.53	\$0.56	\$0.57	\$0.55	\$0.56	\$0.59	\$0.43	
Propane	\$0.50	\$0.46	\$0.44	\$0.45	\$0.46	\$0.48	\$0.48	\$0.47	\$0.47	\$0.50	\$0.37	
LPG (\$AU/ton)	\$988.26	\$901.90	\$867.58	\$879.63	\$909.02	\$942.83	\$951.85	\$919.55	\$937.61	\$994.25	\$733.53	
LPG(cents/litre)	\$0.52	\$0.48	\$0.46	\$0.46	\$0.48	\$0.50	\$0.50	\$0.49	\$0.50	\$0.52	\$0.39	
Freight & Insurance (\$/ton)												
I.f. Australia (us/ton)	\$34	\$28	\$30	\$39	\$53	\$57	\$73	\$68	\$36	\$26	\$19	
I.f. Australia (Aus/ton)	\$39	\$32	\$32	\$43	\$56	\$60	\$76	\$72	\$42	\$33	\$28	
I.f. Australia (cents/litre)												
Butane	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.02	
Propane	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.01	
LPG	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.02	

C.i.f. Australia (Aus/ton)											
Butane	1031	938	903	930	978	1022	1063	1015	1014	1046	762
Propane	1026	932	898	919	961	996	1016	984	968	1021	762
LPG	1027	934	899	922	965	1002	1028	992	979	1027	762
C.i.f. Australia (cents/litre)											
Butane	\$0.60	\$0.54	\$0.52	\$0.54	\$0.57	\$0.59	\$0.62	\$0.59	\$0.59	\$0.61	\$0.44
Propane	\$0.52	\$0.48	\$0.46	\$0.47	\$0.49	\$0.51	\$0.52	\$0.50	\$0.49	\$0.52	\$0.39
LPG	\$0.54	\$0.49	\$0.47	\$0.49	\$0.51	\$0.53	\$0.54	\$0.52	\$0.52	\$0.54	\$0.40
GST, terminal and margin costs											
Terminal costs (\$/tonne)											
Propane	\$10.35	\$10.28	\$9.64	\$9.94	\$9.78	\$9.55	\$9.48	\$9.68	\$10.57	\$11.42	\$13.67
Butane	\$20.51	\$20.35	\$19.10	\$19.69	\$19.36	\$18.91	\$18.78	\$19.16	\$20.93	\$22.61	\$27.06
LPG	\$17.97	\$17.83	\$16.73	\$17.26	\$16.97	\$16.57	\$16.46	\$16.79	\$18.34	\$19.81	\$23.71
Terminal margin	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%
Terminal costs (cents/litre)											
Propane	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.007
Butane	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.012	0.013	0.016
LPG	\$0.01	\$0.010	\$0.010	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.014
GST	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Wholesale Price LPG (\$/tonne)	1141.27	1038.44	999.69	1025.38	1072.76	1113.21	1140.89	1101.43	1088.83	1142.00	853.21
<b>Wholesale Price LPG (cents/litre)</b>	<b>0.61</b>	<b>0.55</b>	<b>0.53</b>	<b>0.55</b>	<b>0.57</b>	<b>0.59</b>	<b>0.61</b>	<b>0.59</b>	<b>0.58</b>	<b>0.61</b>	<b>0.46</b>
Wholesale Price Propane (\$/tonne)	1139.71	1036.89	998.24	1022.39	1068.34	1106.02	1128.03	1092.69	1076.10	1135.12	853.21
<b>Wholesale Price Propane (cents/litre)</b>	<b>0.58</b>	<b>0.53</b>	<b>0.51</b>	<b>0.52</b>	<b>0.55</b>	<b>0.56</b>	<b>0.58</b>	<b>0.56</b>	<b>0.55</b>	<b>0.58</b>	<b>0.44</b>
Retail LPG	71.3	69.5	66.8	64.4	65.9	68.5	69.2	67.8	68.3	69.3	70.3

**Table 5-2: Estimated Terminal Wholesale Price Compared to Retail Autogas**

	2008								
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Wholesale Price LPG (cents/litre)	0.61	0.55	0.53	0.55	0.57	0.59	0.61	0.59	0.58
Wholesale Price Propane (cents/litre)	0.58	0.53	0.51	0.52	0.55	0.56	0.58	0.56	0.55
Retail LPG	71.3	69.5	66.8	64.4	65.9	68.5	69.2	67.8	68.3

**Figure 5: Estimated LPG (Butane/Propane mix) and Propane Import Parity Prices Jan 2007 to Nov 2008.**



## **6 Conclusion**

In Western Australia LPG is sourced from the natural gas flows coming through the Dampier-Bunbury Pipeline and from the BP Kwinana petroleum refinery. Western Australia exports LPG. LPG imports into Australia occur in the eastern states market.

Petroleum products in Australia (petrol, diesel, LPG) have been based on import parity pricing following the decision in 1991 to deregulate these prices. Prior to that time there was price surveillance through the Prices Surveillance Authority. The States do not regulate prices, although they have the power to do so. Rather the price setting for petrol, diesel and LPG is left to the market. Some states monitor and report on prices as a way of providing market information. In Victoria terminal gate prices are published for petrol and diesel but not LPG. Western Australia publishes terminal gate prices for petrol but not LPG. Western Australia also operates the FuelWatch system whereby retailers nominate prices for petrol (all forms) and Autogas by 3:00 pm and hold prices at the specified level for 24 hours. This system requires legislation to enforce both the terminal gate price data to be collected and the FuelWatch prices to be nominated and complied with. Primarily this system is about price certainty for consumers. There appears to be little evidence that on its own it can cause prices to be lower. In the absence of regulation, market competition is the key to keeping price at reasonable levels for consumers. This applies equally to the markets for petrol, diesel, Autogas and domestic LPG.

Autogas prices are published via FuelWatch. For other LPG sales there is no price registering system and as with Autogas, no terminal gate price information is collected. From time to time there are concerns expressed about LPG pricing, especially in relation to LPG sold for domestic use in standard 45 kg cylinders but also to bulk LPG sold to companies who bottle and on sell it. Most recently these concerns resulted in the setting up of an Inquiry into the Affordability of Bottled Liquefied Petroleum Gas (LPG) for Household Use (2007).

One question arising from the Inquiry and submissions to it was the role of import parity pricing in determining LPG prices.

This report has applied a standard model of import parity pricing to estimate what ex terminal prices for LPG might be in Western Australia. It is important to note that Western Australia does not import LPG, rather it is an exporter, so key elements have to be estimated based on comparable arrangements elsewhere.

The benchmark for contract LPG price globally is the Saudi Aramco price quoted in \$US per tonne. This approximates to the free on board price from port of origin. To this must be added an estimate for cost, insurance and freight to the port of destination also in \$US per tonne. This cif price is then converted into Australian dollar equivalents at the equilibrium exchange rate. To this must then be added a terminal storage and handling cost, including profit margin, and GST to get an indicative tax inclusive ex terminal price.

For this analysis monthly data on the Saudi Aramco price was taken as the base. Monthly spot freight rates from Ras Tanura to Japan were used as the indicative freight rates. Terminalling costs are more difficult. A terminalling quoted cost for LPG imports into the US was converted to its Australian dollar equivalent and used to approximate terminal costs. To this estimate of cost + insurance + freight + terminalling, GST at 10% is added.

For the period January to September 2008 the estimated range for LPG prices was 46 to 61 cents per litre. For propane the price is between 44 and 58 cents per litre.

The import parity price should fluctuate as key world price components fluctuate. Although LPG freight rates fluctuate greatly the key variable is the Saudi Aramco price. For 2008, the freight and terminalling costs only amount to around 6% of the estimated LPG wholesale price.

This relatively small share of freight costs and terminalling costs is supported from several separate sources. In particular, a comparison of cif and customs (fob) prices for LPG imports over 2007 and 2008 indicates an approximate insurance+freight component of only 2 cents per litre.

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## **8 Appendix A. Glossary of Terms**

cbm	cubic metres
cif	cost insurance freight = landed price in port of destination
EER	equilibrium exchange rate (e.g. market exchange rate \$US/\$AUS)
fob	free on board = price onto ship at port of origin
LPG	Liquefied petroleum gas
Saudi Aramco Price	Quoted price for LPG shipments from Saudi Arabia main terminal facility at Ras Tanura.
VGLC	very large gas carriers (>70,000 cubic metres)

## 9 Appendix B: Data Tables

Table 9-1: Saudi Aramco Prices in \$US and \$AUS

Month	Butane (\$US/Tonne)	Propane (\$Us/Tonne)	Exchange rate	Butane (\$AUS/Tonne)	Propane (\$AUS/Tonne)
Dec-99			\$0.65		
Jan-00	\$251	\$256	\$0.64	\$ 383.91	\$ 391.56
Feb-00	\$270	\$270	\$0.61	\$ 423.06	\$ 423.06
Mar-00	\$325	\$325	\$0.61	\$ 529.06	\$ 529.06
Apr-00	\$305	\$300	\$0.59	\$ 503.72	\$ 495.46
May-00	\$255	\$255	\$0.57	\$ 431.55	\$ 431.55
Jun-00	\$270	\$270	\$0.60	\$ 470.79	\$ 470.79
Jul-00	\$295	\$295	\$0.58	\$ 492.82	\$ 492.82
Aug-00	\$290	\$290	\$0.57	\$ 498.11	\$ 498.11
Sep-00	\$295	\$295	\$0.54	\$ 513.22	\$ 513.22
Oct-00	\$325	\$325	\$0.51	\$ 598.20	\$ 598.20
Nov-00	\$345	\$345	\$0.52	\$ 670.16	\$ 670.16
Dec-00	\$335	\$335	\$0.55	\$ 640.90	\$ 640.90
Jan-01	\$320	\$335	\$0.55	\$ 577.62	\$ 604.69
Feb-01	\$315	\$350	\$0.53	\$ 576.29	\$ 640.32
Mar-01	\$295	\$330	\$0.49	\$ 561.90	\$ 628.57
Apr-01	\$240	\$275	\$0.51	\$ 490.80	\$ 562.37
May-01	\$230	\$275	\$0.51	\$ 452.04	\$ 540.49
Jun-01	\$235	\$285	\$0.51	\$ 460.78	\$ 558.82
Jul-01	\$230	\$270	\$0.50	\$ 453.20	\$ 532.02
Aug-01	\$215	\$240	\$0.53	\$ 426.50	\$ 476.10
Sep-01	\$215	\$230	\$0.49	\$ 402.47	\$ 430.55
Oct-01	\$235	\$240	\$0.51	\$ 477.35	\$ 487.51
Nov-01	\$232	\$235	\$0.52	\$ 459.13	\$ 465.07
Dec-01	\$205	\$210	\$0.51	\$ 394.23	\$ 403.85
Jan-02	\$205	\$227	\$0.51	\$ 401.49	\$ 444.58
Feb-02	\$185	\$220	\$0.52	\$ 364.32	\$ 433.24
Mar-02	\$180	\$215	\$0.53	\$ 348.57	\$ 416.34
Apr-02	\$185	\$215	\$0.54	\$ 348.01	\$ 404.44
May-02	\$210	\$230	\$0.57	\$ 389.11	\$ 426.16
Jun-02	\$215	\$225	\$0.56	\$ 378.92	\$ 396.55
Jul-02	\$215	\$225	\$0.55	\$ 380.67	\$ 398.37
Aug-02	\$225	\$235	\$0.55	\$ 410.73	\$ 428.99
Sep-02	\$255	\$260	\$0.54	\$ 460.95	\$ 469.99
Oct-02	\$295	\$295	\$0.55	\$ 542.78	\$ 542.78
Nov-02	\$327	\$327	\$0.56	\$ 590.89	\$ 590.89
Dec-02	\$327	\$327	\$0.57	\$ 583.10	\$ 583.10
Jan-03	\$335	\$342	\$0.59	\$ 591.66	\$ 604.03
Feb-03	\$365	\$375	\$0.61	\$ 620.33	\$ 637.32
Mar-03	\$360	\$385	\$0.60	\$ 594.65	\$ 635.94
Apr-03	\$310	\$325	\$0.62	\$ 513.59	\$ 538.44
May-03	\$210	\$230	\$0.65	\$ 337.08	\$ 369.18
Jun-03	\$235	\$248	\$0.67	\$ 360.32	\$ 380.25
Jul-03	\$260	\$275	\$0.65	\$ 389.57	\$ 412.05

Aug-03	\$260	\$275	\$0.64	\$ 398.22	\$ 421.20
Sep-03	\$265	\$278	\$0.68	\$ 414.06	\$ 434.38
Oct-03	\$255	\$260	\$0.70	\$ 374.94	\$ 382.30
Nov-03	\$280	\$280	\$0.72	\$ 397.39	\$ 397.39
Dec-03	\$315	\$310	\$0.75	\$ 437.14	\$ 430.20
Jan-04	\$320	\$320	\$0.76	\$ 426.67	\$ 426.67
Feb-04	\$330	\$330	\$0.77	\$ 431.71	\$ 431.71
Mar-04	\$265	\$265	\$0.76	\$ 343.80	\$ 343.80
Apr-04	\$294	\$290	\$0.72	\$ 387.40	\$ 382.13
May-04	\$320	\$318	\$0.71	\$ 443.21	\$ 440.44
Jun-04	\$355	\$338	\$0.69	\$ 496.99	\$ 473.19
Jul-04	\$335	\$315	\$0.70	\$ 486.28	\$ 457.25
Aug-04	\$343	\$338	\$0.70	\$ 490.98	\$ 483.82
Sep-04	\$383	\$383	\$0.71	\$ 546.28	\$ 546.28
Oct-04	\$403	\$398	\$0.75	\$ 563.87	\$ 556.88
Nov-04	\$473	\$463	\$0.78	\$ 633.96	\$ 620.56
Dec-04	\$427	\$417	\$0.78	\$ 549.20	\$ 536.33
Jan-05	\$372	\$365	\$0.77	\$ 477.54	\$ 468.55
Feb-05	\$372	\$365	\$0.79	\$ 480.37	\$ 471.33
Mar-05	\$382	\$377	\$0.77	\$ 483.24	\$ 476.91
Apr-05	\$418	\$415	\$0.78	\$ 541.52	\$ 537.63
May-05	\$423	\$420	\$0.76	\$ 541.54	\$ 537.70
Jun-05	\$396	\$393	\$0.76	\$ 524.02	\$ 520.05
Jul-05	\$401	\$398	\$0.76	\$ 525.08	\$ 521.15
Aug-05	\$406	\$400	\$0.75	\$ 534.56	\$ 526.66
Sep-05	\$447	\$425	\$0.76	\$ 598.31	\$ 568.87
Oct-05	\$525	\$505	\$0.75	\$ 689.43	\$ 663.16
Nov-05	\$555	\$535	\$0.74	\$ 741.28	\$ 714.57
Dec-05	\$544	\$524	\$0.73	\$ 736.23	\$ 709.16
Jan-06	\$585	\$575	\$0.75	\$ 797.33	\$ 783.70
Feb-06	\$627	\$622	\$0.74	\$ 834.89	\$ 828.23
Mar-06	\$530	\$530	\$0.72	\$ 717.96	\$ 717.96
Apr-06	\$425	\$435	\$0.75	\$ 593.66	\$ 607.63
May-06	\$470	\$470	\$0.76	\$ 623.18	\$ 623.18
Jun-06	\$470	\$470	\$0.74	\$ 615.51	\$ 615.51
Jul-06	\$502	\$502	\$0.77	\$ 675.37	\$ 675.37
Aug-06	\$547	\$547	\$0.76	\$ 714.29	\$ 714.29
Sep-06	\$560	\$563	\$0.75	\$ 734.23	\$ 738.17
Oct-06	\$485	\$480	\$0.77	\$ 648.40	\$ 641.71
Nov-06	\$470	\$450	\$0.79	\$ 611.02	\$ 585.02
Dec-06	\$495	\$480	\$0.79	\$ 630.57	\$ 611.46
Jan-07	\$550	\$545	\$0.77	\$ 695.06	\$ 688.74
Feb-07	\$526	\$526	\$0.79	\$ 681.35	\$ 681.35
Mar-07	\$506	506	\$0.81	\$ 642.13	\$ 642.13
Apr-07	\$545	\$530	\$0.83	\$ 675.34	\$ 656.75
May-07	\$575	\$560	\$0.82	\$ 695.45	\$ 677.31
Jun-07	\$612	\$592	\$0.85	\$ 742.36	\$ 718.10
Jul-07	\$595	\$575	\$0.86	\$ 701.07	\$ 677.51
Aug-07	\$605	\$580	\$0.82	\$ 705.79	\$ 676.62
Sep-07	\$580	\$560	\$0.88	\$ 706.11	\$ 681.76
Oct-07	\$665	\$640	\$0.92	\$ 753.37	\$ 725.05
Nov-07	\$755	\$730	\$0.89	\$ 819.23	\$ 792.10

Dec-07	\$885	\$860	\$0.88	\$ 998.31	\$ 970.11
Jan-08	\$875	\$870	\$0.89	\$ 992.51	\$ 986.84
Feb-08	\$805	\$800	\$0.95	\$ 906.12	\$ 900.50
Mar-08	\$825	\$820	\$0.92	\$ 871.54	\$ 866.26
Apr-08	\$815	\$805	\$0.93	\$ 887.80	\$ 876.91
May-08	\$860	\$845	\$0.96	\$ 921.07	\$ 905.00
Jun-08	\$920	\$895	\$0.96	\$ 962.44	\$ 936.29
Jul-08	\$950	\$905	\$0.94	\$ 986.91	\$ 940.16
Aug-08	\$890	\$860	\$0.86	\$ 943.40	\$ 911.60
Sep-08	\$840	\$800	\$0.80	\$ 972.33	\$ 926.03
Oct-08	\$810	\$790	\$0.67	\$ 1,013.01	\$ 987.99
Nov-08	\$490	\$490	\$0.66	\$ 733.53	\$ 733.53
Dec-08	\$335	\$340	\$0.00	\$ 510.90	\$ 518.53

Source: LPG Australia, Reserve Bank

Table 9-2: Saudi Aramco Propane and Butane Prices, Perth Autogas LPG

Month	Butane (\$AU c/litre)	Propane (\$AU c/litre)	Average Propane/ Butane (\$AU c/litre)	Perth Metropolitan LPG Average (\$AU c/litre)
Jan-00	22.8	20.5	21.1	38.8
Feb-00	24.5	21.6	22.3	38.3
Mar-00	30.7	27.0	27.9	43.9
Apr-00	29.2	25.3	26.3	43.7
May-00	25.0	22.0	22.8	41.0
Jun-00	27.3	24.0	24.8	39.3
Jul-00	28.6	25.1	26.0	44.3
Aug-00	28.9	25.4	26.3	44.8
Sep-00	29.8	26.2	27.1	43.9
Oct-00	34.7	30.5	31.6	50.3
Nov-00	38.9	34.2	35.4	54.2
Dec-00	37.2	32.7	33.8	54.6
Jan-01	33.5	30.9	31.5	51.9
Feb-01	33.4	32.7	32.9	52.1
Mar-01	32.6	32.1	32.2	52.6
Apr-01	28.5	28.7	28.6	50.9
May-01	26.2	27.6	27.2	49.6
Jun-01	26.7	28.5	28.1	49.6
Jul-01	26.3	27.1	26.9	46.8
Aug-01	24.7	24.3	24.4	47.2
Sep-01	23.3	22.0	22.3	44.8
Oct-01	27.7	24.9	25.6	45.2
Nov-01	26.6	23.7	24.5	45.4
Dec-01	22.9	20.6	21.2	45.4
Jan-02	23.3	22.7	22.8	44.5
Feb-02	21.1	22.1	21.9	43.7
Mar-02	20.2	21.2	21.0	43.6
Apr-02	20.2	20.6	20.5	43.5
May-02	22.6	21.7	21.9	43.4
Jun-02	22.0	20.2	20.7	42.6
Jul-02	22.1	20.3	20.8	42.4
Aug-02	23.8	21.9	22.4	42.1
Sep-02	26.7	24.0	24.7	44.9
Oct-02	31.5	27.7	28.6	48.2
Nov-02	34.3	30.1	31.2	51.0
Dec-02	33.8	29.7	30.8	50.4
Jan-03	34.3	30.8	31.7	51.7
Feb-03	36.0	32.5	33.4	53.7
Mar-03	34.5	32.4	33.0	51.6
Apr-03	29.8	27.5	28.1	49.3
May-03	19.6	18.8	19.0	38.1
Jun-03	20.9	19.4	19.8	35.1
Jul-03	22.6	21.0	21.4	36.7
Aug-03	23.1	21.5	21.9	37.2
Sep-03	24.0	22.2	22.6	37.4
Oct-03	21.7	19.5	20.1	37.7

Nov-03	23.1	20.3	21.0	36.9
Dec-03	25.4	21.9	22.8	37.5
Jan-04	24.7	21.8	22.5	39.2
Feb-04	25.0	22.0	22.8	36.9
Mar-04	19.9	17.5	18.1	34.4
Apr-04	22.5	19.5	20.2	34.5
May-04	25.7	22.5	23.3	35.4
Jun-04	28.8	24.1	25.3	38.0
Jul-04	28.2	23.3	24.5	40.1
Aug-04	28.5	24.7	25.6	41.1
Sep-04	31.7	27.9	28.8	43.6
Oct-04	32.7	28.4	29.5	45.4
Nov-04	36.8	31.7	32.9	48.9
Dec-04	31.9	27.4	28.5	47.1
Jan-05	27.7	23.9	24.9	44.9
Feb-05	27.9	24.0	25.0	43.5
Mar-05	28.0	24.3	25.3	43.5
Apr-05	31.4	27.4	28.4	44.5
May-05	31.4	27.4	28.4	45.9
Jun-05	30.4	26.5	27.5	44.9
Jul-05	30.5	26.6	27.6	44.5
Aug-05	31.0	26.9	27.9	46.3
Sep-05	34.7	29.0	30.4	51.0
Oct-05	40.0	33.8	35.4	54.3
Nov-05	43.0	36.5	38.1	56.0
Dec-05	42.7	36.2	37.8	56.5
Jan-06	46.2	40.0	41.6	57.8
Feb-06	48.4	42.3	43.8	62.4
Mar-06	41.6	36.6	37.9	60.1
Apr-06	34.4	31.0	31.9	53.2
May-06	36.1	31.8	32.9	48.9
Jun-06	35.7	31.4	32.5	51.8
Jul-06	39.2	34.5	35.6	54.9
Aug-06	41.4	36.4	37.7	56.7
Sep-06	42.6	37.7	38.9	56.6
Oct-06	37.6	32.7	34.0	54.7
Nov-06	35.4	29.8	31.2	53.1
Dec-06	36.6	31.2	32.5	51.9
Jan-07	40.3	35.1	36.4	56.1
Feb-07	39.5	34.8	36.0	55.5
Mar-07	37.2	32.8	33.9	54
Apr-07	39.2	33.5	34.9	54.5
May-07	40.3	34.6	36.0	55.4
Jun-07	43.1	36.6	38.2	55.4
Jul-07	40.7	34.6	36.1	53
Aug-07	40.9	34.5	36.1	54.1
Sep-07	41.0	34.8	36.3	53.7
Oct-07	43.7	37.0	38.7	56.7
Nov-07	47.5	40.4	42.2	60.8
Dec-07	57.9	49.5	51.6	67.8
Jan-08	57.6	50.3	52.2	71.3
Feb-08	52.6	45.9	47.6	69.5

Mar-08	50.6	44.2	45.8	66.8
Apr-08	51.5	44.7	46.4	64.4
May-08	53.4	46.2	48.0	65.9
Jun-08	55.8	47.8	49.8	68.5
Jul-08	57.2	48.0	50.3	69.2
Aug-08	54.7	46.5	48.6	67.8
Sep-08	56.4	47.2	49.5	68.3
Oct-08	58.8	50.4	52.5	69.8
Nov-08	42.5	37.4	38.7	65.5
	29.6	26.5	27.3	52.7

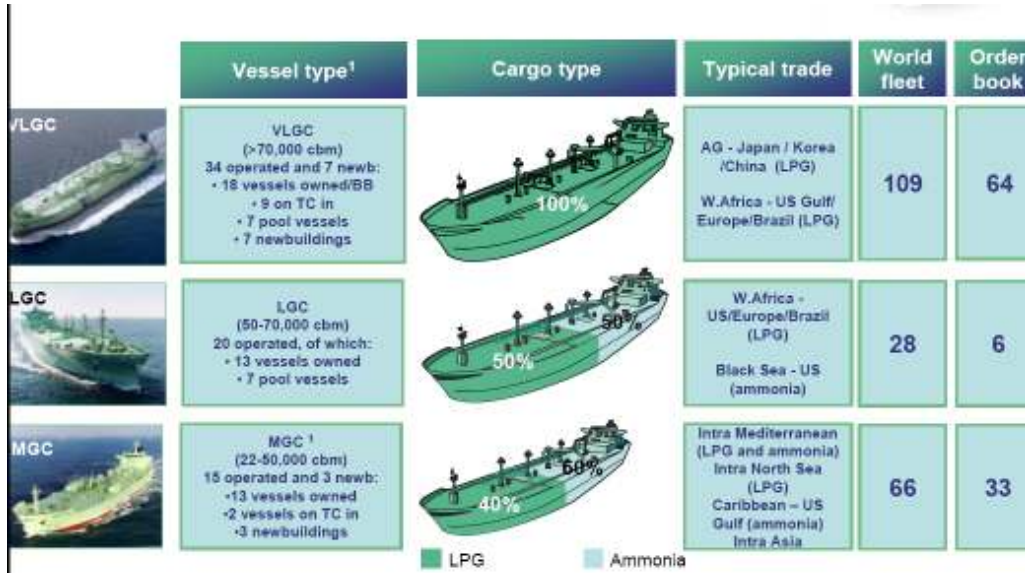
Source: Economic Research Associates, FuelWatch

**Table 9-3: Indicative Freight Rates Based on AG- Japan**

2007												
	January	February	March	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
I.f. Australia (us/ton)	\$25.00	\$25.00	\$24.50	\$31.10	\$35.50	\$37.00	\$40.50	\$44.00	\$58.30	\$38.50	\$49.20	\$48.30
I.f. Australia (Aus/ton)	\$31.59	\$32.38	\$31.09	\$38.54	\$42.94	\$44.88	\$47.72	\$51.33	\$70.98	\$43.62	\$53.39	\$54.48
I.f. Australia (cents/litre)												
Butane	\$0.018	\$0.019	\$0.018	\$0.022	\$0.025	\$0.026	\$0.028	\$0.030	\$0.041	\$0.025	\$0.031	\$0.032
Propane	\$0.016	\$0.017	\$0.016	\$0.020	\$0.022	\$0.023	\$0.024	\$0.026	\$0.036	\$0.022	\$0.027	\$0.028
LPG	\$0.017	\$0.017	\$0.016	\$0.020	\$0.023	\$0.024	\$0.025	\$0.027	\$0.037	\$0.023	\$0.028	\$0.029
2008												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
I.f. Australia (us/ton)	\$34.30	\$28.30	\$29.90	\$39.10	\$52.70	\$57.00	\$73.00	\$68.00	\$36.00	\$26.00	\$19.00	
I.f. Australia (Aus/ton)	\$38.91	\$31.86	\$31.59	\$42.59	\$56.44	\$59.63	\$75.84	\$72.08	\$41.67	\$33.00	\$28.00	
I.f. Australia (cents/litre)												
Butane	\$0.023	\$0.018	\$0.018	\$0.025	\$0.033	\$0.035	\$0.044	\$0.042	\$0.024	\$0.019	\$0.016	
Propane	\$0.020	\$0.016	\$0.016	\$0.022	\$0.029	\$0.030	\$0.039	\$0.037	\$0.021	\$0.017	\$0.015	
LPG	\$0.021	\$0.017	\$0.017	\$0.022	\$0.030	\$0.031	\$0.040	\$0.038	\$0.022	\$0.017	\$0.015	

LPG Insight. Various Issues January 2007 to October 2008.

**Figure 6: World LPG Fleet**



Source: Karstrom (2007)

Table 9-4: Customs and FOB Values for LPG Imports

	342 Liquefied propane and butane ;	342 Liquefied propane and butane ;	342 Liquefied propane and butane ;	342 Liquefied propane and butane ;	342 Liquefied propane and butane ;
		\$ Millions	\$ Millions	Cents/litre	Cents/litre
	Qty (kg)	Customs Value	CIF	Customs Value	CIF
	Month	Month	Month	Month	Month
Jan-2007	80,867	\$0.00	\$0.25	\$0.00	\$1.55
Feb-2007	66,244	\$0.00	\$0.18	\$0.00	\$1.37
Mar-2007	39,833,240	\$26.00	\$27.93	\$0.33	\$0.36
Apr-2007	77,953,699	\$53.00	\$57.61	\$0.35	\$0.38
May-2007	87,039	\$0.00	\$0.20	\$0.00	\$1.20
Jun-2007	44,379,016	\$31.00	\$33.09	\$0.36	\$0.38
Jul-2007	1,492,842	\$1.00	\$1.45	\$0.34	\$0.50
Aug-2007	90,748,375	\$64.00	\$67.12	\$0.36	\$0.38
Sep-2007	44,702,025	\$36.00	\$37.97	\$0.41	\$0.43
Oct-2007	42,761,713	\$38.00	\$39.90	\$0.45	\$0.48
Nov-2007	42,423,391	\$40.00	\$41.50	\$0.48	\$0.50
Dec-2007	3,035,438	\$3.00	\$3.41	\$0.50	\$0.57
Jan-2008	44,561,985	\$45.00	\$46.56	\$0.52	\$0.53
Feb-2008	47,439,814	\$45.00	\$46.68	\$0.48	\$0.50
Mar-2008	52,676	\$0.00	\$0.16	\$0.00	\$1.56
Apr-2008	84,688,727	\$78.00	\$80.56	\$0.47	\$0.49
May-2008	90,248,873	\$86.00	\$89.55	\$0.49	\$0.51
Jun-2008	71,450	\$0.00	\$0.26	\$0.00	\$1.85
Jul-2008	50,349,727	\$50.00	\$51.31	\$0.51	\$0.52
Aug-2008	84,442	\$0.00	\$0.28		\$1.71
Sep-2008	46,911,596		\$50.49		\$0.55
Oct-2008	32,324,696		\$36.33		\$0.57

Source: Australian Bureau of Statistics, International Merchandise Trade [data available on request]

# 10 Appendix C Model Spreadsheet

Based on \$ Calculation of Wholesale/terminal Margin																								
	2007											2008												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Calculation of the LPG Import Parity Price																								
F.o.b. (\$US/ton)																								
Saudi Contract Price																								
Butane		550	526	506	545	575	612	595	605	580	665	755	885	\$875	\$805	\$825	\$815	\$860	\$920	\$950	\$890	\$840	\$810	\$490
Propane		545	526	506	530	560	592	575	580	560	640	730	860	\$870	\$800	\$820	\$805	\$845	\$895	\$905	\$860	\$800	\$790	\$490
US/SAU exchange rate		0.7913	0.772	0.788	0.807	0.8268	0.8244	0.8487	0.8572	0.8214	0.8827	0.9216	0.8865	0.8816	0.8884	0.9466	0.9180	0.9337	0.9559	0.9626	0.9434	0.8639	0.7996	0.6680
Fob (\$AU/ton)																								
Butane		\$695.06	\$681.35	\$642.13	\$675.34	\$695.45	\$742.36	\$701.07	\$705.79	\$706.11	\$753.37	\$819.23	\$998.31	\$992.51	\$906.12	\$871.54	\$887.80	\$921.07	\$962.44	\$986.91	\$943.40	\$972.33	\$1,013.01	\$733.53
Propane		\$688.74	\$681.35	\$642.13	\$656.75	\$677.31	\$718.10	\$677.51	\$676.62	\$681.76	\$725.05	\$792.10	\$970.11	\$986.84	\$900.50	\$866.26	\$876.91	\$905.00	\$936.29	\$940.16	\$911.60	\$926.03	\$987.99	\$733.53
Fob (cents/litre)																								
Butane	1724	0.25	\$0.40	\$0.40	\$0.37	\$0.39	\$0.40	\$0.43	\$0.41	\$0.41	\$0.44	\$0.48	\$0.58	\$0.58	\$0.53	\$0.51	\$0.51	\$0.53	\$0.56	\$0.57	\$0.55	\$0.56	\$0.59	\$0.43
Propane	1960	0.75	\$0.35	\$0.35	\$0.33	\$0.34	\$0.35	\$0.37	\$0.35	\$0.35	\$0.37	\$0.40	\$0.49	\$0.50	\$0.46	\$0.44	\$0.45	\$0.46	\$0.48	\$0.48	\$0.47	\$0.47	\$0.50	\$0.37
LPG (\$AU/ton)		\$690.32	\$681.35	\$642.13	\$661.40	\$681.85	\$724.16	\$683.40	\$683.91	\$687.85	\$732.13	\$798.88	\$977.16	\$988.26	\$901.90	\$867.58	\$879.63	\$909.02	\$942.83	\$951.85	\$919.55	\$937.61	\$994.25	\$733.53
LPG(cents/litre)		\$0.36	\$0.36	\$0.34	\$0.35	\$0.36	\$0.38	\$0.36	\$0.36	\$0.36	\$0.39	\$0.42	\$0.52	\$0.52	\$0.48	\$0.46	\$0.46	\$0.48	\$0.50	\$0.50	\$0.49	\$0.50	\$0.52	\$0.39
Freight & Insurance (\$/ton)																								
I.f. Australia (us/ton)		\$25	\$25	\$25	\$31	\$36	\$37	\$41	\$44	\$58	\$39	\$49	\$48	\$34	\$28	\$30	\$39	\$53	\$57	\$73	\$68	\$36	\$26	\$19
I.f. Australia (Aus/ton)		\$32	\$32	\$31	\$39	\$43	\$45	\$48	\$51	\$71	\$44	\$53	\$54	\$39	\$32	\$32	\$43	\$56	\$60	\$76	\$72	\$42	\$33	\$28
I.f. Australia (cents/litre)																								
Butane		\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.04	\$0.03	\$0.03	\$0.03	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.02
Propane		\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.04	\$0.02	\$0.03	\$0.03	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.01
LPG		\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.02	\$0.03	\$0.03	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.04	\$0.04	\$0.02	\$0.02	\$0.02
C.f. Australia (Aus/ton)																								
Butane		727	714	673	714	738	787	749	757	777	797	873	1053	1031	938	903	930	978	1022	1063	1015	1014	1046	762
Propane		720	714	673	695	720	763	725	728	753	769	845	1025	1026	932	898	919	961	996	1016	984	968	1021	762
LPG		722	714	673	700	725	769	731	735	759	776	852	1032	1027	934	899	922	965	1002	1028	992	979	1027	762
C.f. Australia (cents/litre)																								
Butane		\$0.42	\$0.41	\$0.39	\$0.41	\$0.43	\$0.46	\$0.43	\$0.44	\$0.45	\$0.46	\$0.51	\$0.61	\$0.60	\$0.54	\$0.52	\$0.54	\$0.57	\$0.59	\$0.62	\$0.59	\$0.59	\$0.61	\$0.44
Propane		\$0.37	\$0.36	\$0.34	\$0.35	\$0.37	\$0.39	\$0.37	\$0.37	\$0.38	\$0.39	\$0.43	\$0.52	\$0.52	\$0.48	\$0.46	\$0.47	\$0.49	\$0.51	\$0.52	\$0.50	\$0.49	\$0.52	\$0.39
LPG		\$0.38	\$0.38	\$0.36	\$0.37	\$0.38	\$0.41	\$0.39	\$0.39	\$0.40	\$0.41	\$0.45	\$0.54	\$0.54	\$0.49	\$0.47	\$0.49	\$0.51	\$0.53	\$0.54	\$0.52	\$0.52	\$0.54	\$0.40
GST, terminal and margin costs																								
Terminal costs (\$/tonne)																								
Propane		\$11.54	\$11.82	\$11.58	\$11.31	\$11.04	\$11.07	\$10.76	\$10.65	\$11.11	\$10.34	\$9.91	\$10.30	\$10.35	\$10.28	\$9.64	\$9.94	\$9.78	\$9.55	\$9.48	\$9.68	\$10.57	\$11.42	\$13.67
Butane		\$22.85	\$23.42	\$22.94	\$22.40	\$21.87	\$21.93	\$21.30	\$21.09	\$22.01	\$20.48	\$19.62	\$20.39	\$20.51	\$20.35	\$19.10	\$19.69	\$19.36	\$18.91	\$18.78	\$19.16	\$20.93	\$22.61	\$27.06
LPG		\$20.02	\$20.52	\$20.10	\$19.63	\$19.16	\$19.21	\$18.66	\$18.48	\$19.28	\$17.95	\$17.19	\$17.87	\$17.97	\$17.83	\$16.73	\$17.26	\$16.97	\$16.57	\$16.46	\$16.79	\$18.34	\$19.81	\$23.71
Terminal margin		3%	3%	3%	3%	3%	2%	3%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	
Terminal costs (cents/litre)																								
Propane		0.006	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.007	
Butane		0.013	0.014	0.013	0.013	0.013	0.013	0.012	0.012	0.013	0.012	0.011	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011	0.011	0.012	0.013	0.016
LPG		\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.010	\$0.010	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.014
GST		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Wholesale Price LPG (\$/tonne)		816.13	798.11	753.29	782.37	809.41	858.13	816.06	820.48	846.93	864.70	948.39	1146.13	1141.27	1038.44	999.69	1025.38	1072.76	1113.21	1140.89	1101.43	1088.83	1142.00	853.21
Wholesale Price LPG (cents/litre)		0.43	0.45	0.40	0.42	0.43	0.46	0.44	0.44	0.45	0.46	0.51	0.61	0.61	0.55	0.53	0.57	0.59	0.61	0.59	0.58	0.58	0.61	0.46
Wholesale Price Propane (\$/tonne)		805.06	798.11	753.29	777.26	804.42	851.46	809.58	812.46	840.24	856.91	940.93	1138.38	1139.71	1036.89	998.24	1022.39	1068.34	1106.02	1128.03	1092.69	1076.10	1135.12	853.21
Wholesale Price Propane (cents/litre)		0.41	0.41	0.38	0.40	0.41	0.43	0.41	0.41	0.43	0.44	0.48	0.58	0.58	0.53	0.51	0.52	0.55	0.56	0.58	0.56	0.55	0.58	0.44
Retail LPG		56.1	55.5	54	54.5	55.4	55.4	53	54.1	53.7	56.7	60.8	67.8	71.3	69.5	66.8	64.4	65.9	68.5	69.2	67.8	68.3	69.3	70.3