INDEPENDENT CONSUMER AND COMPETITION COMMISSION

Petroleum Industry Pricing Review

Final Report

27th December 2024

FOREWORD

About the ICCC

The Independent Consumer and Competition Commission (ICCC) is a statutory body established under the provisions of the Independent Consumer and Competition Commission Act 2002 (the ICCC Act) to promote competition and fair trading, regulate prices of certain declared goods and services, and to protect consumers' interests, and other related purposes. The ICCC is empowered under the ICCC Act to have one full-time Commissioner and two part-time Commissioners who form the ICCC Board. At the time of compiling this Report, the Board comprises of:

Mr. Paulus Ain **- Commissioner and Chief Executive Officer**

Mr. Jack Timi **- Associate Commissioner (Resident)**

Vacant **- Associate Commissioner (Non-Resident)**

Enquiries

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Copies of this final report can also be obtained from the ICCC's website at www.iccc.gov.pg.

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Mr. Paulus Ain

Commissioner & Chief Executive Officer

27th December 2024

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1 Executive Summary

This is the final report for the ICCC's 2024 review of petroleum prices in PNG. It describes how regulated fuel prices will be set in PNG from 2025 to 2029. This is part of the ICCC's five-year review of petroleum prices under Sections 10, 21 and 32A of the Prices Regulation Act 1949 (PR Act), Chapter 320. It describes both the analysis carried out by the ICCC, the process and methodologies used and the ICCC's final determinations.

This executive summary describes the high-level findings and final determinations of the review. However, stakeholders will need to read the detail under each section to understand the rationale and intention of the ICCC's determinations.

At the time of publishing this report, the NSO had still not published the September CPI. So, the prices listed in this report do not yet reflect the latest inflation adjustment. However, this will be done prior to 1st January 2025.

Maximum Prices

The ICCC sets the maximum prices which retailers may charge for diesel, kerosene and petrol. However, retailers may choose to sell these products at lower prices. There is some evidence that competition is driving retailers to sell below the maximum price in some geographic areas.

The ICCC hopes that this trend will continue as competition grows for the benefit of the industry and consumers.

Market assessment

The current regulatory arrangements appear to have been effective in protecting the interests of consumers. Wholesalers have continued to compete for market share and invest in infrastructure, and new petrol stations continue to be constructed.

The ICCC has concluded that wholesalers continue to have market power in both the service station and drum markets, with many parts of the PNG having only one or two fuel suppliers. Because of this, the ICCC as decided to keep the current price controls in place to protect the interests of consumers.

In contrast, the commercial market appears to function effectively without the need for regulation.

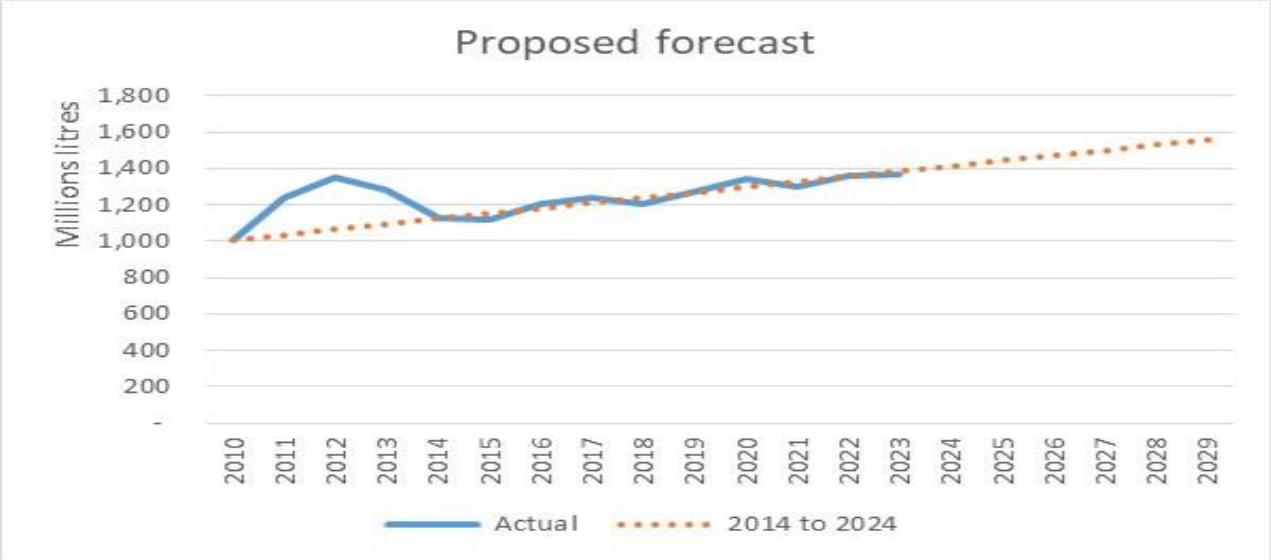
Additionally, because of the destabilizing effects of foreign currency shortages on fuel supply, the ICCC believes maintaining the existing regulatory arrangements is in the best interest of both the industry and consumers to avoid further stress on the market and its suppliers.

All wholesalers are constrained by foreign currency availability. While foreign currency shortages have had a large public impact upon Puma, similar outcomes could arise for any of the wholesalers if foreign currency is not available.

Forecast volumes

Figure 1 shows how total industry volumes have grown since 2010 and the ICCC's projection of future demand as the PNG economy grows. The ICCC has used this projection to determine the wholesale margin for 2025 to 2029.

Figure 1



Cost components included in prices

Regulated prices are made up of the various economic cost components that are necessary to deliver fuel to customers. These are:

- the import parity price (IPP) as defined by the project agreement;
- transport costs including coastal shipping and road freight;
- wholesale margins and drum filing margins; and
- retail margins.

The IPP is defined by the project agreement and the ICCC has no legal or regulatory authority to change it. However, the IPP appears to continue to set prices which are very close to what importers pay to import product directly into PNG.

Transport costs

No changes have been made to the way transports costs are collected and passed through to retail prices.

In 2019, the ICCC started to use the average road transport costs in each region to set retail prices. Previously, prices were driven by the highest cost. This change appears to have promoted efficiency gains with these costs falling in some regions where more than two wholesalers compete.

Return on investment

The ICCC has calculated a WACC to determine the target returns for wholesale and retail investments in the petroleum industry (see Table 1). However, for retail investment the additional risk of constructing a new service station has also been recognised. This relates to unplanned cost over-runs which are common for new construction projects as well as lower than expected sales volumes at a new site. Both are risks that an investor building only one service station cannot avoid by diversification.

Table 1: Target return on investment

Wholesale Pre-Tax real WACC	15.18%
Retail Pre-Tax real WACC	14.04%
Retail risk adjusted WACC for a single new service station	18.66%

Wholesale margin

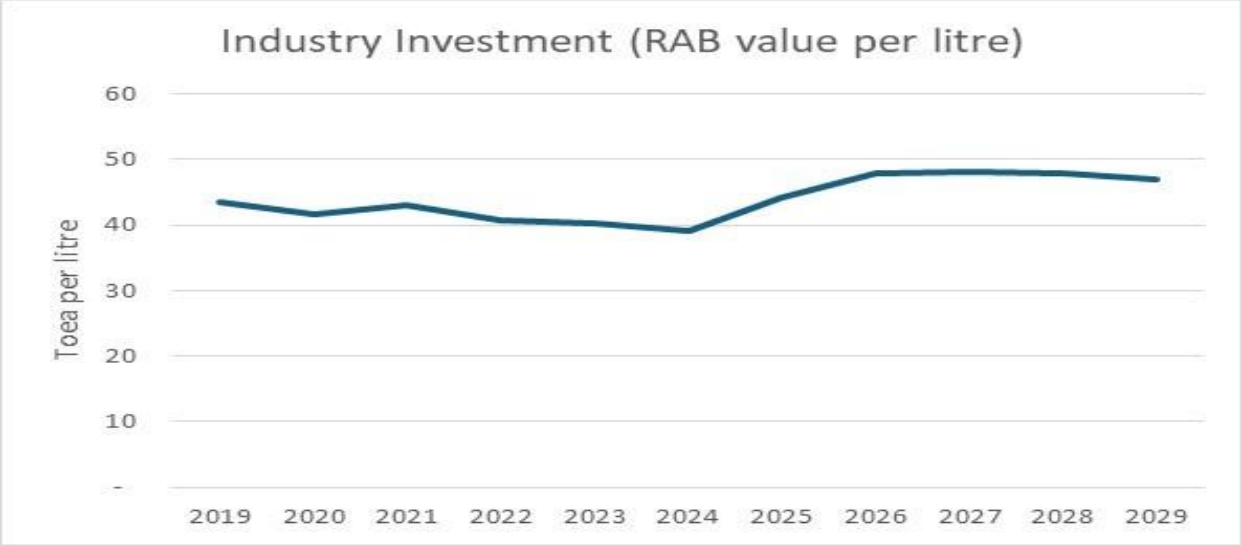
All the wholesalers have continued to invest in their business and to replace their assets as they age. The industry regulatory asset base has maintained its value in real terms over the recent regulatory period.

However, the industry has stated that it intends to invest K215 million over the next two years. Figure 2 shows that the value of the industry asset base will increase by about 30% if these intentions are carried out.

Most of this new investment will be additional storage capacity and is a result of foreign currency shortages which have driven change in the industry. Increased investment in storage will mean higher prices for consumers as the industry becomes less efficient.

Because of the current uncertainty of this new investment, the ICCC has decided to make a mid-term adjustment to the wholesale rate. This will occur in the fourth quarter of 2026, when the ICCC will assess actual capital spending between January 2024 and September 2026. The adjustment will be a proportion of 4.73 toea per litre. The proportion will be the percentage of K215 million that has been spent by the industry by September 2026. The details of this are described in section 8.5 and 8.10.

Figure 2



The initial wholesale margin for 2025 will be 28.26 toea per litre with an annual decrease of 0.85% in addition to CPI adjustments. This has been calculated using a building block model following the same methodology used in 2019. This is a 4.7% decrease below the current rate of 29.7 toea per litre, but it will then increase again in 2027 with the mid-term review adjustment.

Retail Data

Retail costs have been extensively reviewed and this has led to significant increases in the retail margin (see Table 2).

Table 2: Changes to components of the retail margin (toea per litre)

	New	Previous	Change
Land Costs	5.4	1.1	4.5
Operating Costs	21.3	17.3	4.0
Asset Costs	18.4	17.8	0.2
All average	45.0	36.0	9.0[1]

The ICCC has interacted with the industry, through meetings, submissions and an industry workshop. The main message from the industry was that retail margins needed to increase, or retailers would start to close. The ICCC requested that all retailers complete a survey to provide evidence of their current operating costs. With the assistance of the wholesalers, the ICCC has received 82 responses to this survey from retailers.

[1] Note that totals do not sum exactly because individual values are simple averages for changes across all geographic areas.

The improved evidence base has resulted in a general increase in retail margins. Part of this is through better information and part of this is through retailers highlighting areas where the ICCC's retail model did not take into account all of their costs**.**

Table 3 shows some of the changes that have been made and the magnitude of the change they have driven.

Table 3: Reasons for changes to retail margins

Reason	Change in margin (toea per litre)
Increased WACC to reflect the non-diversifiable risk of building a new service station.	+3.2
Product evaporation at retail sites of 0.3%	+1.3
Allowance for the cost fuel used in Gensets	+1.4
Maintenance costs not previously allowed for.	+0.9
Inventory at the bottom of the tank, required to maintain pumps	+0.1
Higher administration and banking costs	+2.9
Better information about security costs	+0.2
Improved information about sales volumes which has reduced margins	-8.0
Reduced % of sales sold at peak, which drives lower investment in bowser and forecourt size	-1.8

Some of these changes are more pronounced in some geographic areas (see Table 4).

Drum fillers margin

The drum filling margin is proposed to be 10.2 toea per litre for both new and reused drums. The industry supports the ongoing use of a separate drum filling margin and has not raised any issues with the current levels of the allowance.

Capital costs

WACCs (Weighted average costs of capital) have been calculated using the capital asset pricing model. For wholesale assets the ICCC is proposing to use a pre-tax real WACC of 15.4%, and a pre-tax real WACC of 14.04% for retail.

Table 4: Changes to retail margin by geographic area (Toea per litre)

	Asset Cost	Operating Cost	Land Cost	New Retail Margin	Old Retail Margin	Change
Alotau	18.8	17.2	3.4	38.6	29.2	9.4
Bulolo	17.4	18.0	3.4	38.8	36.1	2.7
Goroka	18.8	13.3	8.0	40.1	34.2	5.9
Kainantu	15.7	17.2	4.0	37.0	30.7	6.3
Kavieng	18.7	17.8	3.4	37.3	27.6	9.7
Kimbe	17.4	27.3	6.5	51.2	36.8	14.4
Kokopo	17.2	12.2	12.5	41.8	32.2	9.6
Kundiawa	17.6	15.9	3.4	36.9	43.2	(6.3)
Lae	15.9	26.2	8.4	50.4	39.2	11.2
Madang	16.8	19.7	6.9	43.5	32.1	11.4
Mendi	19.0	27.5	4.0	50.5	39.1	11.4
Minj/Banz	23.9	23.5	3.5	50.9	37.6	13.3
Mt.Hagen	19.7	21.8	8.5	50.0	41.6	8.4
Namatanai	19.7	28.2	4.0	51.9	39.7	12.2
Popondetta	12.6	23.3	4.0	39.9	36.3	3.6
Port Moresby	17.1	20.6	6.3	44.0	37.5	6.5
Ramu	16.9	15.8	4.0	36.7	36.1	0.6
Tari	24.2	30.7	4.0	58.9	41.7	17.2
Wabag	18.1	23.7	3.4	44.2	39.1	5.1
Wewak	19.8	23.8	6.5	50.0	30.7	19.3

Indicative Prices

Table 5 shows how the cost components build up to calculate the retail price for diesel in each centre. The numbers shown use the IPP and transport costs for July 2024.

These are the maximum prices that may be charged. However, retailers can choose to price below these maximum prices.

Table 5: Diesel Price build up based upon proposed prices (Kina per litre)

	Retail Margin	Whole-sale Margin	Coastal Shipping	Road Freight	IPP + Excise	New Price Incl. GST	July 2024 price	% Change
Alotau	0.39	0.28	0.61	0.04	2.72	4.44	4.36	2%
Bulolo	0.39	0.28	0.25	0.14	2.72	4.17	4.15	0%
Goroka	0.40	0.28	0.25	0.32	2.72	4.38	4.33	1%
Kainantu	0.37	0.28	0.25	0.18	2.72	4.18	4.13	1%
Kavieng	0.37	0.28	0.63	0.07	2.72	4.49	4.40	2%
Kimbe	0.51	0.28	0.55	0.06	2.72	4.53	4.39	3%
Kokopo	0.42	0.28	0.20	0.10	2.72	4.09	4.00	2%
Kundiawa	0.37	0.28	0.25	0.47	2.72	4.51	4.59	-2%
Lae	0.50	0.28	0.25	0.04	2.72	4.18	4.08	3%
Madang	0.43	0.28	0.22	0.05	2.72	4.08	3.97	3%
Mendi	0.50	0.28	0.25	0.64	2.72	4.84	4.73	2%
Minj/Banz/Kindeng/Kumdi	0.51	0.28	0.25	0.51	2.72	4.71	4.58	3%
Mt.Hagen	0.50	0.28	0.25	0.48	2.72	4.66	4.58	2%
Namatanai	0.52	0.28	0.63	0.19	2.72	4.78	4.66	3%
Popondetta	0.40	0.28	0.63	0.32	2.72	4.80	4.77	0%
Port Moresby	0.44	0.28	0.21	0.04	2.72	4.08	4.02	1%
Ramu	0.37	0.28	0.25	0.15	2.72	4.15	4.16	0%
Tari	0.59	0.28	0.25	0.89	2.72	5.21	5.04	3%
Wabag	0.44	0.28	0.25	0.62	2.72	4.76	4.72	1%
Wewak	0.50	0.28	0.56	0.05	2.72	4.52	4.32	5%

Support from the Industry

The ICCC would like to thank all those who participated in this review. The review could not have been carried out without the extensive efforts provided by wholesalers to provide information about both their own businesses and to encourage their customers the retailers to complete the ICCC's survey. The ICCC also thanks all those retailers, who took the time to complete the survey, allowed the ICCC to visit their sites and met with the ICCC.

Next Steps

The new regulatory arrangement described in this report will come into effect from 1st January 2025, however, it will be reflected in the retail prices at fuel service stations from 8th January 2025. This pricing regime will remain in place until 31st December 2029. The retail prices will continue to change on a monthly basis as described in this report.

The ICCC will commence its next petroleum industry pricing review in 2029.

2 BACKGROUND

2.1 Previous reviews

The ICCC's previous reviews were conducted in 2004, 2009/10, 2014/15 and 2019. Details of the findings in these reviews can be found in previous final ICCC reports.

2.2 Legislative requirements

The existing regulatory and pricing arrangements applying to petrol, diesel, kerosene and Jet A1, are governed under sections 10, 32A and 21 of the Prices Regulation Act 1949 (PR Act) respectively. The Government through the Minister for Treasury has declared these petroleum products under section 10 of the PR Act for price regulation purposes. The ICCC sets the maximum total (retail) price and drum filling margins pursuant to section 21 of the PR Act. Under section 32A of the PR Act, the ICCC monitors the prices of petrol, diesel and kerosene ex-Napa Napa set under the project agreement between the state and Puma, as well as the prices of Jet A1 and the sea and road freight cost components of fuel prices.

The provisions of section 25A (6) of the PR Act provide for the ICCC to initiate a review on its own accord when it considers it to be appropriate. Section 25B of the PR Act outlines the processes by which a review of a pricing order can be undertaken, including the timelines, the requirement to publish details of its decisions, and the form of decisions that can be made as a consequence of the review. Furthermore, section 25C (3) of the PR Act specifies that in response to a review, the ICCC may decide to:

- continue to operate the existing price control arrangements in their present form;
- vary the existing price control arrangements; or
- terminate the present price control arrangements, through a recommendation to the Minister to revoke the declaration of goods or services for the purpose of price control by the ICCC under section 10 of the PR Act.

In undertaking this review, the ICCC is required to have regard to the following regulatory principles under section 21(2A) of the PR Act:

a) the need to protect consumers and users of the declared goods or services from misuse of market power in terms of prices, pricing policies (including policies relating to the level or structure of prices) and the standard of the declared goods or services;
b) the cost of making, producing or supplying the declared goods or services;
c) the desirability of encouraging greater efficiency in relation to making, producing or supplying the declared goods or services;
d) the need to ensure an appropriate rate of return on any investment in relation to the declared goods or services;
e) the borrowing, capital and cash flow requirements of persons making, producing or supplying the declared goods or services;
f) considerations of demand management and least-cost planning;
g) existing standards of quality, reliability and safety of the declared goods or services, and the desirability of encouraging improvements in those standards;

h) the effect of any proposed order on general price inflation over the medium term;
i) the economic and social impact of any proposed order; and
j) any other matters the ICCC considers relevant.

In addition, the ICCC must also take into consideration its primary objectives pursuant to section 5 of the ICCC Act which are to:

- enhance the welfare of the people of PNG through the promotion of competition, fair trading and protection of consumers' interests;
- promote economic efficiency in industry structure, investment and conduct; and
- protect the long-term interests of the people of PNG with regard to price, quality and reliability of significant goods and services.

2.3 Conduct of the review

The ICCC has conducted this review in a transparent manner, undertaking the following key stages:

Release of a public notice informing all stakeholders of the commencement of the review and outlining issues for consideration in the review and also inviting all stakeholders to provide submissions.	16th February 2024
Meeting with key stakeholders.	April 2024
Requesting submissions and specific data from specific industry participants and interested stakeholders.	February to July 2024
Conducting site visits to retail sites.	April to May 2024
Publishing a draft report indicating the substantive direction of the ICCC's proposed determination and requesting submissions from stakeholders.	20 September 2024
Holding a public workshop for interested stakeholders in which the ICCC explained its modelling methodology in detail.	26 September 2024
Circulating its financial models in the form of excel spreadsheets to interested stakeholders.	October 2024
Requesting further submissions and information in response to comments made by stakeholders.	September to November 2024
Publish final report	No later than 31st December, 2024

The determinations made in the final report will come into effect from 1st January 2025.

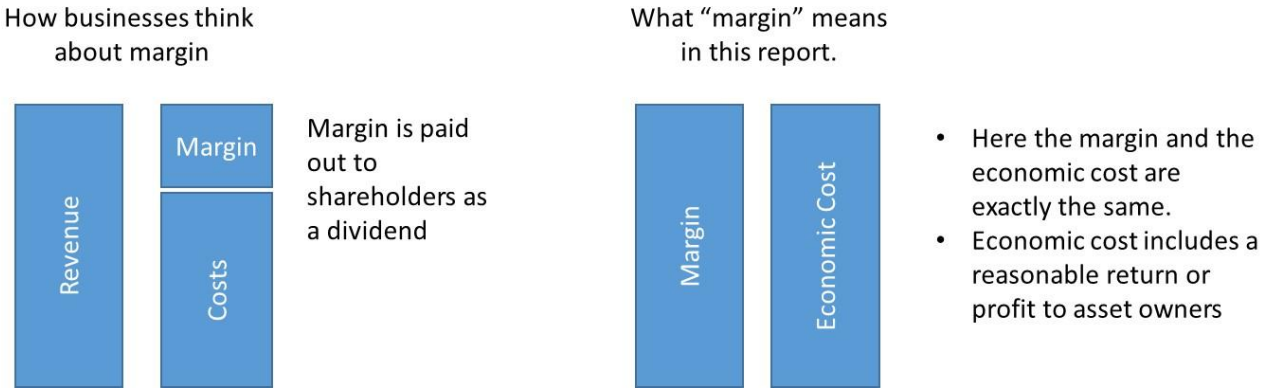
2.4 Structure of the regulated fuel prices

Prices are determined by the ICCC by estimating all the costs incurred by the various industry participants who contribute to the delivery of fuel to the retail market. This is illustrated in Figure 3.

Figure 3: The components of the retail price

2.5 Retail margins and terminology

The ICCC uses the word "margin" in an economic sense and so it means costs. Therefore, "retail margin" means retail costs and "wholesale margin" means wholesale costs. Part of the economic costs is providing a reasonable profit to investors. This is calculated using a weighted average cost of capital which is used to calculate a fair return on investment for asset owners.



The ICCC calculates the retail margin **only** in order to determine the retail price. The purpose of the retail margin **is not** to determine the amount that a retailer must pay to a wholesaler. The retail margin **does not** indicate the amount of money that a retailer operator will retain. Rather the retail margin will be used by the appropriate party to pay for retail costs. This includes bills associated with operating a retail site and payments to its suppliers of retail assets. Where the wholesaler has paid for the retail assets on the retail site, the retail operator will pay the wholesaler for the use of these assets as negotiated and agreed between parties.

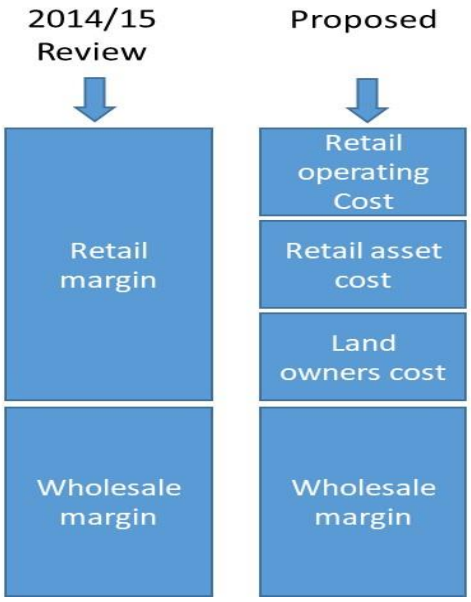
It is also important to note that the wholesale margin **does not** cover the cost of any retail assets even though they may be owned by the wholesaler. The cost of the wholesaler's retail assets is included in the retail margin, **not** the wholesale margin.

The ICCC has assumed that the retail margin will be split between wholesalers and retail operators according to who bears the costs of the assets at a retail site. However, some stakeholders have incorrectly assumed that 100% of the retail margin will be paid to retail operators.

The ICCC calculated the retail margin by adding together three component costs:

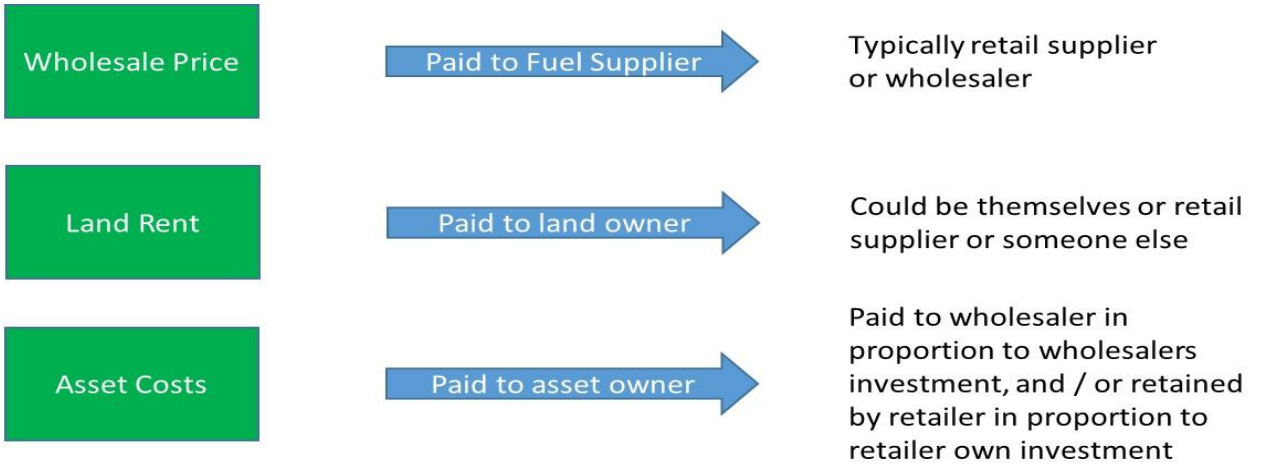
- retail operating cost allowance;
- retail asset cost allowance; and
- retail landowners cost allowance.

Figure 4: Illustration of the margin split



To further illustrate how these three margins might work, Figure 5 indicates what payments a retail operator might make.

Figure 5: Payments made by retailers



Despite this description, several stakeholders still did not appear to understand the purpose of the retail margin as calculated by the ICCC. Therefore, the following examples have been created to illustrate it.

Each of the following examples apply to a fictitious retail site in Port Moresby. The total cost of developing the site was K12 million. Only K7 million of this was related to the forecourt, tanks and bowsers. The balance of the development cost was to build a Kai bar and other facilities on the site. The site has a monthly fuel sales volume of 300,000 litres. The regulated price of fuel is K4.00 per litre and the retail margin is 30 toea per litre.

Example 1: The retail operator owns the land on which the retail site is located. It also owns all the retail assets on the site. It pays its wholesale supplier a rate per litre which includes the wholesale margin, IPP and transport costs.

Example 2: The retail operator rents land from a local landowner and pays the land owner directly. A wholesaler has paid for and continues to own some of the assets on the retail site. This includes, the bowsers, the tanks and the branding which together cost K2 million. The retail operator has a supply agreement with its wholesale supplier, in which it pays K300,000 per year or K25,000 per month to the wholesalers to cover the cost of the wholesaler's retail assets on this site. The retail operator also pays the wholesaler a rate per litre which includes the wholesale margin, IPP and transport costs.

Example 3: All the assets on the retail site are owned by the wholesaler and are built on the land the wholesaler rents from a landowner. The wholesaler has contracted a retail operator to operate the site. The retail operator has a supply agreement with its wholesale supplier. The wholesaler supplies and owns all the fuel on the site and receives all the revenue from the fuel. The wholesaler pays the retail operator a monthly fee of K20,000 to cover its operating costs which include salaries and other costs. The retail operator also keeps an agreed percentage of sales revenue from the kai bar.

Table 6 shows what the expected payments will be for both the retailer and the wholesaler.

In each of our examples the retail margin available to cover all the monthly costs for the retail operator will be K90,000. In each example this covers the cost of land, retail assets and retail operating costs regardless of who incurs them. In each example the agreement and payments made between the retailer and the wholesaler will be different due to the different ownership and commercial arrangements agreed by each party.

Table 6: Payments by retailer to wholesaler for use of retail assets

	Example 1 (K)	Example 2 (K)	Example 3 (K)
Monthly payments to retail asset owner			
Development cost of retail fuel assets	7,000,000	7,000,000	7,000,000
Cost of the wholesaler's share of retail assets	-	2,000,000	7,000,000
Monthly payment to wholesaler for use of assets	-	25,000	
Fuel Sales (300,000 litres at K4 per litre)	1,200,000	1,200,000	1,200,000
Monthly value of retail margin	90,000	90,000	90,000
Retail operator's monthly payments			
Price paid to wholesaler for fuel	3.70 per litre	3.70 per litre	nil
Monthly payment to wholesaler for fuel	1,110,000	1,110,000	nil
Payment to landowner		30,000	nil
Monthly payment to wholesaler for use of assets		25,000	nil
Retail operators retained margin (covers own operating costs)	90,000	59,300	nil
Payments received from wholesaler			20,000
Wholesaler's receipts and payments			
Receipts for fuel	1,110,000	1,110,000	1,200,000
Payments to landowner			30,000
Receipts for use of assets		25,000	
Payments to operator			20,000

If the retail operator owns the retail assets and the land, as in example 1, the retail operator will only pay for the fuel.

In example 2, the retailer pays for the fuel as well as paying rent to the landowner and payments to the wholesaler for the use of their assets.

In example 3, the operator pays nothing for fuel and all fuel revenues collected by the operator are paid directly to the wholesaler. The retail operator receives a payment of K20,000 per month to cover their operating costs, as well has a percentage of revenue from the Kai Bar. The wholesaler pays the rent directly to the landowner.

2.6 Agreements between retailers and wholesalers

The ICCC does not specify or restrict the types of agreements or commercial arrangements that are made between a retailer and a wholesaler. However, the amounts shown in Table 6 can be calculated using the same methodology described in this report.

2.7 Zoom and Premix

Two stroke engine fuel is frequently referred to as zoom or premix. It is a fifty-to-one mixture of petrol and oil. It is widely used in Papua New Guinea as fuel for boat engines, brush cutters, chainsaws and lawnmowers. The product is often sold in drums, although many outlets also sell zoom using pumps and bowsers.

In the 2019 review the ICCC investigated whether there was a justification for regulating the price of zoom due to complaints about prices. Its finding was that:

- A consumer could choose to purchase petrol and add the appropriate oil to produce their own zoom. Thus, the consumers have a viable alternative to purchasing zoom which is already mixed.
- The ICCC would also expect that the barriers to entering the zoom market would be relatively low. Thus, if participants in the market were selling zoom at prices that were excessive, new entrants could easily enter and sell at a lower price.
- Oil prices at that time indicated that a 50 toea per litre premium for zoom over the price of petrol was appropriate. Actual retail prices for zoom were found not to exceed this.

Based upon these findings, in 2019, the ICCC decided not to regulate zoom prices. Consequently, in this review the ICCC is also not proposing to regulate zoom prices.

2.8 Definitions

Table 7 provides a set of definitions for various terms used in this report.

Table 7: Definitions of common terminologies

Commercial Customer	A commercial customer is someone who buys products in bulk for their own use. That is, anyone who buys products in sufficient quantities that they are delivered by tank on a truck rather than in drums or through a bowser at a retail site. Generally, this will mean a commercial customer is any customer who is not a retail customer. For the purposes of this report, commercial customers do not include retailers.
Drum Filling Margin	This is the cost of the activity of filling drums. It excludes the cost of the drum being filled and the assets required to fill them.

Import Parity Price (IPP)	This is a cost defined in the project agreement, originally signed by InterOil and the Government. It is intended to be the same as the cost of importing fuel from an overseas refinery into PNG.
Project Agreement	An agreement between InterOil (now Puma) and the Government.
Retail Assets	These are assets that are located on a retail site. They may be owned by either a retail operator or a wholesaler or any other party.
Retail Asset Cost	This includes the cost of owning retail assets such as bowsers, underground tanks, canopies, forecourts, buildings, branding or any other physical infrastructure required at a retail site. It includes the cost of purchase, transport to the site and installation at the site of these assets. It includes the cost of debt and the cost of equity, which is calculated as a weighted average cost of capital return on the replacement value of assets. It excludes any operating costs associated with operating a site and it excludes any rent paid on land.
Retail Customer	A retail customer is anyone who either buys a product: • from a retail service station or • that is sold in a 200-litre drum.
Retail Land Cost	This includes the cost of owning or renting land used for retail sites. It includes the cost of debt and the cost of equity.
Retail Operating Cost	This includes the costs of operating a retail site or premises used to sell petroleum fuel products to retail customers. This includes the cost of: • forecourt staff • their supervision, and • any other costs associated with operating a site for selling petrol, diesel and kerosene to retail customers. It excludes the cost of retail assets, such as bowsers, underground tanks, canopies, forecourts, buildings, branding or any other physical infrastructure required at a retail site. It also excludes the cost of rent or owning land.
Retail Price	The price paid by a retail customer.
Retailer	Someone who sells fuel to retail customers.

Wholesale Margin	This includes the cost of managing the supply of petroleum products to customers and end users. It includes the cost of: • storage and other assets associated with storage depots • assets associated with drum filling • managing customer relationships • ordering and managing inventory • managing and arranging transport • maintaining relationships with refineries or any other supplier of petrol, diesel and kerosene, and • brand management and advertising. It excludes the cost of: • ownership of retail assets • direct transport costs such as road transport, coastal shipping and international shipping costs, and • refinery costs and the direct purchase costs of the petroleum products.
Wholesale price	The price paid by a retailer to a wholesaler for fuel. This is made up of the IPP, transport costs and the wholesale margin.

3 HEALTH, SAFETY AND ENVIRONMENT (HSE)

3.1 Diesel fuel standards

To set the IPP Price for diesel, the ICCC currently uses prices from the Mean of Platts Singapore ("**MOPS**") 500ppm benchmark.

One wholesaler in their submission said:

> *"It has become apparent over the previous years that as the international market has transitioned to 10ppm and many suppliers are not willing to price 500ppm ADO off the MOPS 500ppm benchmark and chose to offer basis the MOPS 10ppm benchmark.*
> *We would recommend that the ICCC reviews the use of the 500ppm benchmark and instead transitions the IPP calculation towards the 10ppm benchmark with a fixed or floating differential to reflect the 500ppm quality difference to 10ppm."*

For clarity, the two grades of fuel have the following attributes.

500ppm Diesel	• Higher sulphur content (500 parts per million) • Higher emissions of sulphur dioxide • Suitable for older engine technologies • Potentially lower cost but higher maintenance
10ppm Diesel	• Ultra-low sulphur content (10 parts per million) • Significantly lower emissions of sulphur dioxide • Required for modern diesel engines with advanced emissions controls • Higher cost but better for the environment and engine longevity

The ICCC met with CEPA to discuss this issue. They were generally supportive of making the change to 10ppm diesel.

The ICCC is also supportive of the idea and sees the eventual change as an inevitable for PNG to keep pace with the rest of the world.

However, 10ppm grade diesel does cost more than 500ppm. Over the last 12 months the additional cost of 10ppm averaged 4.7 toea per litre more than 500ppm[2]. So, the change would result in consumers paying more for the benefit of a cleaner environment.

The ICCC understands the decision to mandate a change belongs to the Climate Change and Development Authority (CCDA).

[2] *Over the last 12 months, the price difference between 500pmm and 10ppm diesel varied from 0.4 toea per litre to 12.4 toea per litre.*

From the ICCC's perspective, there are two main options to progress this issue.

> Option 1. Require all fuel suppliers in PNG to replace 500ppm with the 10ppm grade of diesel. This is beyond the scope and powers of the ICCC and would require a decision by the CCDA.
>
> Option 2. Support both grades by introducing separate regulated prices for each grade. This is within the scope and powers of the ICCC.

The ICCC is open to and supportive of either of these approaches. While the ICCC must follow the Project Agreement, the Project Agreement is silent about fuel grades. So, the Project Agreement should not constrain this decision.

To pursue option 1, the ICCC believes that other parties including the CCDA would need to lead the way. For this approach to work, all wholesalers would need to start importing 10ppm diesel and any diesel manufactured by Puma would need to meet the 10ppm standard. The IPP calculation in the project agreement, would need to be changed and this would require both the Government and Puma to agree to change it. These things should be relatively straight forward to carry out but require agreement from all parties.

For option 2, wholesalers could choose between fuel standard standards. Different wholesalers could supply different grades and sell their product at the appropriate regulated price. If they wished they could choose to sell both grades, but this would require separate storage and transport and, potentially, separate bowsers on retail sites. Selling both products would be more complex and would probably increase costs for wholesalers. Also, there would be increased compliance costs for the ICCC which would need to check that consumers paying for higher grade product actually received it.

3.2 Unleaded petrol

In their submission a wholesaler raised the following issue.

> *"It is our view that the 91 RON spec used in PNG requires specific blending and therefore pricing can differ from supplier to supplier. The current differential to MOPS 92 RON is not sufficient to cover these blending costs charged by suppliers*."

Unleaded petrol is produced by blending components to produce a specific octane rating such as 91 RON. This is typically done at the refinery. However, sometimes additional blending takes place at distribution terminals. The ICCC is not aware that wholesalers in PNG do this.

However, the ICCC notes the following.

- If PNG wholesalers do carry out additional mixing of components at their wholesale depots, the cost of this activity and cost of infrastructure to do this will already be covered by the wholesale margin.
- Puma already receives a mark-up in the IPP calculation over and above MOPS prices. The ICCC understands this is to reflect the higher cost per litre Puma face because their refinery is smaller and less efficient that Singapore refineries.

The ICCC therefore does not perceive there to be any reason to make changes to the IPP calculation.

3.3 HSE standards

The ICCC has received a submission from a wholesaler which alleges that other participants in the market do not conform to HSE standards.

The following excepts are taken from their submission.

> *"There is an obvious growth and proliferation of "retail outlets" that are developing facilities that are substandard and create real environmental and safety risks for consumers. These outlets collect the full margin under the regulated pricing structure and yet provide a substandard and at times dangerous service model. We believe the ICCC, in its capacity of protecting consumers, needs to apply some form of regulation or standards for retailers to achieve affording them retailer status. If they choose not to meet these standards then they should not be able operate. This will help improve industry standards and consumers safety."*

> *"As previously discussed in this document, there needs to be some regulatory oversight of retail operations to protect consumers in addition to price monitoring. This should include minimum safety, product quality stewardship requirements as a minimum in order to participate in the retail market. The proliferation of low standard and potentially dangerous sites across the country that receive the full margin but refuse to re-invest to create a safer facility is alarming, and requires proper monitoring by ICCC. We believe the ICCC can play a monitoring role in this supported by other regulatory bodies."*

In meetings held with other wholesalers, similar views were expressed.

The ICCC met with CEPA (Conservation and Environmental Protection Agency) to discuss safety and environmental protection standards at petrol stations and fuel storage depots. CEPA confirmed that standards were in place and that those who do not meet these standards can be closed down. However, CEPA generally do not have the resources to enforce these standards. For this reason, they focus their resources on facilities with the greatest risk. This is generally in situations where there are more than 5 million litres of fuel stored. Most service stations will fall below this threshold.

The ICCC also attempted to meet with the Department of Labour and Industrial Relations (DLIR) to discuss safety for workers at petrol stations. The Department initially agreed to a meeting then postponed it. They said this was due to the sensitivity of the topic.

One wholesale submission suggested that there could be a price-based incentive to encourage compliance with safety regulations.

> *"Additionally, a review of how margins are allocated between certain market offerings should be considered to incentivise an increase in customer service offerings to consumers, especially when there is a clear disparity between how some suppliers invest millions into world class facilities, whilst others neglect safety and the customer experience, yet receive the same margins."*

The ICCC does not think this would work in practice. To understand the likely effects of such a price differential, two possible pricing solutions can be explored.

Option 1. Regulate a lower price for service stations that do not meet safety standards.

- If this occurred, many consumers would be attracted to the lower prices at service stations with poor safety standards. Consequently, service stations with poor safety standards might

increase their sales volumes. This might remove the incentive the service station has to improve its safety standards. [3] Other service stations who meet the safety standards may be compelled to also reduce their prices to avoid losing market share.

- To implement this would require an independent agent (the ICCC or CEPA or some other agency) to carry out inspections. The ICCC is not aware that any PNG based agency has the resources to police the over 234 sites currently operating in PNG.

Option 2. Allow the wholesaler to charge unsafe retailers higher prices for fuel.

- The ICCC does not currently specify the price that wholesalers charge retailers. So, this would be a major change in the current regulatory arrangements.
- If a wholesaler chose to do this, it is likely that a retailer would go to an alternative wholesaler, if one was available in their region.
- In effect this would be a wholesaler taking on the role of requiring retailers to meet safety standards. The ICCC has met with all the wholesalers and all of them claim to have high safety standards and require all of their suppliers to meet these standards. Three of the wholesalers claimed that their standards were generally higher than others.

The ICCC does not see a practical pricing solution that will create incentives for safety compliance. Instead, the ICCC thinks that HSE standards should ideally be enforced by a government agency to protect the interests of consumers, workers and the environment. If all retailers are required to meet these standards, no individual service station will have a cost advantage.

In the absence of a government agency with the resources available to enforce standards, the industry itself can enforce standards by refusing to supply retailers that do not comply.

The ICCC raised this issue with the industry and invited feedback. Feedback was received agreeing with the ICCC's view. The ICCC has therefore determined not to pursue this any further. The industry is encouraged to self-regulate and, if specific instances of unsafe practices are discovered, to raise these with CEPA.

[3] *Any service station can charge a lower price than the regulated prices.*

4. FUEL PRICES IN PNG

4.1 How are fuel prices set?

Fuel prices in PNG are set by the ICCC every month. The ICCC does this by following a formula. The main purpose of this price review is to review this formula.

The formula used by the ICCC is simply the sum of the costs required to deliver fuel to a consumer at the pump or in a drum. Table 8 and Figure 6 illustrate this by showing the component costs of prices in Port Moresby and Kundiawa[4].

Table 8: Retail Price Formula – the Sum of the component costs

	Port Moresby Diesel (toea/litre)	Port Moresby Petrol (toea/litre)	Kundiawa Diesel (toea/litre)
Import Parity Price (IPP)	277	253	277
Excise Duty	23	61	23
Coastal Shipping	25	25	25
Road Transport	4	4	46
Wholesale storage and operating costs (Wholesale Margin)	30	30	30
Retail facilities, equipment and operating costs (Retail Margin)	30	37	43
GST	40	41	44
Retail Price	435	451	488

Cost components shown are for July 2024 and have been rounded to the nearest toea.

[4]*Kundiawa was chosen for comparison purposes because, compared to Port Moresby, average monthly volumes are low and transport distances are high.*

Figure 6[5]

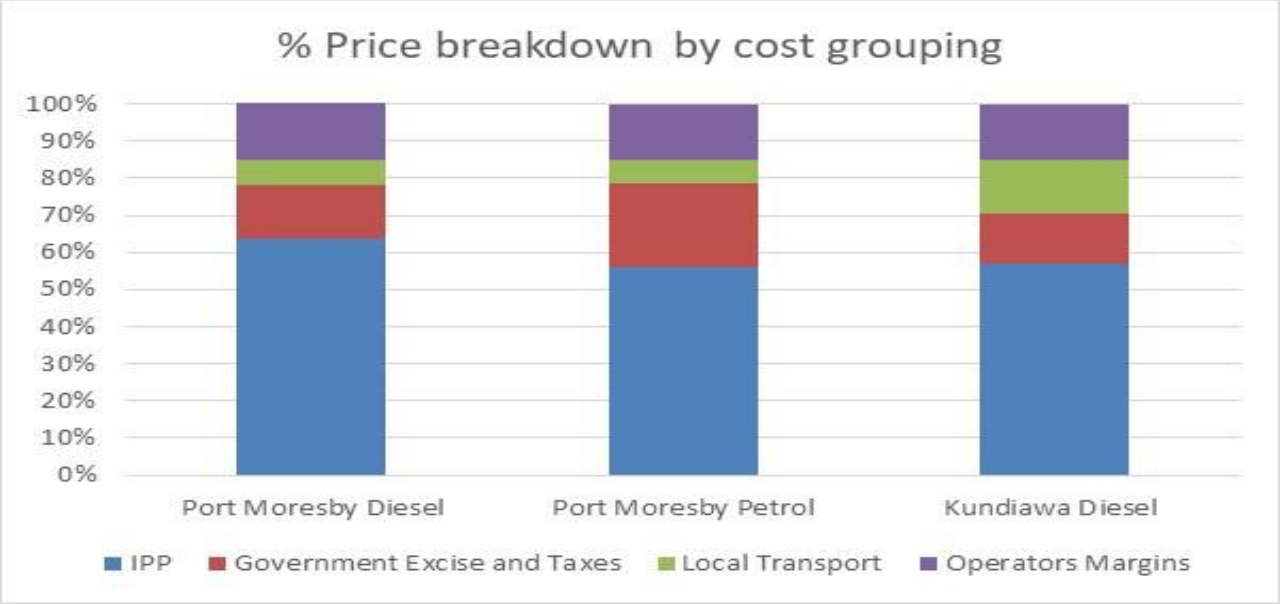


Figure 6 illustrates that between 57% and 64% of costs are driven by the IPP, while operator's margins make up about 15% of the price. For petrol, government taxes make up 23% of the price and for diesel they are 14%. Local transport costs ranged from 6% to 15% of the retail price.

Each of these cost components is discussed further in the appropriate sections of this report.

4.2 Import parity pricing (IPP)

The IPP is determined by a formula specified in the Project Agreement between the Government and Puma. It is calculated using a formula which is laid out in detail in the agreement. The ICCC is required to use this formula to calculate regulated prices[6].

The components used to calculate the IPP are shown in Table 9.

Table 9: Components of IPP calculation

MOPS (Mean of Platts Singapore)	The price at which product can be purchased in Singapore. MOPS is a price benchmark used primarily in Asia to price refined oil products such as gasoline, diesel, and jet fuel. The MOPS benchmark represents the average of the daily price assessments for these products in the Singapore trading hub. It is published by S&P Global Platts.

[5] *Operators margins include the Wholesale Margin and the Retail Margin.*

[6] *The "Independent Consumer and Competition ICCC (Oil Refining Facility State Agreement Exception) Regulation 2003 limits the powers of the ICCC by removing its authority to regulate the prices described in the Project Agreement.*

	The ICCC calculates a monthly average MOPS price based upon opening and closing daily prices. For diesel the ICCC uses the price for GASOIL 0.05% sulphur • For petrol the ICCC uses 92 UNL Mogas • For kerosene the ICCC uses the jet/kerosene posted price.
Local Producers Margin	This is a margin added to the MOPS price. The ICCC understands that it was added to support the additional cost of operating a small-scale plant in PNG. Small refineries have higher costs per litre. The fixed margins added are, • For petrol – USD 5.26 per barrel • For diesel – USD 4.01 per barrel • For kerosene – USD 3.04 per barrel
Freight charges	This is the cost of freighting petroleum products from Singapore to PNG. This is calculated based upon the average freight rate as it stood in 1996. Each month it is adjusted to reflect current costs using the AFRAc and WORLDSCALEc indexes. This adjustment is done by dividing the current value of each of these indexes by their values in 1996. These ratios are then multiplied by the 1996 freight rate. $FreightToday = 1996Freight \times \frac{AFRAcToday}{AFRAc1996} \times \frac{WorldScalecToday}{WorldScalec1996}$ The project agreement defines the values used. 1996 Freight = 15.44 USD / MT 1996 AFRAc =255 USD / MT 1996 WORLDSCALEc = 5.08 USD / MT To illustrate this the July 2024 calculation is shown here. $FreightToday = 15.44 \times \frac{380}{255} \times \frac{12.9}{5.08}$ = 58.57 USD / MT The USD / MT price is converted into toea per litre using the appropriate density for each product and the average exchange rate for the month.
Maritime Insurance	Maritime insurance is calculated as 0.052% of the value of the product. The value of the product includes the MOPS price and the freight charges.
Losses	Losses occur due to evaporation of product plus losses incurred as product is loaded into and out of ships. Two types of losses are allowed for. • Ocean losses are set at 0.75% of the value of the product. • Inland losses are set at 0.5% of the value of the product.

	For ocean losses, the value of the product includes MOPS, freight and maritime Insurance. For inland losses, the value of the product includes MOPS, freight, maritime insurance, ocean losses and landing charges.
Landing Charges	Landing charges are allowed for at a rate of 0.218 toea per litre. This is adjusted by multiplying the ratio of the 1996 USD exchange rate and today's USD exchange rate. The exchange rate in 1994 was 1.0611 USD per Kina.
Additives	Fuel additives are allowed for at a rate of 0.011 toea per litre. This is adjusted by multiplying the ratio of the 1994 USD exchange rate and today's USD exchange rate.
Demurrage	Demurrage is allowed for at a rate of 0.075 toea per litre. This is adjusted by multiplying by the ratio of the 1994 USD exchange rate and today's USD exchange rate.
The IPP	Each of these component costs is converted into toea per litre and added up to calculate the IPP.

The components of the IPP formula are outlined on Table 10.

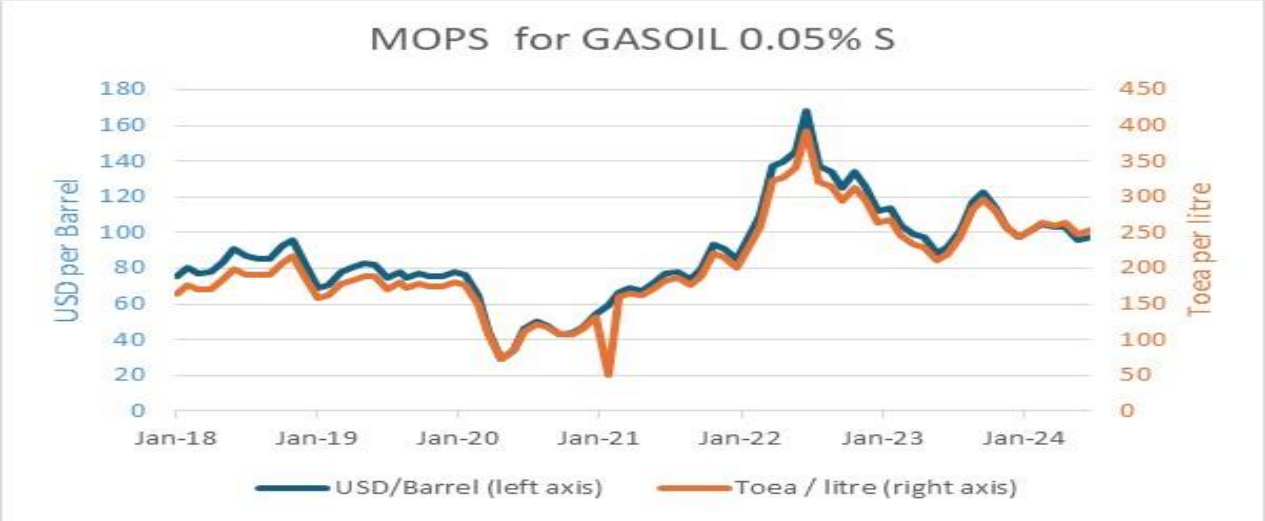
Table 10: IPP formula components in toea per litre (July 2024)

	Petrol	Diesel	Kerosene
MOPS Price	218.5	242.7	241.9
Fixed Margin	13.3	10.1	7.7
Freight Charge	16.8	19.1	17.9
Other Costs			
Marine Insurance	0.1	0.1	0.1
Ocean Loss	1.9	2	2
Landing Charges	0.9	0.9	0.9
Inland Loss	1.6	1.5	1.3
Additives	0.1	0.1	0.1
Demurrage	0.3	0.3	0.3
IPP (excluding Excise)	253.5	276.8	272.2
Excise Tax	61.0	23.0	-
IPP (plus excise)	314.5	299.8	272.2

In July 2024, 91% of the IPP costs came from the MOPS price component. Freight costs made up 7% and the other costs were 2% of the total.

Figure 7 shows how the MOPS price for diesel has changed since 2018. It is interesting to see that changes in currency exchange rates have made little difference to the IPP over this time period.

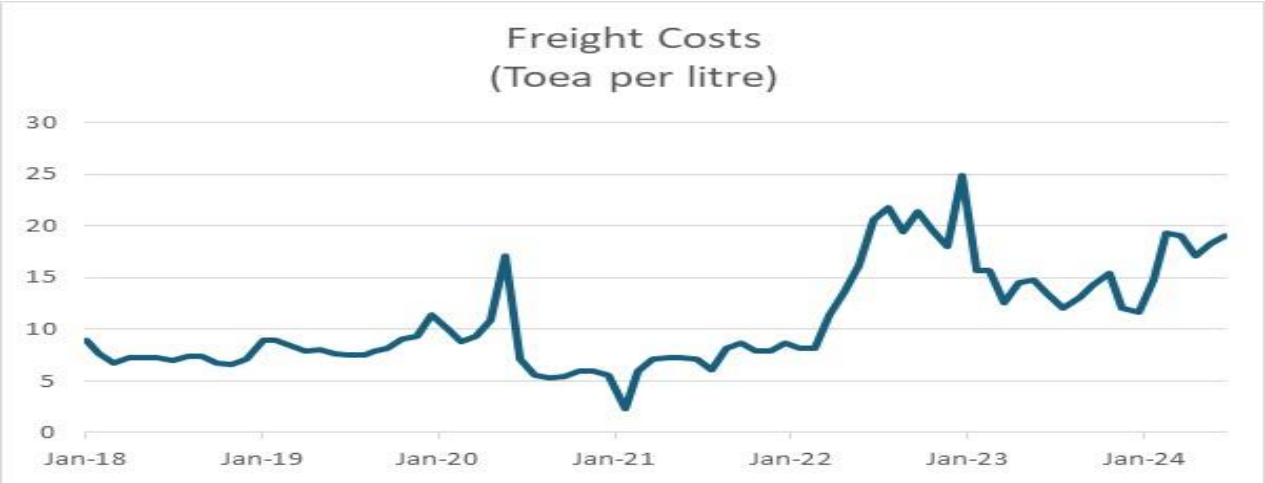
Figure 7



As Figure 7 shows, prices fell sharply during Covid lockdowns in 2020 and then rose quickly in 2021 as world economies ramped up again and then further increased in 2022 as Russia invaded Ukraine. In 2023 prices fell again as worldwide production increased to meet increased demand.

Figure 8 shows how freight rates have changed over the review period. In 2020 the peak is attributed to increases in worldwide freight demand and shipping disruptions during Covid lockdowns. This eased in 2021 and 2022 but has now increased again due to such factors as increased demand, and security risks in the Middle East.

Figure 8



<u>Does the current IPP calculation achieve its objective?</u>

The answer to this question appears to be yes.

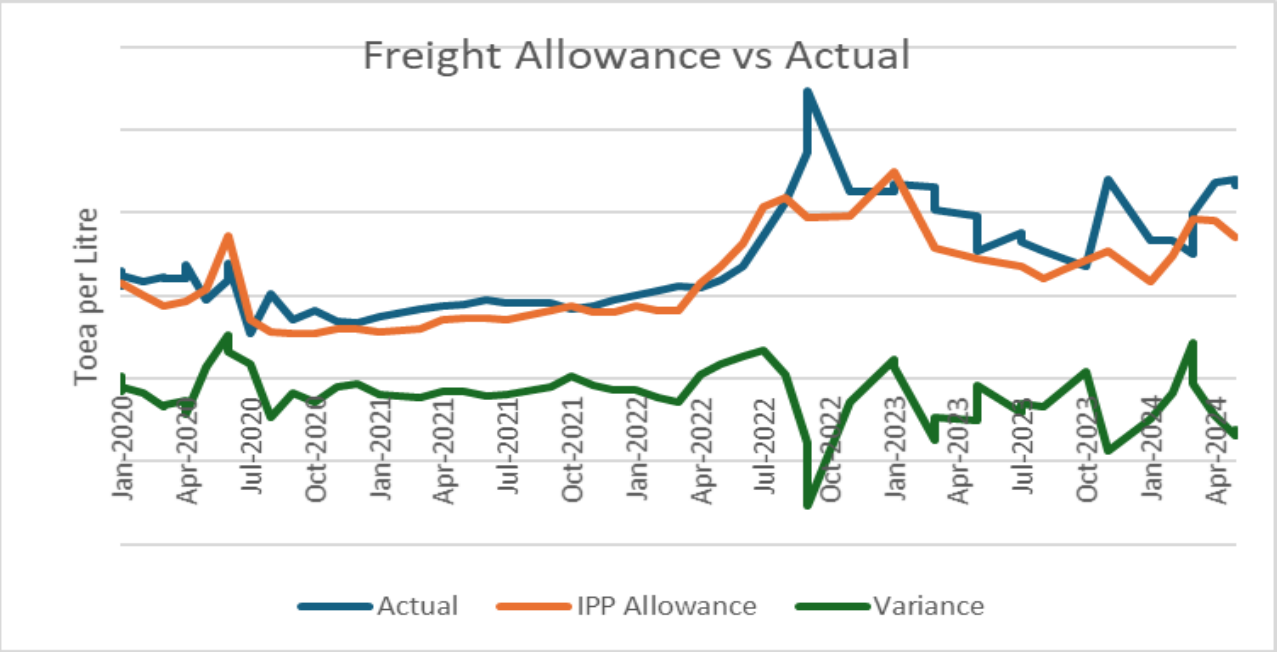
The concept behind the IPP is that a wholesaler pays Puma Energy a price which reflects what they would pay if they were purchasing product on the international market and importing it into PNG.

It is assumed that the most likely place to purchase product into PNG would be Singapore, so, the IPP is calculated to reflect the international price of refined fuel products delivered into PNG from Singapore.

It is difficult to argue that MOPS do not reflect what an importer would need to pay to buy fuel in Singapore. Perhaps if volumes were small, then a PNG importer might pay higher prices. However, this could be rectified by investing in larger storage facilities in PNG and importing larger quantities with less frequent voyages.

The most likely source of variance between actual costs and the IPP is the allowance for freight. Figure 9 shows a comparison of the international freight allowance in the IPP and the actual cost of importing fuel into PNG. This comparison shows that most of the time the IPP allowance was slightly lower than the actual cost. However, this variance was still less than the fixed margin which is included in the IPP calculation.

Figure 9[7]



Overall, the ICCC estimates that, in 2023, using the IPP to set prices cost PNG about K28 million more than it would have if market rates had been used. This represents about 2% of the total value of the annual revenue of the retail market[8].

[7] *The numbers have been removed from the vertical axis to protect commercially sensitive information. The vertical bars on the horizontal axis show the size of the variance each month.*

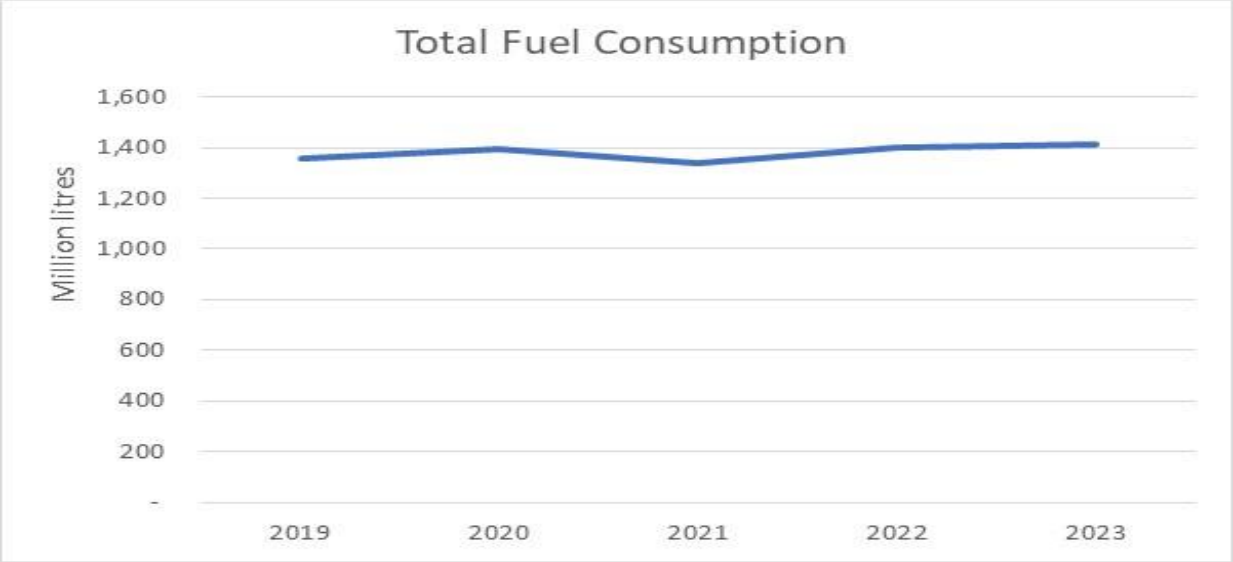
[8] *Total size of the retail market is estimated to be about K1.34 billion including service station and drum sales.*

5 DEMAND FOR FUEL

5.1 Market size

Figure 10 shows the ICCC's estimate of total fuel consumption in PNG over the review period (including private imports). 2023 volumes are about 4% higher than 2019 volumes. There was a small decrease in 2021, but this recovered in 2022.

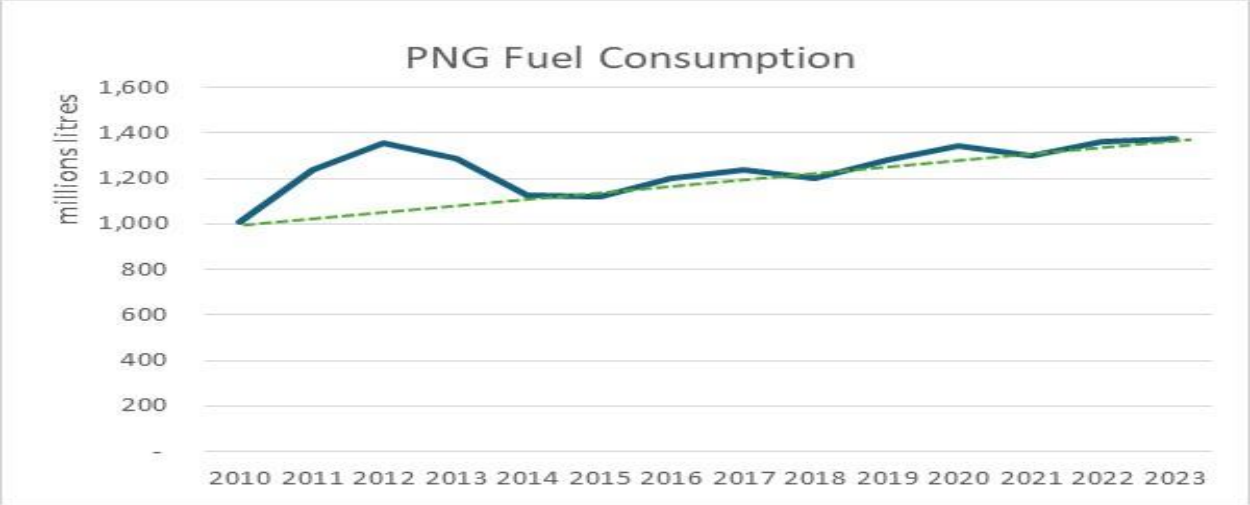
Figure 10[9]



A longer-term trend is shown in Figure 11 (this excludes private imports). The most notable feature of this chart is the increased consumption that occurred during the development of the LNG project from 2010 through 2013. In 2014 fuel consumption fell significantly as the project development was completed and economic activity returned to "normal". The dotted line drawn on the chart shows that current consumption levels are consistent with what steady growth might have been if the project had not occurred. Based on this, the long run average annual growth rate has been 2.4%.

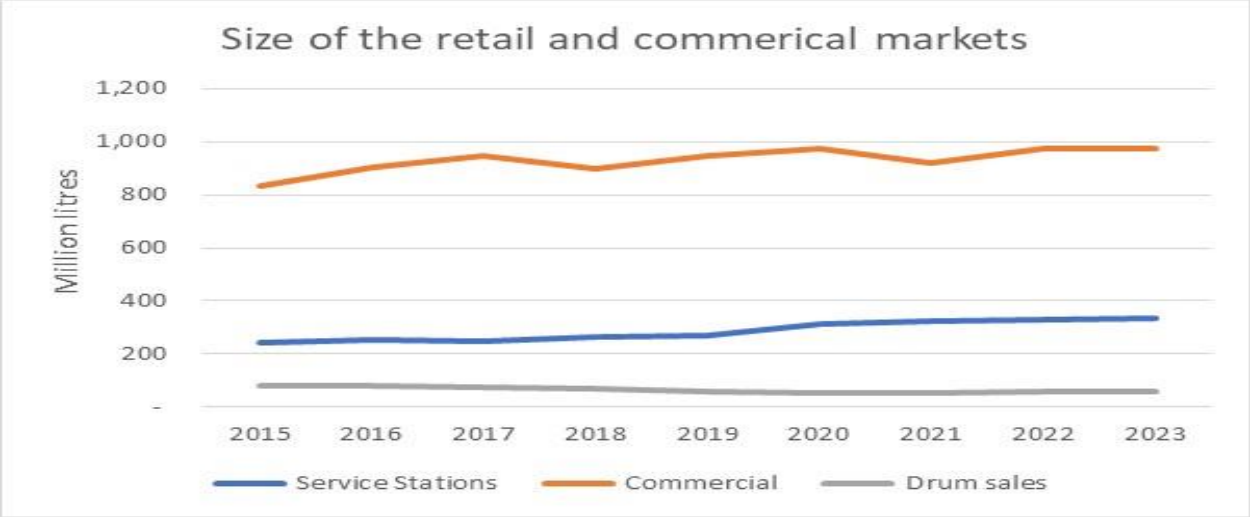
[9] *The estimate is a combination of wholesalers' reported sales volumes plus non-wholesalers' imports sourced from customs data. It includes retail, commercial and drum sales volumes as well as including diesel petrol and Kerosene. It excludes Jet A1.*

Figure 11



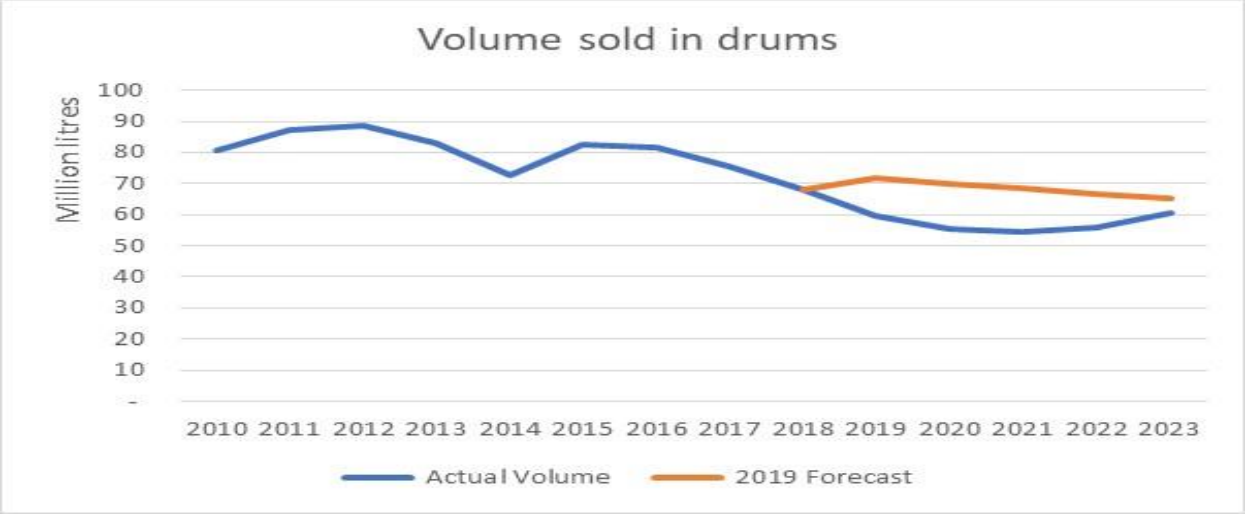
The commercial market is substantially larger than the retail service station market (see Figure 12). In 2023 the commercial market represented about 71% of the market, while the volume of product sold in drums was about 4% of the total.

Figure 12



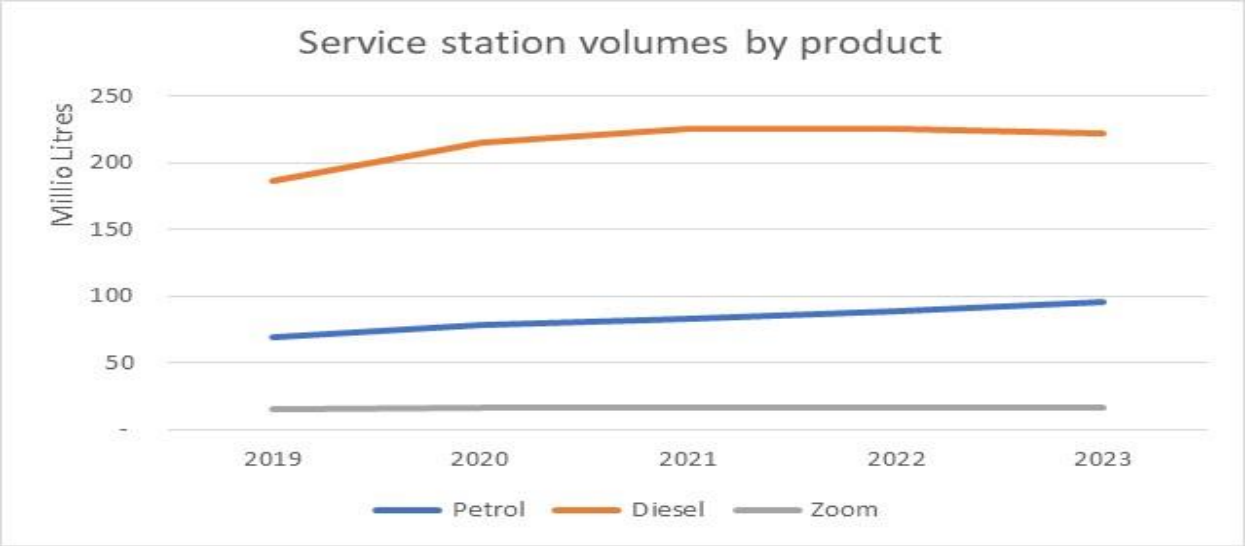
The volume of product sold in drums appears to be following a long-term decline. However, in the last two years the volume has picked up. Figure 13 shows the ICCC's 2019 forecast compared to actual sales volumes. It remains to be seen as to whether the long-term decline trend continues.

Figure 13



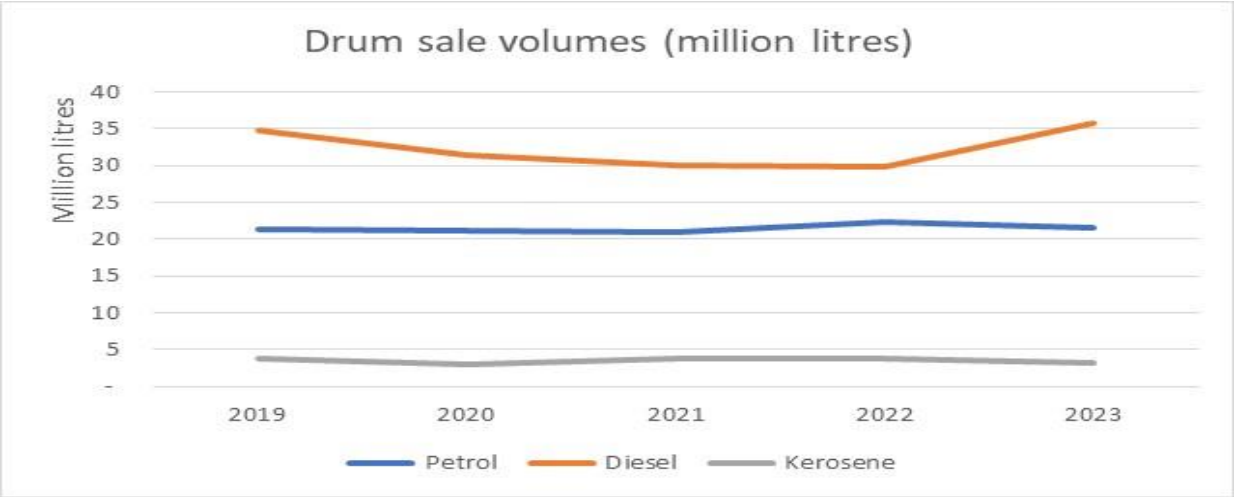
Diesel continues to be the largest volume product sold at service stations (see Figure 14), although petrol volumes have increased over the past five years. Presumably this is a reflection on the type of vehicles that are being imported into PNG.

Figure 14



Drum sales are also dominated by diesel. (see Figure 15).

Figure 15



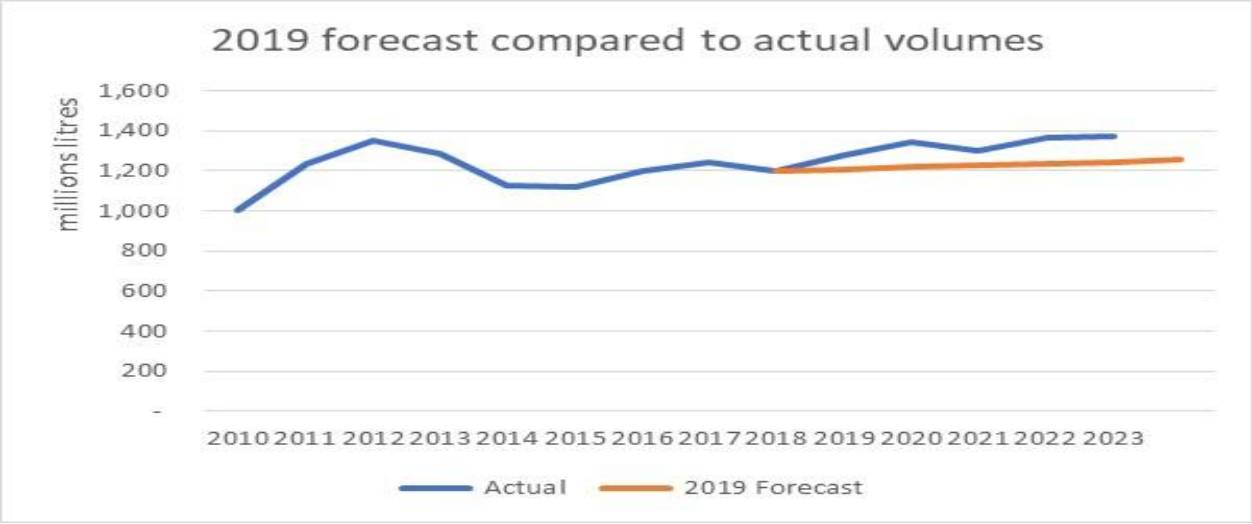
5.2 Demand forecast

To set future prices, the ICCC must determine a forecast volume which will be used to estimate average costs for wholesalers. If the forecast is too high, wholesalers may not cover their costs. Conversely, if the forecast is too low, consumers will be paying too much for fuel.

The 2019 forecast

In 2019 the ICCC based its forecast on the assumptions that retail growth at service stations would be 3% per annum, while commercial growth would be flat. Actual volumes have been higher than this as shown in Figure 16. This means that PNG consumers have paid slightly more than they might otherwise have done.

Figure 16



The ICCC's forecast

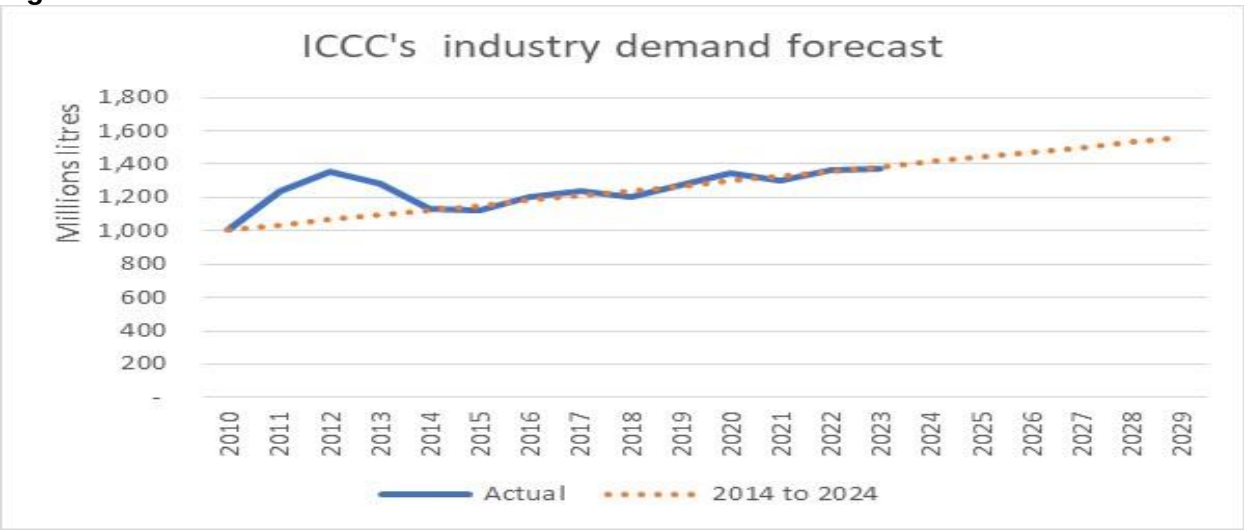
The ICCC has determined to use the forecast shown in Figure 17. To develop this, two approaches were explored.

- Using the relationship between GDP and Fuel consumption (regression analysis).
- Using the line of best fit to estimate a long-term trend (least squares analysis).

Analysis found that GDP by itself did not provide a good explanation of fuel consumption. In general, the number of data points available meant that regression analysis would produce high levels of uncertainty when confidence intervals were considered. The line of best fit approach was simpler and provided a forecast which was likely to be just as reliable as a more sophisticated approach might be.

More detail about both approaches is provided in the appendix. (See section 18.1)

Figure 17



This means that the ICCC is proposing to use the volume forecast shown in **Error! Reference s ource not found.**. For fuel sold in drums, it is assumed that the volumes will be a constant percentage of total sales.

Determination

The ICCC has determined to adopt the forecast volumes shown in **Error! Reference source not f ound.**.

Table 11: Determined Forecast Volumes (million litres)

	2024	2025	2026	2027	2028	2029
All Industry Volume	1,414	1,443	1,472	1,501	1,530	1,559
Drum-filling Volumes	62	64	65	66	67	69

6 FUEL SUPPLY

6.1 Fuel supply crisis

In 2023, a fuel supply crisis developed when Puma was unable to secure foreign exchange funds to purchase fuel on international markets. Consequently, Puma was forced to exercise the force majeure clauses in their supply contracts and ceased supplying many of their customers, including many petrol stations.

The ICCC understands that problems began for Puma in 2022 when the Bank of PNG conducted a special purpose audit. Such audits are usually related to concerns about compliance with financial regulations. Puma was apparently cleared by this audit. [10] But since that time there have been ongoing problems for Puma accessing foreign currency. By the end of 2023, Puma concluded that they would need to reduce the volume of imported product. In February 2024, they issued termination notices to many of their customers[11].

Foreign currency constraints are not restricted to Puma. All the wholesalers face this problem when importing fuel. Whether or not refined product is imported or local crude is used at the Napa Napa refinery, all such products are paid for in US dollars.

Previously the other wholesalers had a fall-back position. If foreign exchange was a constraint for them, they could purchase product from Puma in kina. However, if Puma is not able to supply them, all the wholesalers are now constrained by foreign exchange shortages.

In 2024 Mobil has filled some of the supply gap which Puma was unable to fill. However, the ICCC is not privy to how much access Mobil may have to foreign funds.

It is easy to conclude that PNG will continue to be vulnerable to supply shortages from time to time, when foreign currency is not available to import fuel products.

6.2 International fuel availability supply

PNG relies upon international sources for fuel. This is not a problem. Internationally, fuel is readily available to any party who wants to buy it, provided they can pay the market price. Most of PNG's fuel comes from Singapore.

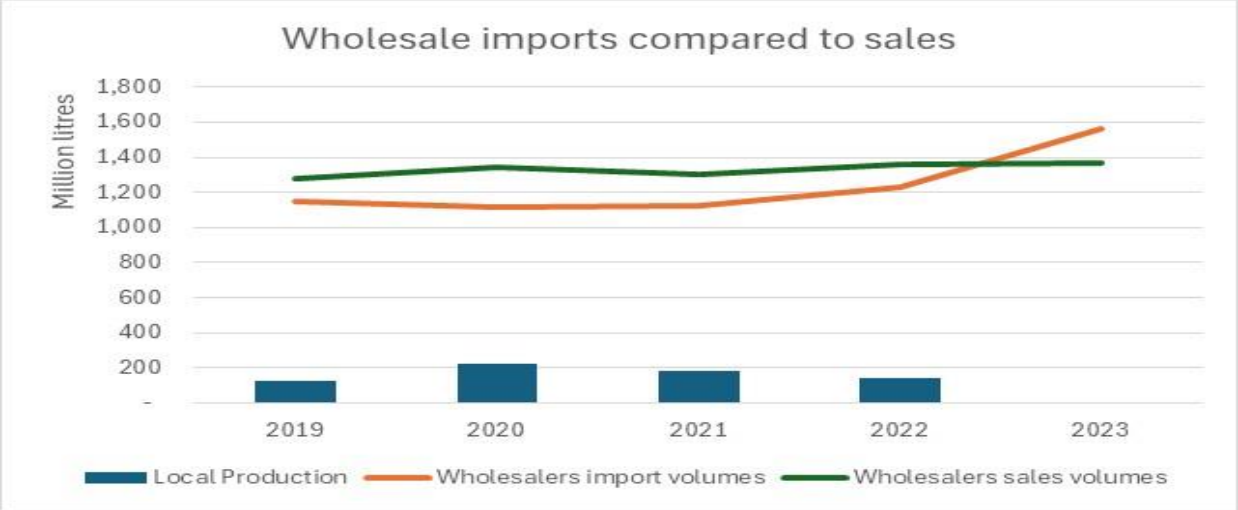
Over the review period, only a relatively small portion of the PNG's fuel has been manufactured by the refinery at Napa Napa. For the years of 2019 to 2022, 87% of PNG's diesel, petrol and kerosene was imported. Figure 18 shows the difference between what wholesalers sold and what they imported in each year. This difference represents what was manufactured by Puma.

In 2023, import volumes exceeded reported sales volumes. The ICCC does not know why this occurred. Possibly this was a timing effect with large imports coming in towards the end of the year as the crisis with Puma's supply reached a crisis point.

[10] *https://islandsbusiness.com/news-break/puma-scales-down-operations-a-fuel-crisis-is-imminent-in-png/*

[11] *https://islandsbusiness.com/news-break/puma-scales-down-operations-a-fuel-crisis-is-imminent-in-png/*

Figure 18[12]



In the ICCC's view, fuel supply issues for PNG are primarily related to foreign exchange availability and not due to the industry itself.

6.3 Storage capacity

A key question in any regulated market is whether there is adequate investment to support market demand. Shortages, or the threat of shortages, can act as a barrier to customers switching suppliers in commercial markets. If capacity is constrained, then shortages are likely be more common.

The wholesalers each have their own storage facilities distributed throughout PNG. The exception is Total Oil who supply fuel in Port Moresby by trucking fuel directly from other wholesalers to their customers. Figure 19 and Table 12 show the location of storage facilities.

[12] *The graph includes diesel, petrol and kerosene but excludes Jet A1.*

Figure 19: Wholesale storage facilities

Table 12: Wholesale Storage Capacity

	Puma Energy	Mobil	Islands Petroleum	Niugini Oil
Port Moresby				
Diesel	√	√	√	√
Petrol	√	√	√	√
Kerosene	√			√
Lae				
Diesel	√	√	√	√
Petrol	√	√	√	√
Kerosene	√			√
Goroka				
Diesel	√			
Petrol	√			
Kerosene				
Mt. Hagen				
Diesel	√		√	√
Petrol	√		√	√
Kerosene	√			√
Madang				
Diesel	√	√	√	√
Petrol	√	√	√	√

Kerosene	√			√
Wewak				
Diesel	√			
Petrol	√			
Kerosene	√			
Oro Bay (Popondetta)				
Diesel			√	
Petrol			√	
Kerosene			√	
Kavieng				
Diesel	√		√	
Petrol	√		√	
Kerosene				
Rabaul				
Diesel	√		√	
Petrol	√		√	
Kerosene	√		√	
Kimbe				
Diesel	√		√	
Petrol	√		√	
Kerosene				
Hargy (Bialla)				
			√	
Alotau				
Diesel	√		√	
Petrol	√		√	
Kerosene				
Total No. Depots	14	3	10	4

Note: capacities are not shown in order to respect commercial sensitivity of data.

Currently there are three centres where four wholesalers have their own storage capacity. In Goroka only one wholesaler has storage, but two others have storage in Mt Hagen which is close enough to be able to supply service stations in and around Goroka and Jiwaka province.

It is notable that only one wholesaler has storage in Wewak and consequently all service stations in Wewak have the same branding.

In Rabaul, Kimbe, Alotau and Kavieng there are two wholesalers with storage. For these centres this increases the security of supply, particularly if foreign exchange constraints limit one wholesaler's ability to maintain the security of supply.

Table 13 shows the combined total storage capacity for the country for each regulated product. Capacity appears to be adequate at a national level.

Table 13: Storage capacity available to meet demand

	Total Capacity (million litres)	2023 Demand Estimate (million litres)	Weeks of supply that can be stored
Diesel	142	1147	8.0
Petrol	34	132	3.9
Kerosene	11	91	8.3

The ICCC also did a simple analysis for storage requirements at each centre with a storage depot. All centres appeared to have adequate storage capacity to meet service station demand with current coastal shipping deliveries. However, the ICCC did not have sufficient information about commercial volumes to be able to fully assess capacity constraints at a provincial level.

Wholesalers have also invested in additional storage capacity during the review period. Table 14: Change in storage capacity shows how storage capacity has changed since 2019.

Table 14: Change in storage capacity

	Capacity in 2019 (million litres)	Capacity in 2024 (million litres)
Diesel	119	142
Petrol	22	34
Kerosene	15	11

The ICCC also notes that there is potential for infrastructure sharing when it comes to storage. In other countries, sharing storage infrastructure is common. Borrow and loan arrangements, can be used to reduce the number of shipments required to supply an area and can increase the efficiency and economics of supply.

The ICCC discussed this issue with individual wholesalers. Currently none of the wholesalers appear to share storage capacity. While some were willing to consider sharing, others were quite clearly unwilling.

If storage was constraining supply, the owner of storage capacity might have a competitive advantage over other suppliers. Currently the wholesaler with the most storage capacity has 60% more than the wholesaler with the second most. However, they still hold less than half of the national storage.

Based upon recent building costs, the replacement cost of all the storage tanks in PNG would be between 260 and 540 million kina. This equates to a cost of between 4 and 8 toea per litre[13]. Therefore, a 1% reduction in storage capacity requirements would be a reduction of about 0.04 to 0.08 toea per litre. This may not be very significant from a consumer's perspective; but may represent a material benefit to a wholesaler.

Enforcing any requirement to share storage capacity would require new legislation. While this would have some advantages, it does not appear to be necessary at this time.

[13] *A replacement cost of 260 to 540 million would equate to annualised capital costs K55 million to K112 million per year using an annualisation rate of 0.2087. This annualisation rate is based upon a cost of capital of 15.4%, an economic life of 30 years and a tax rate of 30%. Assuming that total annual sales are 1.371 billion litres, this would equate to a cost of 4 to 8 toea per litre per year.*

7 INDUSTRY COMPETITION

The ICCC has reviewed the level of competition in the industry and has determined not to make any changes to the current regulatory regime.

The ICCC is particularly aware of the impact fuel shortages have had on PNG from time to time over the last two years. With this in mind, the ICCC believes that it is in consumers' interests to ensure that the regulatory environment is stable and that industry wholesalers and retailers can continue to operate and invest with relative certainty.

However, as required by the Price Regulation Act (PR Act), the ICCC has considered the following questions:

1. Is there a continued need for industry price regulation?
2. Which prices should be regulated?

The ICCC's findings are that no changes are currently needed. The industry is already experiencing significant change as it adjusts to supply constraints brought on by foreign currency constraints. Making substantive changes to the regulatory environment now would create unnecessary additional stress for the industry.

This section describes the ICCC's approach to assessing competition and lays out the evidence available to support the ICCC's findings.

7.1 The value of competition

Price regulation is typically employed to safeguard consumer interests when free markets fail to do so. However, when competition is effective, the results from a free market tend to be more beneficial for consumers than those under price regulation.

Efficient, competitive, and free markets naturally adjust prices based on changes in input costs, demand, and scale. If prices are too high, more competitors enter the market, increasing supply and typically lowering prices. Conversely, if prices are too low, competitors exit the market, decreasing supply and typically raising prices. Thus, competitive markets self-regulate over time as market demands and inputs evolve.

In contrast, it is much more challenging for a regulator to achieve similar outcomes. If a regulator sets prices too high, industry players will earn higher-than-normal profits. Even with new competitors entering the market, prices may not decrease because participants tend to set their prices at the maximum allowed by the ICCC. Although competition can drive prices below the regulated level, the market does not self-adjust automatically. Depending on the regulatory methods used, high prices can lead to overinvestment, inefficient infrastructure investment, and oversupply.

If a regulator sets prices too low, industry players will not receive sufficient returns on their investments. This discourages further investment, and participants may exit the market if their assets need replacing. As participants withdraw, supply shortages are likely. Black markets may emerge, where consumers pay high prices to illegal suppliers due to scarcity.

For these reasons, the ICCC prefers industries to function in competitive environments rather than regulated ones. With multiple players in both the retail and wholesale markets of the petroleum industry in PNG, it is crucial for the ICCC to assess the presence of effective competition and explore ways to encourage it. If competition exists, the ICCC should consider reducing or eliminating price regulation.

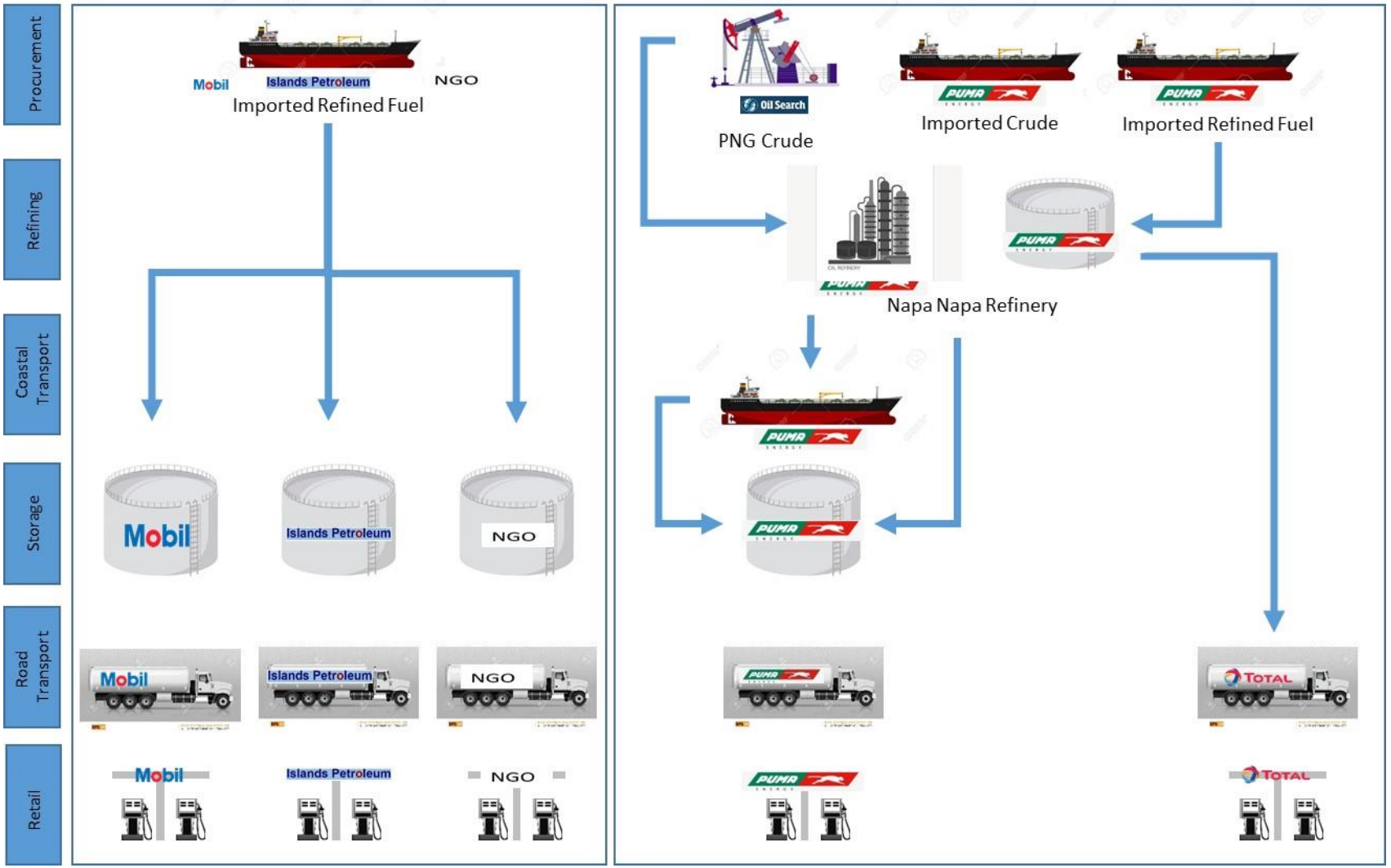
The ICCC has analysed the level of competition in both the retail, commercial and wholesale markets, focusing on the supply of petrol, diesel, and kerosene.

7.2 Structure of industry supply

In the 2019 review the industry structure was described using Figure 20.[14] The major change since this time has been that other wholesalers, in addition to Mobil and Puma, have started to import product.

[14] *The 2019 version of Figure 20 also included Bige. At that time Bige appeared to be a new entrant into the wholesale market. However now it appears that they have not maintained their position in the market.*

Figure 20: Structure of Fuel Industry



When the refinery operates, Puma Energy sources a mix of local and imported crudes. This is because the refinery requires a mix of crudes to operate efficiently and to produce the required mix of products. Depending upon market prices, Puma Energy sometimes imports fuels, particularly petrol. Over the review period 87% of PNG's refined fuel requirements have been imported as already shown in Figure 18.

Mobil sources fuel from international suppliers and delivers it by ship to both their own storage facilities around the country as well as to Islands Petroleum and Niugini Oil. Islands Petroleum and Niugini Oil also import product directly themselves but appear to use Mobil vessels when they do. Both Islands Petroleum and Niugini Oil face the same foreign currency constraints as Puma.

Apart from the refinery at Napa Napa, Oil Search (PNG) Limited also operates another refinery at Kutubu. Oil Search operates this refinery with a low production capacity to serve its own operational requirements. It then sells any excess in the Southern Highlands and Hela provinces.

Most of the wholesalers have their own storage depots, except for Total. Total currently only has retail business in Port Moresby and Lae. Total collects fuel by truck from other wholesalers and delivers it directly to its branded retail sites.

Puma Energy uses coastal shipping to supply its storage depots around the country with product from Napa Napa, or imported product. This includes its storage depot in Port Moresby where it transports fuel by coastal tanker across the harbour. Mobil imports fuel directly into its storage facilities in larger centres and then redistributes it to smaller centres using a smaller LRT tanker.

None of the wholesalers share storage facilities as is common in other countries.

7.3 Market segments

For the purpose of considering competition in fuel markets in PNG, the ICCC has used the following market segments:[15]

- wholesale
- service stations
- product supplied in drums
- commercial
- Jet A1

When conducting a competition review, the first step is always to define markets. Here is a description and justification for treating these segments as separate markets.

Wholesale

Description: Wholesale involves the bulk distribution of goods to retailers and commercial businesses rather than directly to consumers. This market segment is characterized by large volume transactions.

Justification: Wholesale markets operate differently from retail or service station markets.

[15] *The ICCC has used these market definitions in the last three reviews.*

They usually involve negotiations on price and terms, bulk buying, and lower price points due to volume discounts. The competitive dynamics, such as pricing strategies, supplier relationships, and market entry barriers, differ significantly from those in retail or service stations.

Barriers to entry: Total has entered the market since 2012. Investment is required in storage to expand into markets outside of Port Moresby.

Sources of market power: The project agreement, ownership of storage and access to foreign currency are all sources of market power.

Service stations

Description: Service stations, or gas stations, are retail outlets where consumers purchase fuel for their vehicles, along with other convenience products like snacks, drinks, and automotive supplies. They serve individual consumers and are often located in high-traffic areas.

Justification: Service stations are distinct from wholesale and commercial markets because they cater directly to end-users. Elements of competition include location, brand loyalty, fuel pricing, and additional services offered. Market conditions and competitive strategies in service stations are significantly different from those in wholesale or commercial markets.

Sources of market power: Geographic location

Product supplied in drums

Description: Product is sold in drums to consumers for their own use, predominantly in rural areas where service stations are not present.

Justification: The market for products supplied in drums involves specific distribution channels, storage requirements and drum filling facilities, which are separate from retail service stations.

Source of market power: Geographic location

Commercial

Description: The commercial market pertains to goods and services intended for business use rather than personal consumption. This includes business to business transactions where products are purchased for use in business operations or resale.

Justification: The commercial market operates under different dynamics compared to consumer-facing markets. The purchasing decisions, volume, pricing, and competition in commercial markets are driven by business needs and contracts rather than individual consumer preferences. This segment's competition is influenced by factors such as business relationships, contract terms, and bulk purchasing.

Jet A1

Description: Jet A1 is a type of aviation fuel used in jet engines. This market segment specifically addresses the supply and distribution of this fuel to airlines and aviation operators.
Justification: The Jet A1 market is unique due to its specific application in aviation. It involves different regulatory standards, distribution networks, and pricing mechanisms compared to other types of fuel. The competitive landscape for Jet A1 includes considerations such as airport contracts, fuel quality specifications, and logistical arrangements, necessitating separate treatment from other fuel markets.

Summary
In the ICCC's view, each of these market segments is separate due to their unique characteristics, competitive dynamics, and consumer needs. Each segment operates under different conditions and involves distinct players and strategies. It is important to analyse them individually to understand the competitive landscape accurately and the potential use of market power.

7.4 Market power

A firm which has market power, will be able to increase its prices without losing customers. There can be many sources of market power, but the most common one is that customers have no alternative choices where they can purchase the equivalent product.

For fuel products, which must be physically transported to the point of use, the market power of a firm might be specific to a particular geographic area. If that firm is the only source of the product, it will have market power in that particular area.

The wholesaler and services station owner relationship.

Wholesalers have several advantages that contribute to them having a measure of market power over retailers.

1. **Supply chain control**: Wholesalers manage the fuel supply chain, including relationships with refineries and transport logistics. This allows them to dictate terms to petrol station owners. This has become a more important factor in today's business environment in PNG, where fuel supply is so reliant upon foreign exchange availability.

   When a wholesaler is the only one or one of only two wholesalers with storage facilities in a region, service station owners have little choice about who they buy from.

   For a new wholesaler to start selling services in a new area, they must first set up their supply infrastructure. If volumes are small this may not be an attractive proposition. So, while in theory there are no barriers to entry, a market must be large enough to support the infrastructure a wholesaler needs to build.

   While a new entrant might be able to enter a new geographic area by purchasing product from another wholesaler, in many cases the existing wholesaler has strong incentives not to supply them as a competitor to their own business.

2. **Contractual obligations**: Long-term contracts between wholesalers and petrol stations can lock the latter into specific terms, supply conditions, which may favour the wholesaler. Breaking these contracts can be costly or difficult for petrol stations.

3. **Market consolidation**: Because wholesalers are one of a few major suppliers, the petrol station may have limited alternative sources. In many parts of PNG there are only one or two local suppliers. This increases the wholesaler's leverage in negotiations.
4. **Branding and marketing support**: Wholesalers have economies of scale that allow them to develop national brands. These brands can attract customers to petrol stations.

   A service station owner's entry into a supply contract with a wholesaler ties the station to the wholesaler's brand, giving the wholesaler more control over the station's operations and pricing.
5. **Wholesalers can enter the market**: If a wholesaler cannot find service station owners who are willing to sell its product in the market and carry its brand, the wholesaler can choose to enter the market itself and compete against existing service stations.

Service station owners have very little countervailing market power. Prior to signing a contract, in some centres, a service station owner located at a high traffic site may be able to attract interest from more than one wholesaler. But the wholesalers themselves do generally have alternative options available. Once it has signed a supply contract, the wholesaler is generally in the more powerful position.

Service stations

A service station's ability to sell its products at higher prices will depend upon consumers' alternative choices in the immediate geographic area. Even in larger centres like Port Moresby, there is a limit to how far consumers will travel to get cheaper fuel. Travelling any distance to buy fuel will represent a higher cost due to the fuel consumed to get there, as well as the lost time. Service stations in high traffic locations may be able to sell products at higher prices due to the convenience.

In a market where prices are capped, competition between service stations occurs in other ways. In Port Moresby, service stations are increasingly focusing on providing nicer environments with nicer facilities for customers. Many service stations also have fast food restaurants and offer a diverse range of other products, such as groceries and snack foods.

As Port Moresby has grown, wholesalers have been working with service station owners to build new sites in high growth areas.

The drum market

Customers who purchase fuel in drums often do so because, in their area, there are no service stations available. They tend to be in more rural areas where there is less choice.

A wholesaler's scale and control of the supply chain in an area means that without price regulation, it could easily charge prices in excess of economic costs. In most places around the world, anyone with a utility vehicle can drive to the nearest town and fill a drum with product. But in many parts of PNG, where roads are poor or non-existent, this is not an option. For this reason, the wholesalers who control the national distribution of fuel have market power in this market.

The wholesaler and commercial customer relationships

Some large commercial customers will have countervailing market power which they can use to protect their own interests when negotiating with wholesalers. The volume of product they consume makes their business attractive to all wholesalers.

This may mean that a wholesaler will consider installing new infrastructure and shipping product to a new location if it wins a large customer's business. This means that under most circumstances a large commercial customer can expect at least two wholesalers to be competing for its business.

A large commercial customer's fall-back position is that it can directly import product, provided it has access to foreign currency.[16] Because of this, the price that wholesalers can charge is limited.

Smaller commercial customers will not have the same level of market power as the large ones. However, they also will not face the same pressure to sign long term contracts and will be able to easily switch suppliers in provinces where more than one wholesaler operates.

Because of this countervailing market power, prices for commercial services can be left to market forces and do not need to be regulated.

Jet A1

Airlines and users of Jet A1 are a specialised type of commercial customer. The same competitive dynamics will apply as for the commercial market, although the product is different. Large companies like Air Niugini and PNG Air will have market power and can protect their own interests. Air Niugini in particular can also tanker fuel[17] from other international airports, such as Brisbane or Sydney, which it visits regularly.

Smaller aviation firms that operate in provincial areas will have fewer options for fuel. Because they do not have the large volumes of Air Niugini and PNG Air, it is likely that the prices they pay will be higher.

Conclusions about market power

From this analysis, there is a strong argument that:

- Wholesalers have market power over service station owners and, because of their control over the distribution of fuel, this market power is also present in the drum market.
- Commercial customers and large airlines have countervailing market power and can protect their own interests.

7.5 Retail site ownership

There are four ownership and operating arrangements which are common in PNG. The industry describes these in terms of dealers and companies.

[16] *Larger commercial customers who are exporting product are more likely to have access to foreign currency.*

[17] *For example, an airline flying from Brisbane to Port Moresby can choose to carry enough fuel for the return flight to Brisbane. So, if fuel is cheaper in Brisbane than in Port Moresby, an airline can avoid the higher priced fuel by tankering.*

Table 15: Retail site ownership arrangements

DODO	Dealer owned and dealer operated	The retailer both owns and operates the site. The retailer is not a wholesaler.
CODO	Company owned and dealer operated	The wholesaler owns the site and outsources operations to a third party.
CLDO	Company leased dealer operated	The wholesaler leases the site from a third party and outsources its operation to another third party.
COCO	Company owned and company operated	The company both owns a site and manages the site.

As was the case in 2019, wholesalers generally do not operate service stations, but rather choose to have a third-party operator even when they own the station.

However, after the 2019 changes to retail margins in some geographic areas, it appears that some wholesalers have chosen to own more of the service stations that they supply.

Retail brands

The ICCC has collected data from all the wholesalers to identify the number of service stations they supply. This is shown in Table 16. For practical purposes, the service stations have been grouped into geographic areas which are in close proximity.

Table 16: Retail sites by Brand

	IP	Mobil	NGO	Puma	Total	All
Alotau	1			1		2
Buka	2					2
Bulolo			1	1		2
Goroka			3	15		18
Jiwaka	16		4	2		22
Kavieng	2			2		4
Kimbe	3			4		7
Kiunga			2			2
Kokopo	10			8		18
Kundiawa			1	1		2
Lae	20	1	2	11	3	37
Madang	4			3		7
Manus Island			2			2
Mendi/Ialibu	3		1	1		5
Mt Hagen	20		11	17		48
Namatanai	1			1		2
Other Centres	2		1	1		4
Popondetta	2					2
Port Moresby	1	9	4	10	12	36
Tari	2			1		3
Wabag	1		2	3		6
Wewak				3		3
By Wholesaler	90	10	34	85	15	234
% of Sites	0	0	0	0	0	
Centres Supplied	17	1	12	18	1	25

Observations about retail site brands

- The number of service stations identified is much larger than in 2019. In 2019 the ICCC identified 175 stations compared to 234 now.[18] This increase appears to be a combination of new service stations being built, plus better data collection.
- There are eight centres that have only one supplier. However, four of these were only large enough to have a single service station.
- There are now five centres that have more than two suppliers. In 2019 there were only two. So, customer choice, and hence competition, has increased in three of these centres.
- Puma is now no longer as dominant as it was, and Islands Petroleum is growing its market. Islands Petroleum supplies more service stations than Puma Energy. This has changed since 2019 when Puma appeared to supply 65% of the services stations.

[18] *Two wholesaler's questioned whether there were 234 service stations. One asked for clarity about the ICCC's definition of a service station. The ICCC sourced this information by asking all wholesalers for a list of all the retail sellers they supplied. Another wholesaler suspected that the list may be counting some retailers twice. The ICCC's analysis indicated that there were only two retailers on the list that might be duplicated because they were supplied by more than one wholesaler.*

It is not clear to the ICCC just how much of this change has been a result of the supply crisis, when Puma was not able to supply all its customers.

- Niugini Oil has also expanded. In 2019 it had 24 service stations in 9 centres. Now it has 34 service stations in 12 centres
- The number of sites supplied by Mobil has not changed since 2019. However, Mobil does appear to have done some redevelopment at some sites during the review period. Mobil appears to compete with Islands Petroleum in Port Moresby and Lae, but not in any other provinces of PNG. (Islands Petroleum previously took over parts of Mobil's business outside of Port Moresby and Lae).
- The ICCC only identified two service stations where more than one wholesaler supplies fuel. This reaffirms the impact of wholesale contracts limiting the options available to service station owners.

Finding

Overall, the regulatory environment appears to be supporting an expansion of the distribution network with new service stations being built, survival of the old ones and more choices available to consumers.

Assets at sites

While a "dealer" may own a site, it frequently does not own the assets on the site. In general, the site ownership and operating arrangement does not provide any indication of the owner of the assets on a site. Often the wholesaler has made a large investment by providing the underground tanks, bowsers, the canopy and the branding for a site. In many cases it appears that the wholesaler owns 100% of the assets on a site. This may be the case even on a DODO[19] site. This has not changed since 2019.

Retail site owners generally have long term contracts with their wholesale providers. These contracts restrict the retail operator from using any other wholesaler as long as it continues to operate and often for a year after it ceases to operate a particular site. The terms of these contracts generally reflect the economic lives of the assets in which the wholesalers have invested. We would expect that the economic life of retail assets would be generally longer than 10 years and so it is expected that these commercial contracts would also have terms that are longer than 10 years.

Finding

Most retailers are, in effect, tied to their wholesale providers and cannot easily change providers.

Retail competition

The total number of service stations across the country is not a real indicator of choice available to customers within a particular area. Each geographic area should be considered by itself.

Even in the larger towns and cities, competition is limited by the natural geographic location of each site whereby customers choose to purchase from a particular site because of its physical location.

[19] *Dealer owned and dealer operated*

Because of land availability it will often be difficult for a competing service station to be set up in close geographical proximity to an existing service station.

Competition between retail outlets is apparent in some forms. Customers in major centres will choose between service stations based on factors including the safety and cleanliness of the site, queuing times and the availability of other service station products. From time to time, retailers may run 'promotions' to attract additional traffic.

The ICCC also observed that in Port Moresby some retail sites chose to price below the maximum price allowed by the ICCC. Clearly from the increased number of retail sites, barriers to entry in this part of the vertical market is not an issue.

7.6 New investment

One of the goals of the regulatory regime is to ensure that both wholesalers and retailers can continue to profitably invest in the industry and receive fair returns on their investment. The test of this is see if actual investment is occurring.

Retail investment

Since 2019, investment in retail sites has continued. Using Port Moresby as an example there have been three new service stations built since 2019.

Table 17: Service stations in Port Moresby[20]

	2014	2019	2024
Number of service stations	15	33	36

Between 2010 and 2014, the total number of retail sites was decreasing. Based upon the data available, the ICCC estimated nationally the number of service stations had declined by 23%. This decrease appeared to be occurring despite a shortage of petrol stations. For example, in Port Moresby there were long queues at most petrol stations for large periods of the day.

Prior to 2014, the cost of retail assets was captured in the wholesale margin and was based upon historic costs inflated to today's values and depreciated to reflect their age. It is likely that this previous approach would have made it difficult to cover the cost of brand-new assets.

In 2014, to ensure that retail margins would support investment in new sites, the ICCC changed its methodology for setting the retail margin. The new method involved using a bottom-up model of the cost of building a new retail site.

This approach was successful, and between 2014 and 2019 many new service stations were built. In Port Moresby the number more than doubled (see **Table 17**). Queues at service stations either disappeared or were significantly decreased.

[20] *Only Port Moresby has been used as a comparison here, because of a low level of confidence about the reliability of the ICCC's data in other areas. Data collection between review periods may not have been consistent.*

However, it also became evident that both wholesalers and service station owners had misunderstood what the term “retail margin” referred to[21], even though it was clearly described by the ICCC in the 2014 review. There were cases where service station owners were retaining 100% of the retail margin, even though they did not own all of the retail assets. This made these service stations much more lucrative for these owners than they should have been. Consequently, the ICCC was concerned that this had led to over-investment in retail sites. So, in the 2019 review, the ICCC focused on refining the retail margin to better reflect the cost of building a new site in each geographic area as well as trying to educate both wholesalers and retailers about what the retail margin is[22].

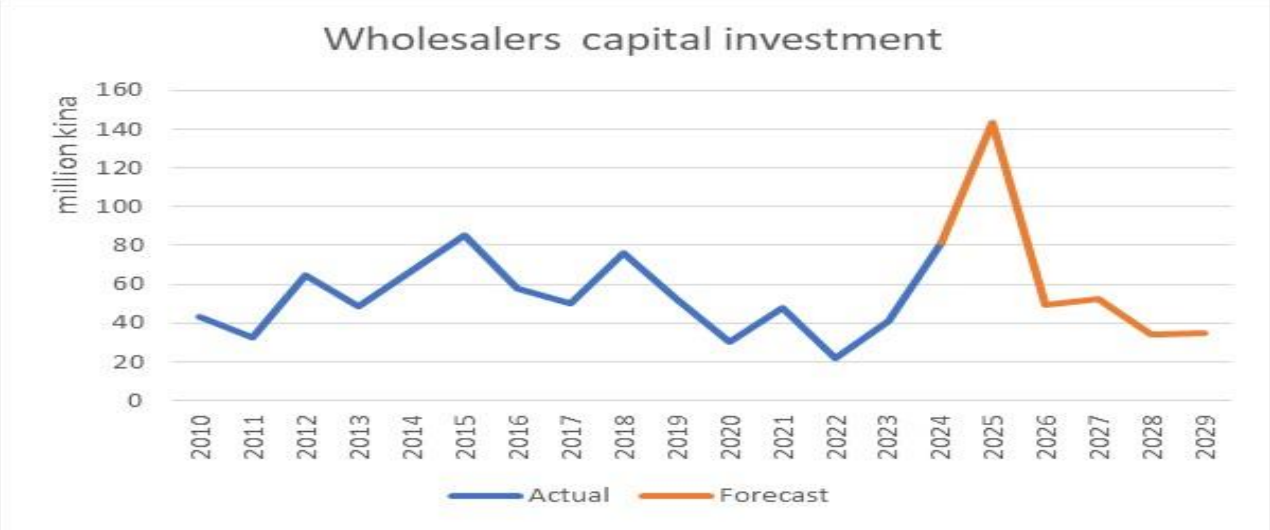
The risk for the ICCC and the industry was that, if the retail margin was set too low, no new sites would be built. However, this appears not to have occurred. As shown in Port Moresby, new sites have continued to be built, but at a slower pace. This appears to support the ICCC’s approach to setting retail margins and indicates that prices are about right.

Wholesale investment

While wholesalers have continued to invest, upgrade and replace assets, the level of investment did flatten out during the review period. Figure 21 shows new investment and Figure 22 shows how the value of the regulatory assets base (RAB) has changed in real terms.

The industry is expecting to substantially increase investment levels over the next two years. If this occurs the value of the regulatory asset base for wholesalers may increase by as much as 30%.

Figure 21: Investment in wholesale assets

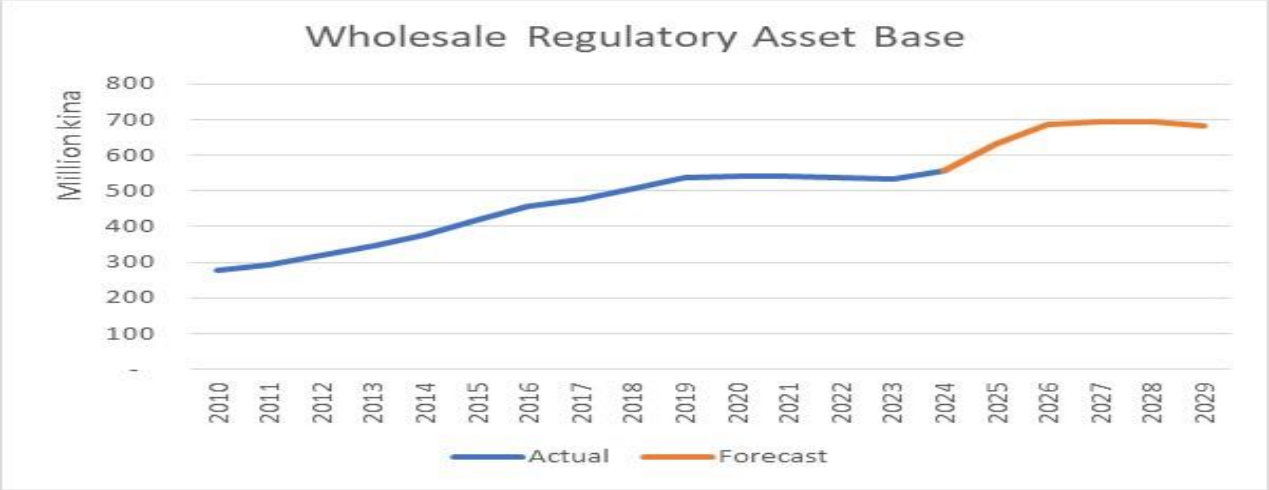


Note: Actual figures have been inflated into 2024 Kina values using the PNG CPI

[21] *For an explanation of retail margin see section 2.5*

[22] *0For an explanation or retail margin see section 2.5*

Figure 22



The refinery

Puma has also continued to invest in the refinery. Over the past five years, it has invested more than K60 million. The ICCC sees that as positive. While a smaller portion of PNG's fuel has come from the refinery over the last five years, the refinery still remains an asset for PNG and is an important component of PNG fuel supply infrastructure.

7.7 Market share

The ICCC has estimated the market shares of the each of the wholesalers and how this has changed over the review period. Because this is commercially sensitive information, it cannot be published in this report.

However, the ICCC can confirm that in both the service station market and the commercial market, there have been significant changes in market share (when measured in volume terms). Some of this appears to be due to the fuel crisis but not all of it.

Changes in market share in the commercial market, where there is no price control, is a positive indication that competitive market forces are behaving as expected.

In the service station market, where prices are regulated, changes in market share are also seen as positive. Some of this change will be due to new service stations being built. The ICCC sees this as a positive outcome of the regulatory regime. While wholesalers cannot compete on price in this market, they are still able to compete for additional volume and consider it worthwhile to do so.

7.8 Wholesaler behaviour

In this report, the ICCC has noted that the wholesalers and retailers may enter into any commercial arrangement they agree to. However, comments and complaints received by the ICCC from retailers about wholesalers' behaviour illustrates the market power that wholesalers hold over retailers.

It is not generally in the interests of wholesaler to see the retailers they supply fail.

Brand premiums

Some retailers have complained about additional charges from wholesalers which are described as a "brand premium". The main reason a retailer would pay a premium to use a wholesaler's brand would be if using that brand resulted in increased sales volumes.

The ICCC has not investigated the nature of these "brand premiums" charges and what they might cover. Retailers should carry out their due diligence before entering into supply agreements with wholesalers.

Tax for climate change fee

One retailer provided the ICCC with a copy of a letter they had received from their wholesale supplier. The letter required them to start to pay a 1 toea per litre charge to the wholesaler which was purportedly to pay for a tax imposed by the government.

The ICCC can confirm that it did have discussions with government agencies about the possibility of introducing a new the tax of this nature. However, this tax was never implemented. The retailer claims that the wholesaler refused to reverse their decision to charge the tax.

The ICCC has not investigated this case but thinks that the alleged behaviour of this wholesaler reflects the market power they hold over retailers.

The role of the ICCC

The main role of the ICCC, as described in the ICCC Act, is to protect consumers and to promote competition. In doing so the ICCC must also consider the legitimate commercial interests of the parties it regulates, as described by the Act.

The role of the ICCC is **not** to protect the interests of businesses. This means that it is not the role of the ICCC to protect retailers from wholesalers who may be looking after their own interests at the expense of the retailer.

However, if a wholesaler or a retailer is acting in an anti-competitive manner, the ICCC has a role to intervene.

Independence

An independent retailer, who owns the assets on its retail site, is in a stronger commercial position than one who is contracted to a single wholesaler. Retailers entering supply contracts need to do their due diligence before signing. This might include adding clauses to contracts that protect them from future unforeseen behaviour by the wholesaler.

The ICCC has noted that it is not in the interests of wholesalers to allow retailers to fail. However, wholesalers may have various reasons why they want to see changes to retail ownership and might from time to time put pressure on retailers to drive change. Retailers should seek to protect themselves from such behaviour by carefully reviewing supply contracts before signing them.

7.9 Conclusions

The ICCC's has found that:

- Wholesalers continue to have market power in both the service station markets and the drum market. Price deregulation would be unlikely to improve outcomes for consumers in PNG.
- While prices are regulated in the service station market, wholesalers have continued to compete for business and there have been significant changes in market share.

- In the commercial market, competition appears to be effective and there is no need for any form of regulation.
- Under the current regulatory regime, wholesalers have continued to invest in the market. New service stations have been built and wholesale infrastructure has been upgraded along with additional investment in storage capacity in some regions.
- The current regulatory regime allows for price competition below the regulated price cap. The ICCC sees occasional examples of this occurring.
- Price regulation provides assurance to consumers that they are not paying too much for fuel.

The ICCC also notes the destabilising effects of foreign currency shortages on fuel supply in PNG. In this context the ICCC thinks it will be in the best interests for both the industry and consumers not to make any changes to the current regulatory arrangements. Such changes would further add to the stress currently faced by industry participants.

Finding

Deregulation would be unlikely to result in better market outcomes or lower prices for consumers.

Determination

Prices of petroleum fuel products sold at petrol stations and in drum will continue to be regulated.

8 WHOLESALE COSTS

8.1 What wholesalers do

Wholesalers provide several services including some or all of the following.

- Sourcing fuel. This includes both importing as well as sourcing fuel from the refinery at Napa Napa.
- Storage of fuel and holding inventory. This involves investment in and management of storage tank facilities (The ICCC notes that Total Oil does not do this, but instead sources fuel directly from the refinery by truck or from other wholesalers and delivers it to their customers).
- Managing the logistics of arranging transport and holding inventory.
- Distribution of fuel to retail and commercial customers either by truck or by ship. In some cases, wholesalers will outsource these activities, and in others, they will choose to invest in their own ships and / or trucks.
- Drum filling. This generally means investing in drum filling infrastructure and storage tanks.
- Selling other products such as lubricants and LPG in gas bottles.
- Providing support services for retailers and commercial customers. This may include designing and building retail sites, providing training, providing advice on safety and many other aspects of running a retail service station.
- Development of branding and marketing of those brands.

Wholesalers will also frequently invest directly in retail or commercial site infrastructure. For a retail site, this can include owning underground tanks, bowsers, paying for branding or in some cases owning the entire site. For commercial customers, this often includes owning storage tanks. However, for the purpose of setting the wholesale margin, investment in customer site infrastructure is excluded.

The costs of retail assets are included in the retail margin, so any inclusion of these costs in in the wholesale margin would be double counting.

8.2 Methodology

In all previous determinations of the wholesale margin, the ICCC has used the building block method. This methodology estimates the economic costs of a company based upon the following formulas.

Economic cost = efficient operating expenditure + return on capital + return of capital

where:

Return on capital = WACC x the value of the regulated asset base

Return of capital = depreciation of the regulated asset base, based on the remaining economic life of the company's assets.

WACC = weighted average cost of capital

The economic cost is often referred to as the revenue requirement. This is the revenue which a company must receive to cover its economic costs and to remain sustainable.

The economic cost is then divided by the forecast sales volumes to determine a cost per litre. This cost per litre is referred to as the "wholesale margin".

The ICCC determined to continue to use an industry average approach to calculate the wholesale margin. That is, the sales and expenditure forecasts of each company are combined and averaged to determine what the wholesale margin will be for the entire industry. The approach recognises that some firms are more capital-intensive than others. That is, they have different balances between operating and capital costs. Using an average allows each company to determine its own balance between operating and capital costs as long as it keeps its costs within the margin.

8.3 Commercial and large customers

Commercial customers

Prices for commercial customers are unregulated. However, the costs of selling products to these customers must still be understood to determine the costs of selling regulated products. This is because a wholesaler's assets and business resources are used to service both the commercial and retail markets. The total cost of serving both these markets is divided by the total volume of both markets to establish the average cost per litre.

Large customers

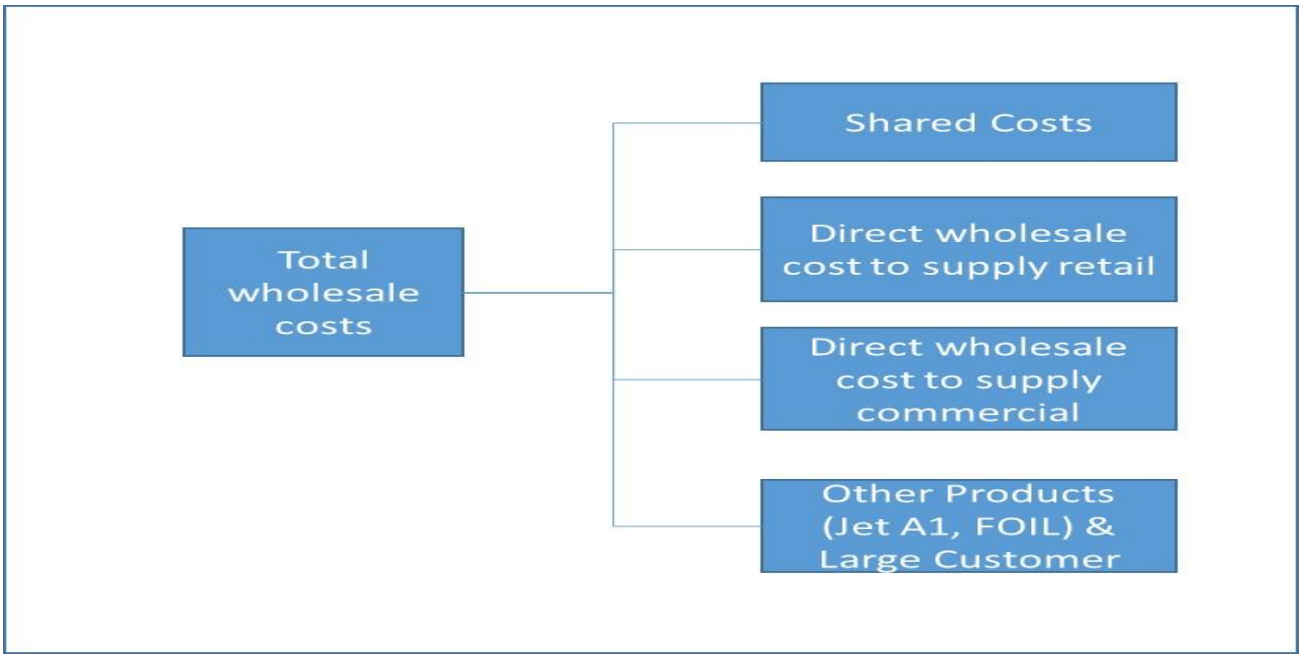
In the 2014 and 2019 reviews, Puma had some large customers which it argued did not use its wholesale assets. Instead, these customers were supplied directly from the refinery. Consequently, if the cost of its wholesale storage assets was spread across all its volumes including these large customers, this would have unfairly lowered the implied average cost, which would have unfairly understated the actual cost of providing wholesale services to service stations.

While the volume associated with large customers has declined, Puma continues to have a significant volume of product that is delivered directly from the refinery to customers. The ICCC has decided to use the same approach in this review.

Large customers are defined to include any customer who purchases more than 25 million litres per year of a single product directly from the refinery.

Puma Energy's costs can be described as in **Figure 23**.

Figure 23: Wholesalers cost break down



The ICCC has allocated Puma Energy's asset costs using the following methodology:

First establish the costs.

- Separate out head office assets and assume these represent shared assets. For this the ICCC assumed:
    - 10% of building costs;
    - 50% of furniture and fittings; and
    - 100% of computer and IT systems costs.

- Apportion shared asset costs based upon volumes.
    - From information provided by Puma, the ICCC was able to establish the percentage of Puma's total volumes, which was Puma's regulated volume plus its commercial volume excluding large customers.
    - The value of shared assets was multiplied by this percentage to establish the portion of these shared assets that would be included in the regulatory assets base.

For operating costs, the ICCC did not allocate costs. Rather, the ICCC has continued to use an average cost approach, which is described in the next section.

8.4 Operating costs

The ICCC has taken the same approach to analysing operating costs as it did in 2019. This involves splitting costs into five categories.

- Size driven costs – these are costs are that are driven by the size of the business.
- Asset driven costs – these are costs that are driven by the assets it owns.
- Site driven costs – these are costs that are driven by the number of sites and the size of those sites.
- Advertising costs – advertising and public relations.
- Excluded costs – costs which if included would result in double counting.

Table 18 provides more detail on each of these cost categories.

Table 18: Business cost drivers

Driver	Rationale
Size driven	These costs depend on the size of the business. As a company grows in value and sells more products, these expenses will increase. Larger businesses usually need more employees, and they can afford to hire professionals like engineers, lawyers, accountants, and economists. The number of employees also affects the need for human resources management, corporate communications, office space, and related expenses like internal telecommunications and desktop IT. Travel costs often depend on both the number of employees and the company's geographic spread. In practice, this category includes any costs that aren't listed in other categories.
Asset driven	These operating costs are related to the value of a business's assets. They include expenses like insurance and maintenance. Maintenance costs can go up if the assets are old, and they also increase when the business acquires more assets.
Site driven	The more locations a business operates out of, the more particular types of costs will grow. This includes rent, land taxes, utilities (electricity and water), security and environmental remediation.
Advertising costs	These include advertising and public relations.
Excluded costs	These are costs which if included here would result in double counting. They include items such as: • Financing costs which are allowed for in the cost of capital calculations used in the building block method.

	• Retail costs – this is any cost that is allowed for in the retail margin. • Truck driving staff used for road freight. These costs are allowed for in the road freight costs. Only wholesalers who don't outsource their road freight will have these staff. • Costs that appear excessive and which could not be sustained in competitive market.

The ICCC classified all operating costs into these five categories.

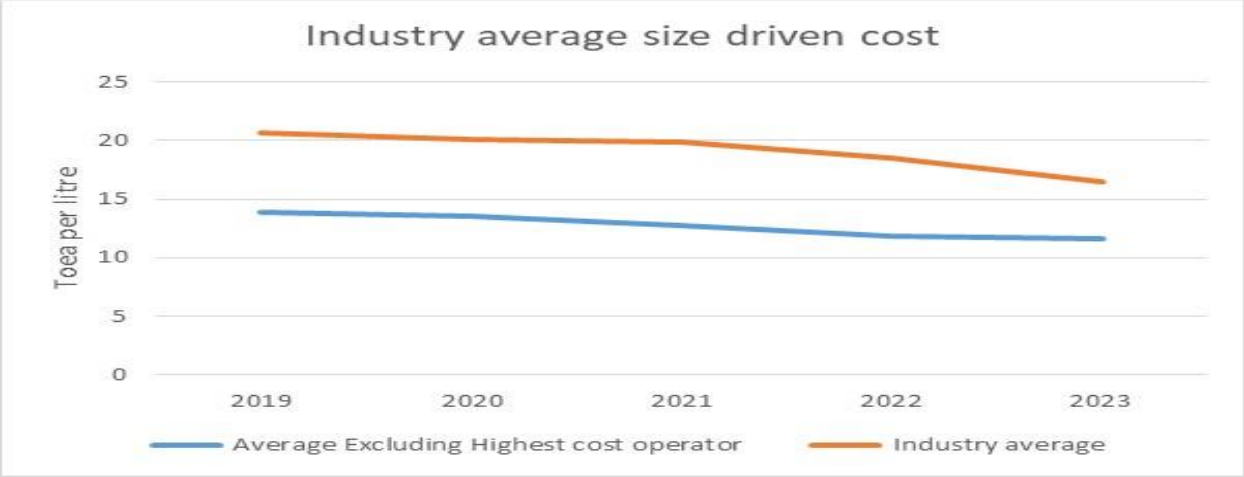
Size driven costs

To maintain stability in the industry the ICCC has determined to maintain the size driven cost allowance at the current inflation adjusted level of 12.8 toea per litre.[23]

In 2019 there were two companies with notably higher size driven costs. Since 2019 there has been a convergence of costs toward the 12.8 toea per litre allowance, with only one exception. One of the companies with high costs in 2019 has reduced its costs to close to the allowance. The other company with high costs has also significantly reduced its costs and is forecasting that they will fall further. However, this company's costs continue to be significantly higher than all other providers.

Figure 24 shows the whole industry average cost as well as the cost if the highest cost wholesale is excluded. In 2023, the industry average was 16.4 toea per litre. If the highest cost provider is excluded, then the average drops to 11.6 toea per litre.

Figure 24



The observed convergence of cost, by four out five operators, implies that the allowance appears to be about right. It is likely that the four of the five wholesalers have used this allowance to set their operating cost budgets. That these companies have been able to continue to operate and provide their services within this budgeted allowance, confirms to the ICCC that the approach used in 2019 was appropriate.

[23] *In 2019 the ICCC determined to set the size driven cost allowance at 10.8 toea per litre. This is the equivalent of 12.8 toea per litre today after inflation adjustment.*

Maintaining the allowance for size driven costs at 12.8 toea per litre will support industry costs as shown in Table 19.

Table 19: Size driven cost allowance[24]

	2020	2021	2022	2023	2024
Forecast total regulated volume (million litres)	1,443	1,472	1,501	1,530	1,559
Size driven cost allowance (K million)	184.7	188.5	192.2	195.9	199.6

Determination

The ICCC has determined to set the size driven cost at 12.8 toea per litre and continue to adjust it for inflation over time.

Asset driven costs

In 2019, total asset costs were K33.1 million. For 2023 the reported values are 31.1. In the same period, the value of assets as measured by the RAB, has fallen from K542 million to K492 million. Figure 25 shows the costs expressed as both an average cost per litre for the whole industry and a cost per kina of asset value.

While both these measures fell in 2020, they have increased again in 2023. The ICCC understands that insurance costs in some industries have increased.

Figure 25

In 2019, the ICCC used the average asset cost per litre over the previous period to set the allowance for asset costs. However, in this review ICCC wants to make allowances for potential increased investment in wholesale assets.

[24] *This is based upon the 2023 June quarter CPI. Inflation adjustments will be made when CPI is reported for June quarter 2024.*

So, the ICCC has determined to set the asset cost allowance by multiplying the RAB value by the asset cost per asset value. In 2023 the asset driven cost per kina of RAB value was 0.0633.

Asset driven cost allowance = Cost per kina value of assets x Value of RAB

Table 20 shows the resultant allowance for asset driven costs using this approach.

Table 20: Asset driven cost allowance

	2024	2025	2026	2027	2028	2029
RAB value forecast (million kina)	554.2	628.3	683.2	690.8	690.2	680.7
Asset driven cost allowance (million kina)	35.1	39.8	43.3	43.8	43.7	43.1

Determination

The ICCC has determined to set the asset driven cost at 0.0633 kina per kina of assets and to adjust it by inflation over the regulatory period.

Site driven costs

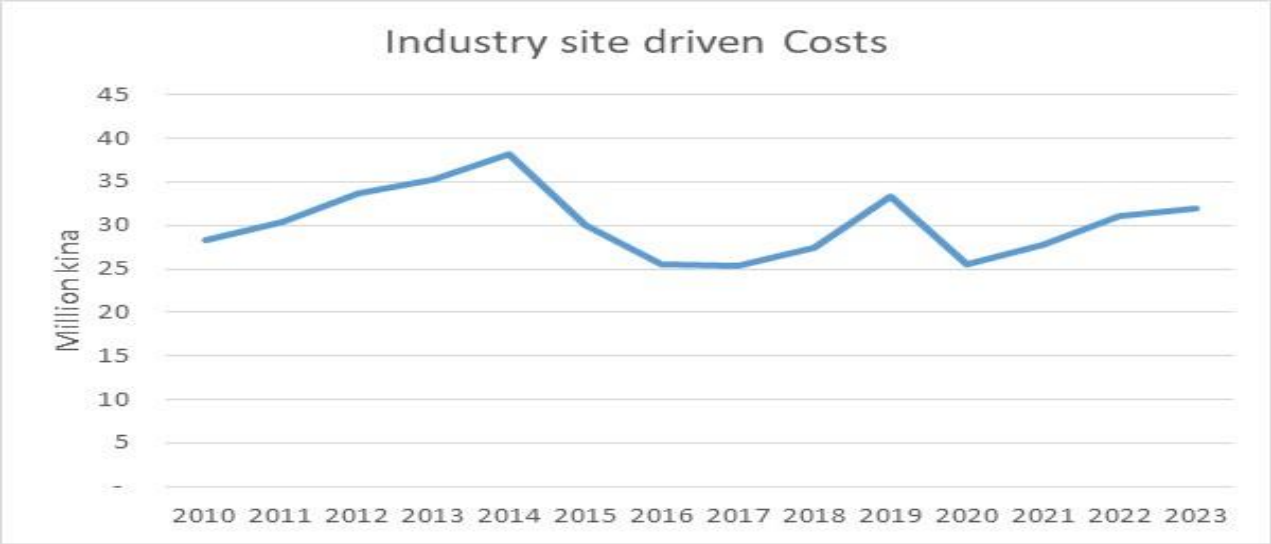
Consistent with previous determinations, the ICCC has determined to treat site driven costs as a fixed cost. In 2019 this cost was set as the average of the total industry's costs for the previous four years. Using this approach, the cost allowance for 2025 to 2029 will be K29.9 million per annum. This compares with K27.2 million per annum[25] in the 2019 review.

Site driven costs vary quite a lot between wholesalers. For all providers, security cost is a significant component. For some, rent is a major component, depending upon whether they own the land on which their storage depots are located. For some, electricity is also a major cost, and this increased in 2023.

Figure 26 shows how industry site driven costs have changed in real terms since 2010. From 2019 to 2023, there were no new storage depots built by the industry, and none of the wholesalers have indicated their intention to build any new depots before 2029.

[25] *In the last review the actual value was K22.97 million. Inflating this using CPI is equivalent to K27.2 million today.*

Figure 26



Determination

The ICCC has determined to set the site driven cost allowance at K29.9 million per annum and to adjust it for inflation over the regulatory period.

Advertising and publicity costs

The ICCC regards advertising positively as it promotes competition. Businesses invest in advertising to boost profitability by increasing sales volume and spreading fixed costs over a larger base.

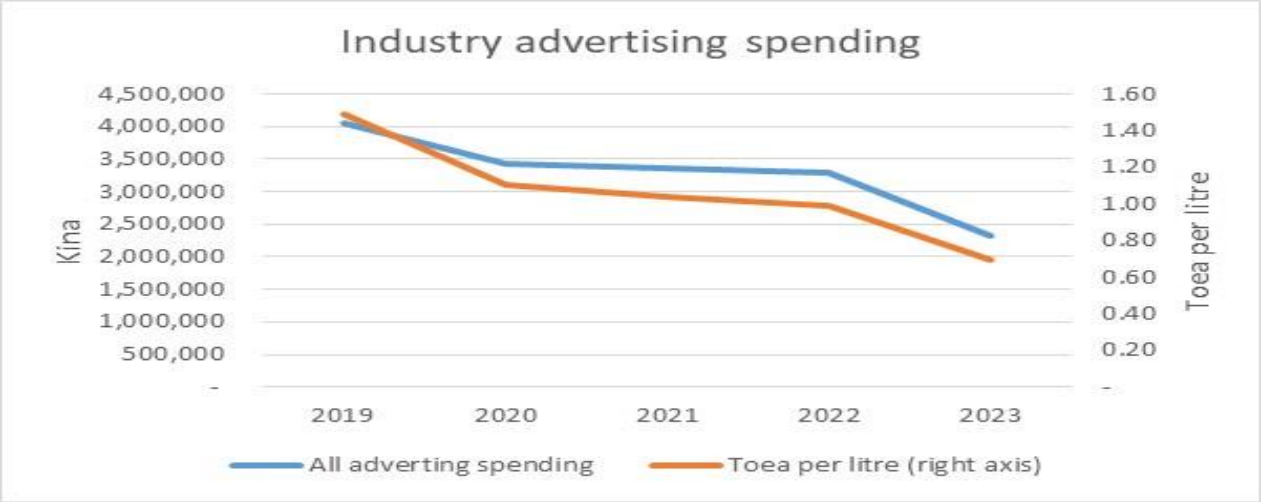
The ICCC has determined to continue with the same allowance for advertising that it used in 2019. With inflation this is currently 0.915 toea per litre. [26]

Figure 27 shows how total industry spending has fallen during the regulatory period, and what this means on a per toea basis. Much of the fall in total industry spending is due to the fall in spending from one wholesaler. During periods of supply shortages, there is little value for wholesalers in advertising for new volumes.

The ICCC could have chosen to reduce this allowance on the basis that actual spending has fallen below this level. However, this is likely to be a short term decrease due to supply shortages. If the industry can overcome supply shortages and gain access to foreign currency, it is expected that advertising spending will increase again.

[26] *0.77 toea per litre in 2019 is equivalent to 0.915 toea per litre in 2023.*

Figure 27



Determination

The ICCC has determined to set the advertising allowance at 0.915 toea per litre and adjust this for inflation during the regulatory period.

Operating cost allowance

Table 21 provides a summary of the operating costs allowed for in the wholesale margin, based upon the ICCC's approach to setting allowances for operating costs.

Table 21: Summary of operating cost allowance (K million)

	2025	2026	2027	2028	2029
Size driven costs	181	185	188	192	196
Asset driven costs	35	40	43	44	44
Site driven costs	30	30	30	30	30
Advertising cost allowance	3	3	3	3	3
Industry operating cost	249	258	265	269	273

8.5 The regulatory asset base

The return on capital and the return of capital elements of the building block approach requires the ICCC to determine an appropriate asset value for the industry.

The asset value used in the building block model is known as the regulatory asset base ("**RAB**"). The RAB represents the current value of past capital investments for pricing purposes. Current value is estimated by inflating historic costs using CPI and depreciating to reflect its age.

Retail assets are excluded from the wholesale RAB, as the cost of these assets is included in the retail margin. Including retail assets in the RAB would result in double counting of these costs.

Wholesalers earn a return on their capital investments via the application of a regulated rate of return (known as the weighted average cost of capital, or "**WACC**") to the RAB.

The ICCC has estimated a weighted average cost of capital, and this is explained later in section 15 of this report.

RAB roll-forward for current regulatory period

The ICCC has used the same methodology as in previous reviews to set the RAB.

The ICCC has used the following method to roll forward the value of assets.

Opening value at the start of the year

+

Capital expenditure (additions to the capital base)

-

Depreciation and disposals of assets

+

Indexation of the asset base using CPI to maintain its real value

=

Closing value at the end of the year

Any asset which has reached its full economic life is assumed to be disposed of and any residual value for this asset is removed from the RAB. The exception to this is vehicles. These are assumed to have a life of 10 years but are replaced after four years with the old vehicle being sold at book value.

New investment was assumed to occur in the middle of each year and so for the first year of any investment, half a full year's depreciation was applied.

In this way all capital costs incurred by the wholesale companies is effectively included in the RAB. This information is then used to establish the level of costs which must be recovered by wholesalers to ensure that they will earn a return on their investment.

Assessment of capital spending

The ICCC has used the RAB as assessed at 1st January 2019 as its starting point to roll forward. Accepted regulatory practice is that once a regulator has assessed capital spending and included it in the RAB, it is not removed in later review periods. This is to provide regulated entities with assurance that if they invest in their business, they can expect to receive a fair return on this investment. The ICCC has followed this approach.

The ICCC's focus in assessing capital spending has been to identify which assets are related to providing wholesaler services and excluding retail assets. It is difficult for the ICCC to assess whether a particular wholesaler is over-investing or under-investing.

However, the ICCC has excluded any assets which are not wholesale assets. In particular, the following asset types were excluded.

- Retail assets (assets which are on retail sites) are excluded because the cost of these is specifically allowed for the retail margin calculation.

- Commercial assets (assets which are on commercial sites). These are excluded in the same way that retail assets are excluded. If commercial fuel prices were regulated, presumably these asset costs would be covered in a commercial service margin.
- Road tankers which are used for transport of fuel were removed, because the cost of road transport is allowed for separately. Including these assets would result in double counting road freight costs.
- Assets related to non-regulated products such as LPG and lubricants.
- Jet A1 assets were excluded because the Jet A1 volumes were not included.

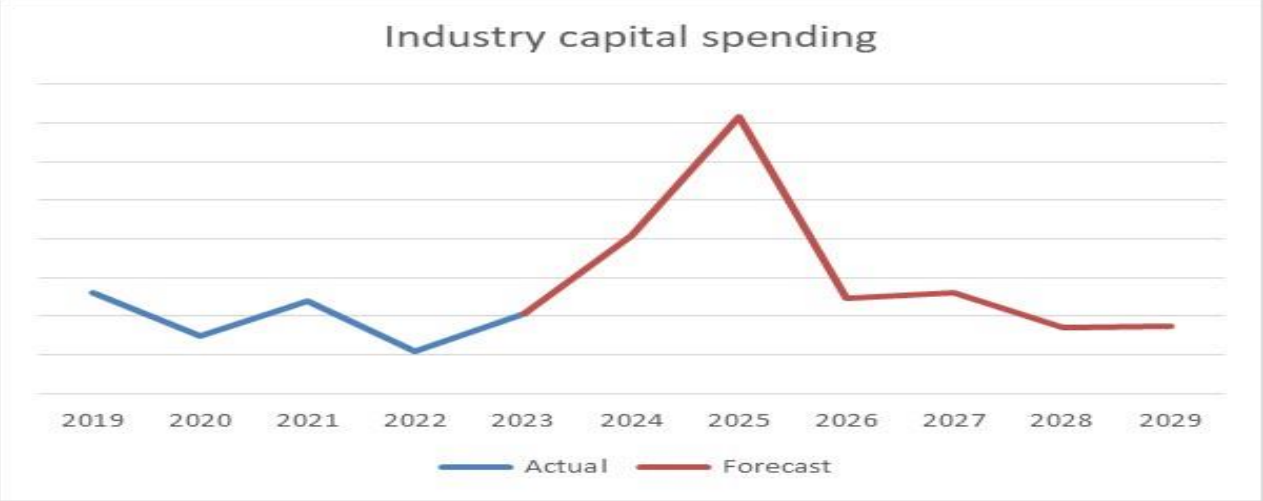
Drum filling assets were included.

- Drum filling assets are included because the drum filling margin does not include capital costs. Therefore, drum filling assets costs are included in the wholesale margin.

Planned Capital Spending

The ICCC requested that each wholesaler indicate its capital spending plans over the next regulatory period. Figure 28 shows the combined stated capital spending intentions for the industry. As can be seen, the industry is planning to significantly increase investment in 2025.

Figure 28[27]



Some industry participants have raised concerns that the industry may become over capitalised. This might come about if some industry players lose market share and have underutilised storage facilities.

A simple test of the adequacy of investment is to compare ongoing investment to depreciation. Over the period of 2019 to 2023, the industry investment to depreciation ratio was about 1.0. This means the level of investment was essentially maintaining the value of the assets and overall investment by industry. However, the industry's stated investment intentions exceed replacement costs.

Figure 29 shows this as a rolling five-year value. By 2025 investment levels will have risen to 1.8 times depreciation.

[27] *The axis has been removed from this graph for commercial sensitivity*

Figure 29[28]

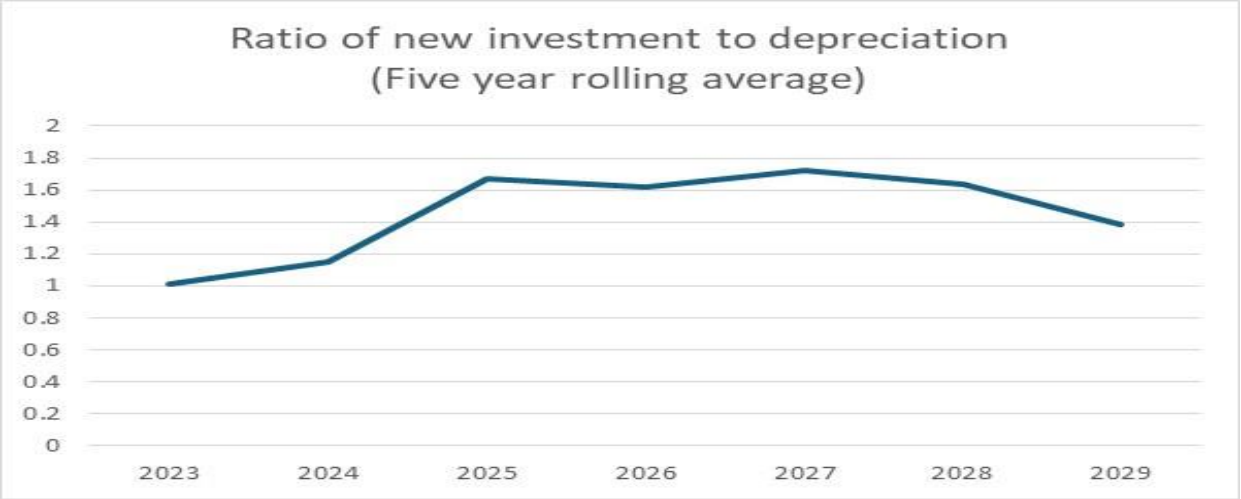
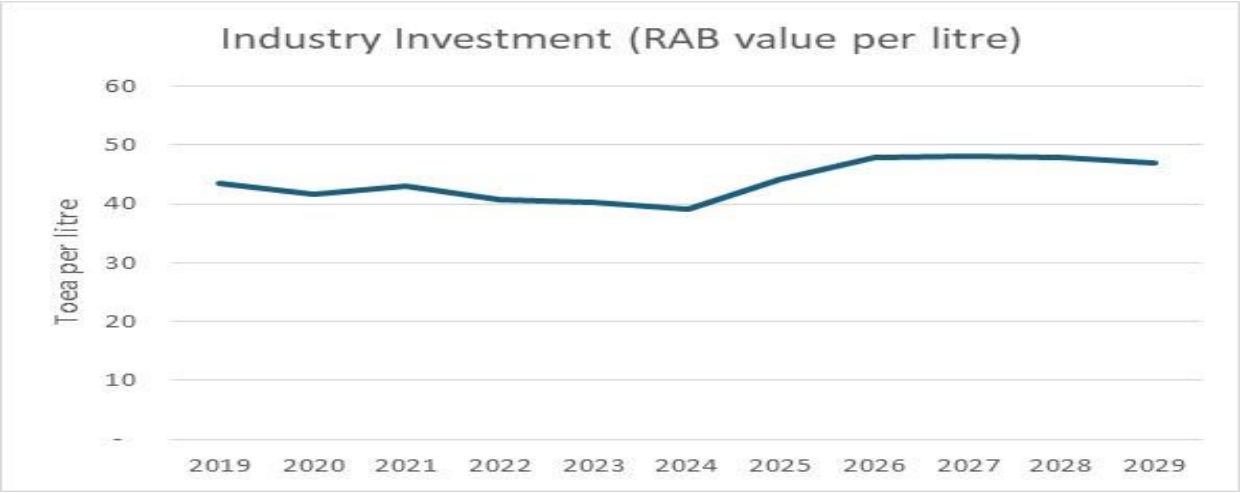


Figure 30 shows how industry investment will increase from current levels on a toea per litre basis. Essentially the level of investment proposed will decrease the capital efficiency of the industry, by about 25%.

Figure 30



This raises concerns about whether this level of investment is warranted. Additional storage capacity will give wholesalers more flexibility to compete and increase their market share in the areas where they build it. Increased storage capacity will also support larger and more efficient shipment of fuel. A thorough analysis of storage capacity requirements is beyond the scope of this review. However, there do not currently appear to be constraints on the industry as a whole.

[28] *Using a five-year rolling average helps to smooth out peaks to make the trend more evident.*

Mid Term Review

There have been many examples in the past where the ICCC has made allowances for regulated entities to increase their capital investment, only to discover later that the investment has not been made. When this occurs, the effect is that consumers are paying for something that they do not receive. To avoid this occurrence in this case, the ICCC will carry out a mid-term review.

The ICCC has discussed this with the wholesalers and various wholesalers have made positive comments in support.

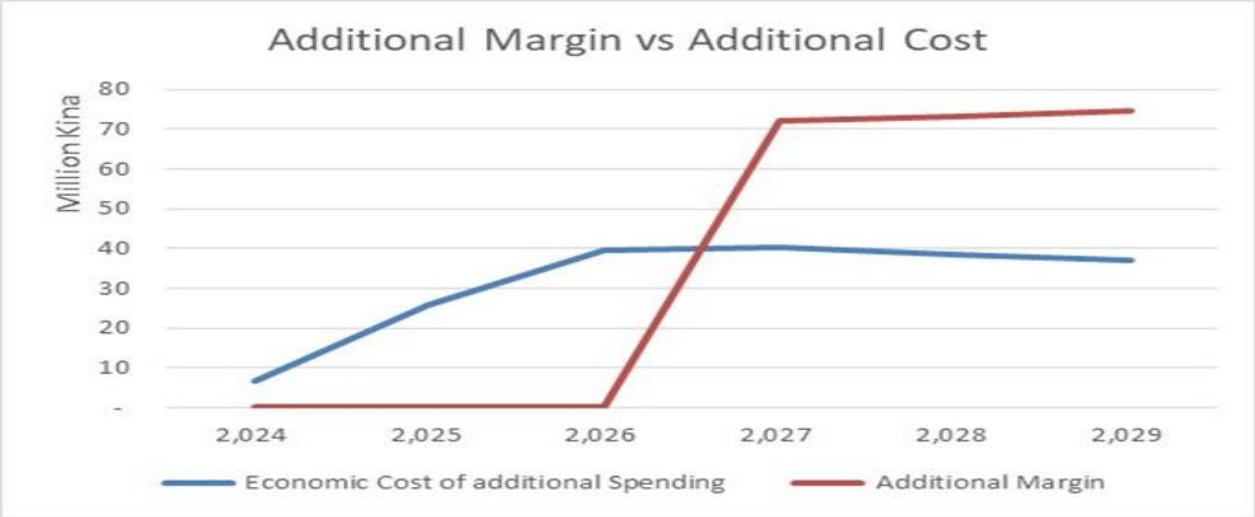
This section describes how the mid-term assessment will be carried out
Future capital spending for 2024 to 2029 has been split into two categories.

- **Base level capital spending** – this has been set at the average capital spending for the last five years. That is K37.2 million per annum. From 1st of January 2024 to 30th of September 2026 this will equal K102.3 million
- **Additional capital spending** – this is spending which occurs in addition to base level spending. The industry is forecasting this to be K215 million from 2024 to 2028.

The mid-term review will be carried out between 1st October 2026 and 31st December 2026. And then depending upon the findings, an adjustment will be made to the wholesale margin which will apply from 1st January 2027.

Additional capital spending of K215 million is equivalent to an additional 4.73 toea per litre on the wholesale margin. Figure 31 illustrates the timing effect of the adjustment. The economic cost of the additional investment will start to be incurred in 2024 and will continue over the regulatory period. The compensation for this cost will not commence until 2027. However, the 4.73 toea per litre has been calculated so that the Net Present Value of additional margin from 2027 to 2029 is equal to the Net Present value of the additional cost from 2024 to 2029.

Figure 31



A description of the process was sent to all wholesalers in October 2024. This was accompanied by the ICCC's building block model spreadsheet, which included the calculation the ICCC will use to make the adjustment.

The ICCC will follow the following process.

- In October 2026 the ICCC will request actual capital spending data from all the wholesalers.
- The ICCC will assess how much capital spending has been made by the industry in addition to the base level spending of K37.2 million per annum, inflated into money of the day.
- The ICCC will calculate this as a percentage of the additional capital spending values (i.e. K215 million).
- This percentage will be multiplied by 4.73 toea per litre.
- The resultant value will be the increment which will be added to the wholesale margin from 1st January 2027.
- Neither of the values of K215 million additional spending or 4.73 toea will be adjusted for inflation at the time of evaluation (I.e. October 2026). But they will be adjusted for inflation in subsequent years.

The annual adjustment to the wholesale margin is describe in section 8.10. This includes a description of how the ACS factor (annual capital spending factor) amount will be included in the wholesale margin.

Determination

Because of the large increase in proposed capital spending by wholesalers, the ICCC has determined that it will carry out a mid-term review of capital spending.

Economic life of assets

The economic life determines the depreciation rates for assets. The ICCC uses straight line depreciation.

Table 22: Economic Lives

Asset Type	Life Used
Buildings Capex Life	50
Furniture and fittings Capex Life	15
Marine vessels Capex Life	10
Motor vehicles Capex Life	10
Office equipment Capex Life	10
Plant & equipment Capex Life	15
IT systems and equipment Capex Life	5
Pumps general Capex Life	15
Tanks and storage 30-year life Capex Life	30
Equipment and buildings 20-year life Capex Life	20
Equipment and buildings 15-year life Capex Life	15
Buildings Capex Life	50

Economic lives may be different from those which are used for tax purposes. So, the lives used by the ICCC are not necessarily the same as those used in wholesalers' asset registers. However, to classify assets, the ICCC has been cognisant of depreciation life used by wholesalers. For example, where capital has been spent on reconditioning existing assets, this capital may not have the same life as if the asset were a new asset. So, for example, where an old building is renovated or a tank is reconditioned, asset lives have generally been set at shorter time periods than if the asset were a new asset.

Determination

The ICCC has determined to use the same economic lives as in the 2019 price review.

Value of the RAB

Table 23 shows the value of the regulatory asset base and depreciation that has been used by the ICCC in the building block model. This is what the value of the RAB will be with base level capital spending and excludes any allowance for ACS (additional capital spending).

Table 23: Values of the industry regulatory asset base

(Kina millions)	2024	2025	2026	2027	2028	2029
Average RAB value	520	521	520	519	517	513
Depreciation	40	40	40	41	41	41

8.6 Working capital

The ICCC has determined to make the same allowance for working capital as it did in 2014. The allowance is based upon the assumption that, on average, debtors (i.e. retailers) take 30 days to pay their wholesale suppliers and the wholesalers take 30 days to pay their suppliers.

The calculation works as follows:

- Annual operating expenditure is multiplied by 30/365 to calculate the provision of working capital by creditors.
- Annual revenue (the wholesale margin x the wholesale volume) is multiplied by 30/365 to calculate working capital required for debtors, and
- Working capital supplied by creditors is subtracted from working capital required for debtors to give a net value of working capital requirements.

Working capital for inventory is calculated separately as described in the next section.

8.7 Inventory costs

In addition to a return on the RAB, the ICCC considers it reasonable that the petroleum wholesalers earn a return on their fuel stocks, reflecting the costs and value associated with holding stocks of fuel products. The rate of return applied by the ICCC is the same as that for the RAB (i.e. the WACC).

The following method has been used to estimate the cost of inventory.

- Collect data from wholesalers about the volume of inventory held.
- Calculate national inventory volumes as a percentage of national sales volumes (see Table 24).
- Multiply percentage inventory figures by forecast sales volumes to estimate future inventory levels.
- Calculate the value of inventory by multiplying future inventory volumes by the current IPP for each product plus the cost of coastal shipping. (The value used included the IPP + excise tax, as this is understood to be what wholesalers must pay when they import products into PNG). To allow for coastal shipping costs, the ICCC has used the cost of shipping product from Port Moresby to Lae.
- Multiply the value of inventory by the WACC of capital.

Table 24: Inventory as a % of sales volumes

	Petrol	Diesel	Kerosene
Inventory as % of sales	9.71%	6.57%	8.25%

Table 25 shows the resultant value of the inventory using this method and Table 26 shows the return to the industry on this portion of their investment. The inventory cost is 3.5 toea per litre and this has been included in the wholesale margin.

Table 25: Value of inventory (million kina)

	2024	2025	2026	2027	2028	2029
Petrol	40	41	41	42	43	44
Diesel	216	221	225	230	234	238
Kerosene	19	20	20	21	21	21
Value of inventory	275	281	287	292	298	304

Table 26: Inventory cost in the wholesale margin

	2025	2026	2027	2028	2029
Return on Inventory (million kina)	46	46	47	48	49
Toea per litre	3.2	3.2	3.2	3.2	3.2

8.8 Deduction of drum filling costs

As in previous determinations, the ICCC has determined to continue to have a separate allowance for the cost of drum filling. The drum filling assets are included in the wholesale RAB and the operating costs associated with drum filling are already included in the operating expenditure. Therefore, the ICCC has made a separate deduction of these costs from the revenue requirement for the wholesalers calculated in the building block model. This is to avoid double counting these costs.

The deduction is calculated as the total quantity of regulated products sold in drums by the industry, multiplied by the drum filling margin.

8.9 Revenue requirement, X factor and wholesale margin

The building blocks set out below in **Table 27** provide the basis for the ICCC's calculation of the economic cost for the wholesale industry in PNG. Dividing by the industry volume provides the average cost per litre which is the wholesale margin (See Table 28).

Table 27: The Building Blocks (million kina)

(K millions)	2025	2026	2027	2028	2029
Return on assets	132	133	134	134	135
Return of assets	40	40	41	41	41
Operating expenditure	251	255	258	262	266
Drum fillers margin deduction	(6)	(7)	(7)	(7)	(7)
Economic cost	416	421	426	430	434

Table 28: Average Wholesale Costs

	2025	2026	2027	2028	2029
Economic cost (K millions)	416	421	426	430	434
Industry volume (million litres)	1,443	1,472	1,501	1,530	1,559
Average wholesale cost per litre	28.9	28.6	28.4	28.1	27.8

It is the ICCC's normal practice to smooth revenue requirements when using the building block method, by means of an X factor.

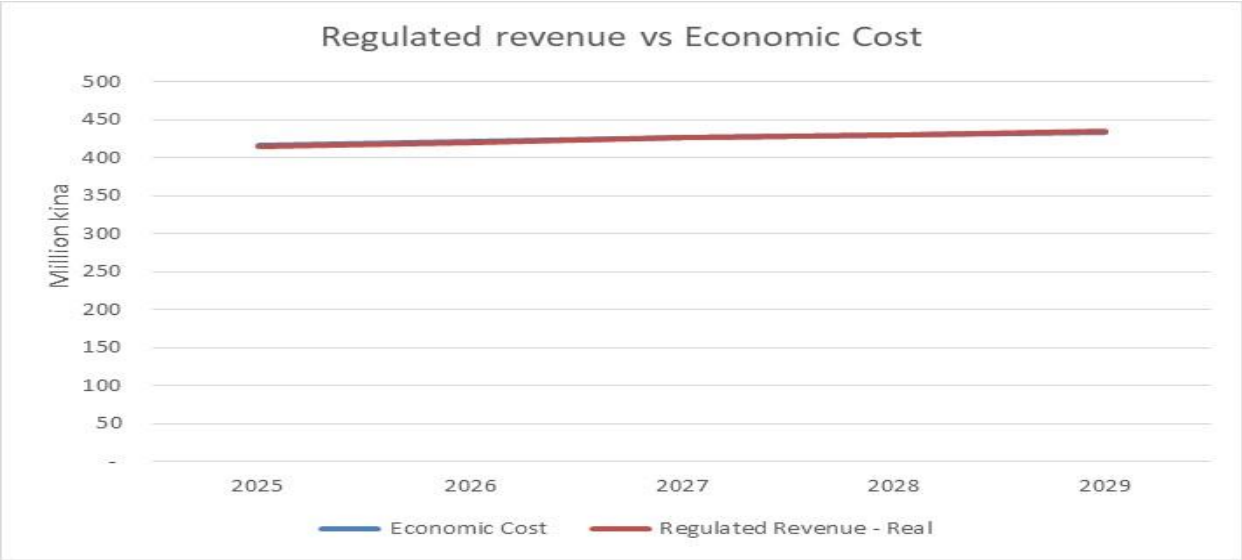
The purpose of smoothing is to avoid any large fluctuations in the price. The method for doing this is to apply an X factor to the annual price. The X factor is set so that the NPV of the economic cost is equal to the NPV of the regulated revenue where the regulated revenue equals the determined wholesale margin times the determined forecast demand.

By setting the wholesale margin price path as shown on Table 29, with a starting price of 29.0 toea per litre in 2025 and an X factor of negative 0.85%, the regulatory revenue will closely match the economic cost (see **Figure 32**). And the NPV of the economic cost will be equal to the NPV of the regulated revenue.

Table 29: Wholesale Margin Price Path (real terms)

	2025	2026	2027	2028	2029
Wholesale margin	28.26	28.02	27.78	27.54	27.31

Figure 32: The effect of revenue smoothing[29]



The reasons why the wholesale margin has changed can be seen in Table 30, which compares the wholesale margin calculated in 2019 with the one determined in this review. The column labelled "2020 (MOD)" are the original kina values in the money of the day and the column labelled "2020 (Real)" are the same value inflated into 2023 kina values[30] to give a real terms comparison with the value in this final report.

Table 30: Changes in inputs to the Wholesale margin

	2020 (MOD)	2020 (Real)	2025
WACC	13.47%	13.47%	15.18%
Capital investment (K million)	701	812	815
Return on assets (K million)	95	110	124

[29] *Note that while the X factor is negative, volumes are growing, so total costs and revenues will also increase.*

[30] *At the time of writing this report, 2024 CPI figures had still not been released.*

Depreciation (K million)	30	35	40
Operating expenditure (K million)	187	217	251
Drum filling operating expenditure (K million)	6	7.0	6
Economic cost (K million)	305	354	408
Volume (million litres)	1218	1,218	1,443
Economic cost (toea per litre)	25.16	29.02	28.26

From Table 30, we can see that the WACC has increased. Return on capital assets has increased because both the capital investment and the WACC have increased. Depreciation has increased also with the higher level of capital employed by the industry. Operating costs have also increased. Overall, because volumes have increased, this has resulted in a decrease in the wholesale margin in real terms.

8.10 Wholesale margin adjustment

Currently the ICCC makes an annual adjustment to the wholesale margin to reflect the impact of inflation. The ICCC will continue to do this using the same process and calculation.

The movement in the CPI will be determined by using the following formula:

$$CPI_t = \frac{CPI_{Mar(t-1)} + CPI_{Jun(t-1)} + CPI_{Sept(t-1)} + CPI_{Dec(t-2)}}{CPI_{Mar(t-2)} + CPI_{Jun(t-2)} + CPI_{Sept(t-2)} + CPI_{Dec(t-3)}} - 1$$

Where:

CPI means the underlying Consumer Price Index (excluding alcoholic drinks, tobacco and betel-nut) published by the National Statistical Office

Year $_t$ is the year for which wholesale margin is being set;

Year $_{t-1}$ is the previous regulatory year;

Year $_{t-2}$ is the regulatory year two years previous; and

Year $_{t-3}$ is the regulatory year three years previous.

This is the ICCC's standard approach to making annual CPI adjustments for regulated prices. The ICCC has previously arranged with the PNG NSO for the provision of the underlying CPI figures to the industry, and this has been delivered on a regular basis.

Therefore, the wholesale rate will be adjusted annually where;

Annual Adjustment for 2026, 2028 and 2029

$$NWM = OWM \times CPI \times (1 - 0.0085)$$

Annual Adjustment for 2027

$$NWM = OWM \times CPI \times (1 - 0.0085) + ACS$$

And Where:

NWM = New Wholesale Margin (Current year)

OWM = Old Wholesale Margin (Previous year)

CPI = the CPI adjustment as described elsewhere in this report

0.0085 = the X factor

ACS = Additional capital spending factor

$$ACS = \frac{(Actual\ capital\ spending - base\ line\ capital\ spending)}{K215\ million} \times 4.73\ TOEA\ PER\ LITRE$$

Where:

Actual capital spending = all wholesalers capital spending between 1 January 2024 and 30 September 2026.

Base line capital spending = K102.3 million inflated using CPI

Determination

The ICCC will confirm to the industry no later than the 31st day of December each year, the new average wholesale margin to take effect from the 7th day of the new year. This is consistent with the ICCC's monthly price announcements done on the 7th day of each month. The ICCC will continue to make available to the industry its calculations of the movements in the CPI and the conversion of this movement in the CPI to the new margin that is to apply.

Determination

The ICCC has set the wholesale margin initially at 28.26[31] toea per litre for 2025 and will be adjusted using a CPI+X price path over the next regulatory period starting from 2025, where the X factor has been set at negative 0.85%. The determined calculation is described in this section of the report.

[31] *Note that this will need to be CPI adjusted. At the time of publishing this report, the latest CPI values have still not been published by the NSO. Therefore, once this is available, the wholesale rate will then be inflated into its 2025 equivalent value.*

9 COASTAL SHIPPING

9.1 Background

Coastal shipping costs represents around 4% to 5% of the retail price of diesel in Port Moresby and more in the more distant coastal and remote locations.

When the project agreement was originally signed, InterOil provided coastal shipping services to all the wholesalers. However, when Mobil began importing its own fuels, it also began to source its own coastal vessels and stopped sharing shipping capacity with InterOil. This continues to be the case.

Product is typically delivered to ports in PNG using either MRT (medium range tanker) or LCT (local coast trader) depending upon the quantities required (see Table 31).

Table 31: Typical vessel size

MRT Ports	LCT Ports
Kimbe	Alotau
Lae	Oro Bay
Madang	Bialla
Port Moresby	Kavieng
Rabaul	Wewak

Things to note

- Actual vessel size at each port may vary from time to time, depending upon supply requirements
- Puma Energy operates both an MRT and an LCT from Napa Napa.
- Mobil operates an MRT to import product directly from Singapore to MRT ports. And it uses an LRT to transport product between from MRT ports to LCT ports within PNG. So Lae, Rabaul, Port Moresby and Madang all act as distribution hubs for smaller ports.
- The IPP includes the cost of transporting fuel by ship into PNG, so Mobil's costs are for importing fuel are not included in coastal shipping cost allowances.
- Niugini Oil and Islands Petroleum import fuel supplies through Mobil.
- Mobil and Puma report actual shipping cost information to the ICCC using an excel template provided by the ICCC.
- It has recently been agreed that Islands Petroleum will start to complete the LCT template rather than Mobil. Although Mobil operates the vessel, Islands Petroleum apparently pays most of the costs because most of the product is delivered to them.

Figure 32 shows the port circuits and likely approximate routes taken by Puma and Mobil chartered MRT vessels. Mobil imports product from Singapore and delivers it directly to storage facilities in Port Moresby, Lae, Madang and Rabaul. From these ports it is further distributed to other ports as shown in Figure 34.

Figure 33: MRT Port Circuit

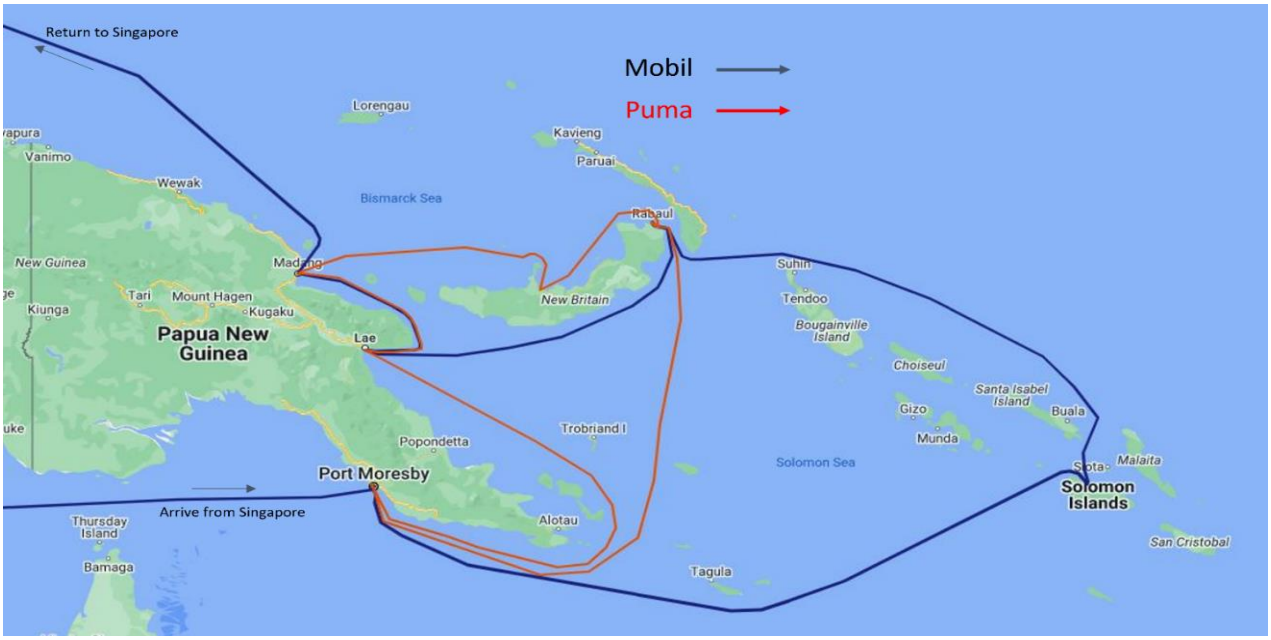
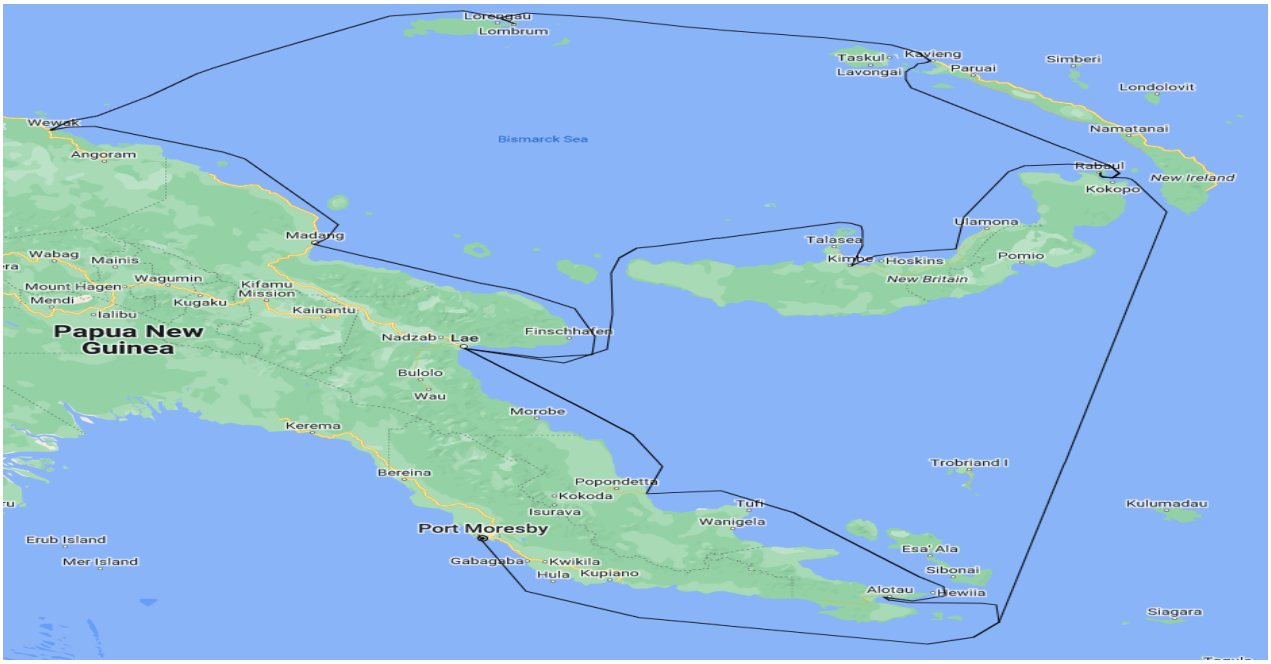


Figure 34: LRT Port Circuit



Puma either produces product at the refinery at Napa Napa or imports it into its storage facilities at Napa Napa near Port Moresby. Then it distributes product from Port Moresby to storage facilities around PNG, either by MRT (as in Figure 32) or LRT (as in Figure 34), as determined by logistics requirements at the time.

Optimising shipping is a complex issue which involves trade-offs, ensuring there are adequate supplies at each port, the capacity of storage facilities at each port, the capacity and utilisation of the vessel and sailing times and schedules. For this reason, there is no one best approach and each company appears to be continuously tweaking their shipping schedules.

Puma commented in its submission about the various alternative options it had considered to reduce the cost of coastal shipping

9.2 Reporting template

In 2019, the ICCC introduced a new template to Mobil and Puma to collect information about their shipping costs. The template calculates the marginal cost of each voyage, as well as the cost of unused capacity on vessels. Unused capacity includes both unused capacity during a journey as well as idle time when a vessel sits at anchor between voyages.

The template calculates the toea per litre cost of delivering to each port. The cost drivers which are built into the model are discussed in the next section.

From the ICCC's perspective, use of the template has been successful. It has standardised the way information is collected about shipping costs and increased the ICCC's transparency of these costs by providing the information in a marginal cost form.

Puma in its most recent submission to the ICCC has made the following request.

> *"NGE kindly requests that the ICCC reviews its freight calculation model and evaluates the monthly operating cost for the two vessels required to deliver fuels to its terminals rather than on a per voyage basis"*[32]

The ICCC has considered this request and has assumed that Puma has made this request because of concerns that the cost of idle shipping capacity will not be recovered. However, it should be noted that

1) The cost of idle time between voyages is already built into the cost in toea per litre for each journey. The model includes the cost of idle time since the last voyage and builds this into the cost of the next voyage.
2) Understanding the cost of each voyage provides better transparency of the underlying costs. Averaging of costs between voyages would fail to adequately reflect the differing cost of going to individual ports.

Mobil has used the template as intended to provide information to the ICCC on their LRT costs.

Mobil has also used the template to provide its MRT costs even though this is not used for coastal shipping[33]. However, the ICCC does use this information to compare actual import costs against the costs allowed for in the IPP calculations.

Mobil has also proposed[34] that the MRT costs should be averaged with Puma's MRT costs. The ICCC does not think this is appropriate as they are for a different purpose. Mobil's MRT is being used to import product into PNG, while Puma's MRT is being used to distribute product between ports.

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[32] *Puma Submission August 2024.*

[33] *As previously noted, the shipping costs for importing fuel are covered in the IPP calculations.*

[34] *Mobil submission*

Determination

The ICCC will continue to use the coastal shipping template in its current form and to continue to exclude Mobil's MRT costs from the calculations.

9.3 Cost drivers

There were several comments made by wholesalers in their submissions that indicate there is some misunderstanding about how shipping costs vary between ports. This section therefore lays out the ICCC's view of shipping costs for fuel.

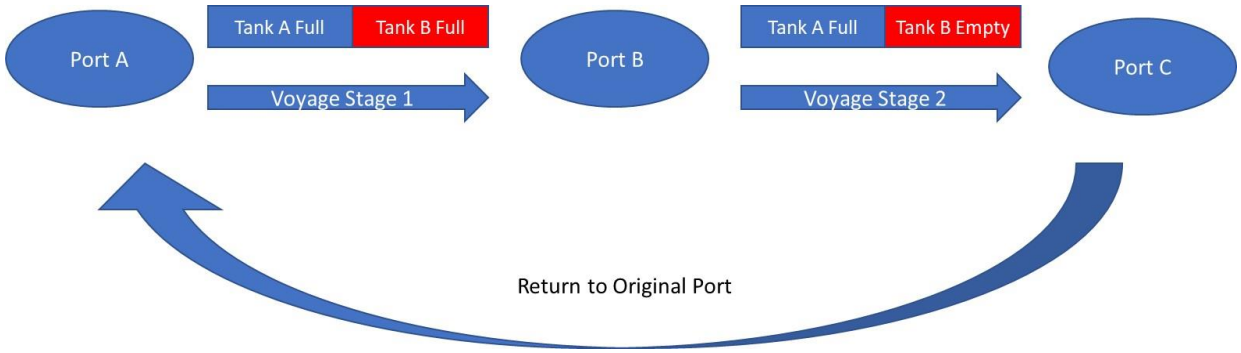
Shipping costs are driven by the following factors.

- The size and type of vessel. The total operating costs of larger vessels are higher, but generally when expressed as a cost per litre of capacity, they are cheaper on a per litre basis.
- The longer a voyage is, the more expensive it will be. This is a function of both the time cost of the vessel (which is often chartered for a period of time), and the fuel required to propel the ship over that distance. The time spent at each port on the voyage extends the total time of the voyage, so the time spent loading and unloading product will also increase the cost of the voyage.

The key concept to understand is as follows. Because the fuel ship completes a voyage by visiting each port and does not collect any other product along the way, any ship's storage capacity consumed by product destined for a particular port is effectively consumed for the entire voyage. This can be illustrated with the assistance of Figure 35.

Suppose a ship has two tanks of equal size which are both full when it sets out on its voyage from Port A to Port C. It stops and delivers product from Tank B at Port B. It then continues to Port C with Tank B empty. Tank B is empty on stage 2 of the voyage because there is no opportunity to fill it up with a product from Port B. It then returns to Port A with both tanks empty.

Figure 35: Capacity consumption on a ship's circular route.



We note that:

- The cost of Tank A and Tank B will be exactly the same on stage one of the voyages, and
- The cost of Tank B on the second stage of the voyage will be exactly the same as the cost of Tank A on the second stage of the voyage. The fact that Tank B is empty, does not change its cost.

From this there are several things to note.

- If Port B is exactly half the distance to Port C, then only 37.5%% of the capacity of the entire voyage, is used (see Table 32).

Table 32: Vessel Capacity Utilisation

	Proportion of journey	Capacity utilisation
From Port A to Port B	25%	100%
From Port B to Port C	25%	50%
From Port C to Port A	50%	0%
Whole Voyage	100%	37.5%

- It would have been cheaper on a per litre basis to have two separate trips with full tanks. So rather than stopping at Port B on the way to Port C, it would be more efficient to deliver both Tank A and Tank B to Port B and then return to Port A, refill both tanks and then deliver both tanks full to Port C. Any time a ship has empty tanks creates spare capacity costs and these drive up the cost of delivered product. Delivering a full ship load of fuel to one port at a time, will mean that only 50% of the capacity of the vessel is left empty during the voyage, compared to 62.5% in our example.
- It is tempting to try and treat Port B and Port C differently from a cost perspective, because Port C is further away. However, both ports consumed the same capacity on the whole voyage. Delivering product to Port C decreased the volume that could be delivered to Port B and conversely, delivering product to Port B decreased the volume that could be delivered to Port C.
- While making separate voyages to both Port B and Port C would be a cheaper transport solution, on a per litre basis, making larger deliveries would require increased storage capacity at each port and involve higher inventory costs at each port. So, total costs may not be cheaper. For this reason, it may still make economic sense to have a voyage which stops at multiple ports.
- The volume delivered to each port does not change the cost per litre for the voyage. If Tank A were twice the size of Tank B, the time to unload Tank B will be less. But the total length of the voyage does not change, and the total capacity of the vessel does not change. Because these are the things that determine the cost per litre for any product on the vessel, the cost per litre for delivery at any port does not change.
- To change the cost of delivering product, the cost of the voyage needs to change. This means either changing the length of time the voyage takes (which ties up the capacity of the vessel), the distance of the voyage (which drives fuel cost) or changing the vessel. The other major factor which can be changed is the utilisation of the vessel (less idle time and full tanks).

The purpose of including this explanation in this report is to help the industry to understand the logic of the ICCC's coastal shipping cost template. The ICCC is not proposing that the industry change its shipping practices.

9.4 Full cost recovery

The intention of the coastal shipping allowance used to calculate retail prices is that they should reflect the actual cost of distribution.

Islands Petroleum has submitted that it does not cover all its costs as charged by its service provider.

The ICCC expects that this issue should resolve itself as the ICCC is in the process of commencing to receive costs directly from Islands Petroleum.

However, for ports where both Islands Petroleum and Puma deliver fuel, the coastal shipping cost will continue to be an average of both service providers costs.

9.5 Incentives

Ideally arrangements for coastal shipping should:

- provide incentives for industry participants to be economically efficient;
- recognise the legitimate commercial requirements of the wholesalers; and
- support the ongoing supply of fuel to all provinces in PNG.

Conceptually, when actual costs are simply passed through there is no incentive for wholesalers to seek efficiency gains to lower costs. Any additional costs they incur are simply passed on to consumers.

However, because Mobil is competing against Puma to import product into PNG and distribute to ports around the country, this does create some incentive to keep costs down.

In practical terms, the wholesalers do not have a lot of leeway to manage shipping costs. Charter prices are driven by international shipping trends. And shipping must conform to standards which are defined by various regulatory bodies both in PNG and internationally.

The major source of control the wholesalers do have over these costs is choosing the level of shipping capacity they lease and how well they utilise this capacity. It has already been noted the logistics of coastal shipping delivery are also related to storage capacity at each port and other supply constraints. The cost of all elements in the distribution chain are linked and must be considered by wholesalers who want to optimise their economic costs.

Several of the wholesalers made comments in their submissions that disagree with the ICCC's previous reviews which promoted the idea that there were opportunities to reduce costs by more optimal shipping.

At this time, the ICCC is focused on supporting the industry to maintain reliable supply of fuel to PNG. Therefore, the ICCC has determined not to change the current methodology for including coastal shipping costs in the retail price.

10 ROAD FREIGHT

10.1 Background

Road transport is a separate component in the cost build up used to set retail prices[35]. The significance of this cost varies by location. For example, in July 2024, the road transport allowance in Port Moresby was 4 toea per litre, but in Kundiawa it was 46 toea per litre.

To determine the road transport allowance, each wholesaler submits its average quarterly transport costs in each geographic area. The ICCC then takes a simple average of these costs to set the retail fuel price in each area.

The ICCC only began using averages after 2019. Prior to this, the ICCC set a range of retail prices based on the highest and lowest transport costs in each geographic area. However, this approach led to all wholesalers charging the highest price, driven by the most inefficient operator. As a result, the ICCC switched to calculating an average cost to encourage less efficient operators to reduce their transport expenses. In 2019 wholesalers expressed concerns that this change could compromise safety standards. However, there appears to be no evidence that safety has been affected.

10.2 Cost variation by location

Currently, the ICCC calculates separate retail prices for each of 29 geographic areas. The reason for this difference is the different transport costs to deliver fuel to each area. From time to time a wholesaler may request that an additional area is created because of the additional cost of serving a different area. To justify creating new areas, costs need to be materially different, and this difference should be driven by underlying cost drivers and not just operational inefficiency.

This approach appears to be adequate.

10.3 Incentives for cost efficiencies

The use of cost averaging appears to be working successfully in areas where there are more operators. Figure 36 shows the average road transport costs for Port Moresby. Since 2019, when averaging was introduced, transport costs have fallen. Figure 37 shows how the transport costs for each individual operator has changed. Similar effects can also be observed in other geographic areas.

[35] *See Table 62 in section 16.*

Figure 36

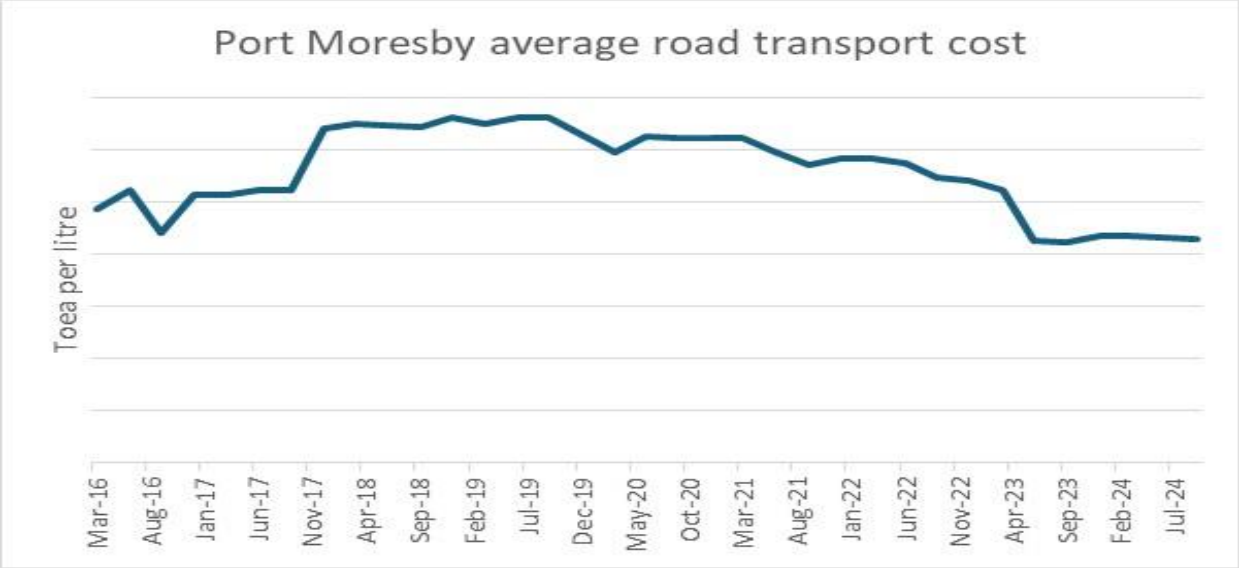
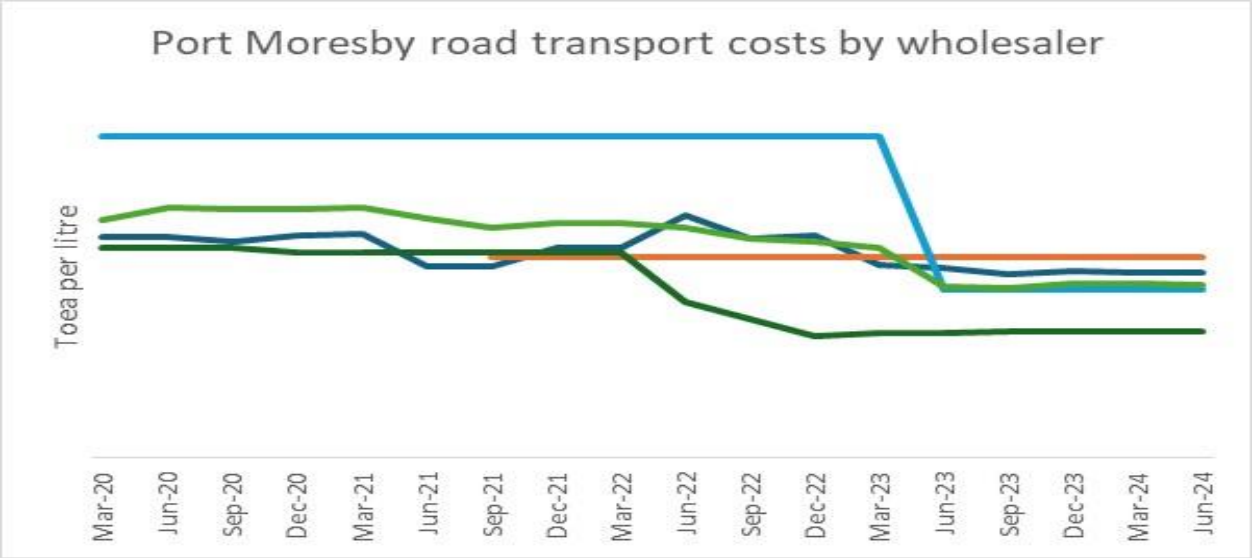
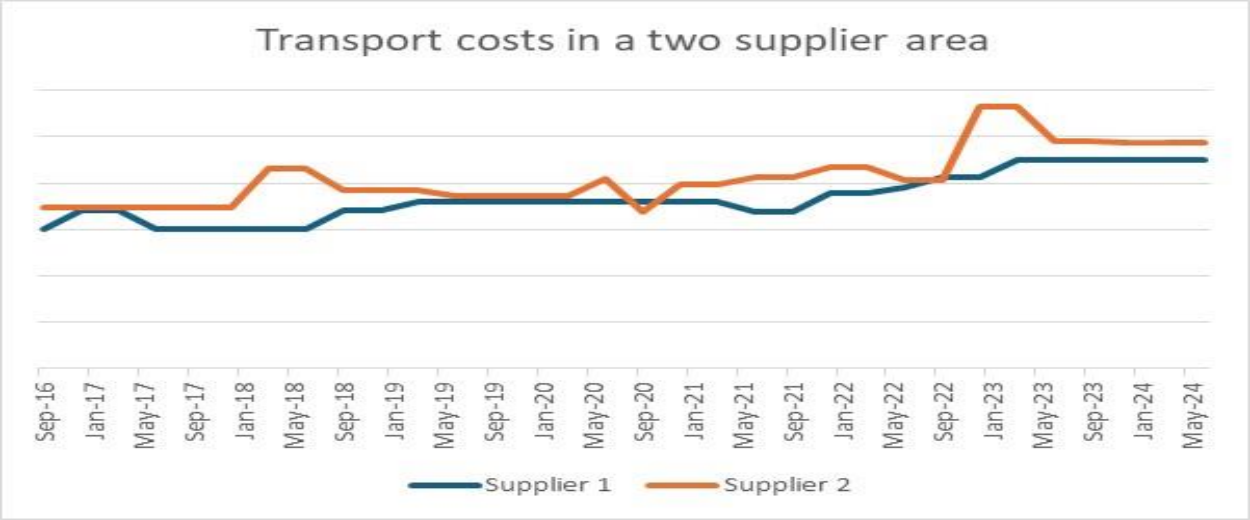


Figure 37



In other geographic areas transport costs have continued to increase. Figure 38 shows the transport costs for an area where there are two suppliers. Short term increases by one operator have subsequently been followed by decreases. The pattern appears to be the same both before and after the introduction of averaging. In this situation it appears that averaging has made little difference to the cost outcomes.

Figure 38



Overall the ICCC thinks that averaging is having a moderating influence on wholesalers' costs, especially in higher volume areas where there are multiple operators.

Determination

The ICCC will continue to use average actual road transport costs to set retail prices in each geographic area.

10.4 Transport contracts

Competitive tenders

In previous reviews the ICCC has discussed with wholesalers the process it uses to award transport contracts. If a contract is awarded by competitive tender, this will help to ensure there is some level of competition in the transport market and that, consequently, costs will remain under control.

What the ICCC has generally found is that, while there may be competitive tenders in some geographic areas, in others there is a limited number of companies who can provide the service.

Transport capability shortage

Recently one wholesaler commented that they were losing road transport contractors to other industries. In some parts of PNG, mining companies will pay higher rates than fuel wholesalers, and so the contractor was choosing to do other work instead. This is a natural consequence of a short-term supply shortage of a scarce resource. Normally, over time the ICCC would expect more contractors to enter markets where such shortages exist. Additional vehicles are easy to acquire, but skilled drivers may be more difficult.

Under these circumstances the wholesaler has two options.

1) Pay more to the contractor to ensure they prioritise fuel deliveries to service stations.
2) Start to do the fuel deliveries themselves.

This wholesaler has chosen the second option. This will involve purchasing and maintaining vehicles, recruiting and training drivers and managing the operation.

It is likely that the cost of delivery of an inhouse transport operation is likely to be less transparent than a contract to a third party. So, reporting the actual cost of delivery will become more complex. This is discussed further in the next section.

10.5 Standard reporting

The ICCC currently receives information from all wholesalers about their road transport costs. The nature and form of the cost information varies widely and can be confusing. If wholesalers also start to carry out road transport services themselves, it is expected this variation in reporting will increase.

In the draft report, the ICCC proposed to introduce standardised reporting to address these issues. However, after discussion with various stakeholders, it decided not to proceed. The ICCC is mindful of the current levels of stress and change within the industry and introducing further changes would not be helpful at this time.

Determination

The ICCC will continue to the current approach of collecting information about road transport costs from wholesalers.

11 DRUM FILLING MARGIN

The ICCC will continue to calculate a drum filling margin using the same approach as in 2019.

In their submissions, wholesalers were in favour of keeping the drum filling margin as a separate cost allowance. As one wholesaler commented

"Drums are labour and logistically intensive and variable in volume by location."

No submissions raised any issues with the current level of the drum filling margin.

The ICCC has therefore updated the model used in 2019, by CPI adjusting the 2019 cost inputs. Activity inputs have been kept the same.

11.1 Background

Due to the absence of local retail outlets in some coastal and remote regions, a substantial proportion of fuel used in PNG is sold in drums. In 2024 the ICCC has estimated that about 4% of total industry volumes is sold in drums. This has declined since 2019 and one wholesaler commented that they thought the volume of drums used would continue to decline.

Islands Petroleum, Niugini Oil and Puma Energy all have drum filling operations.

The first time a consumer purchases a drum of petroleum product she or he will buy the product as well as the drum. However, drums can be reused. Provided a drum is returned in serviceable condition, subsequent fillings (usually of a different drum; sometimes of the same one) do not require the drum to be purchased again. The number of times a drum can be refilled will depend upon the manner in which it has been transported, stored and handled by customers. Estimates of the average number of reuses range from around three to fifteen times. The ICCC has used an average of 7.5 times.

Drum filling, which involves transferring fuel from bulk storage to the drum, is a relatively time consuming and labour-intensive task. Each time a drum is received it generally needs inspection, cleaning, painting and the seals and caps checked. In addition, drums take up storage space at depots.

In previous determinations the ICCC has set a drum filling margin to recognise this cost. This means that the retail price of a drum includes both the wholesaler's margin plus a drum filler's margin:

Fuel Price in Drums = IPP + Wholesale Margin + Transport Costs + Drum filler's Margin

The ICCC does not regulate the price of the drum. In the ICCC's view, drums are a consumable item which is subject to free market competition. Therefore, any local producer who overcharges for drums will face competition from imports and other suppliers. Two wholesalers commented in their submissions that there was only one drum manufacturer in PNG and that no drums were imported.

There are a variety of approaches to drum charging. Some wholesalers do not charge extra for a new drum. Some have higher standards for the second-hand drums they accept. Some will only refill their own drums, while others will refill any drum, provided it doesn't leak.

The drum filling costs are captured in the operating cost and the capital costs of the wholesaler. To avoid double counting these costs, the allowance for drum filling is subtracted from the costs that are used to set the wholesale margin.

This means that if the drum filling margin is set too high, the whole margin will be lower in compensation. And if the drum filling margin is set too low, the wholesale margin will be higher in compensation.

A substantial investment in equipment is required to establish a drum filling operation. Indications from wholesalers are that this may be three to four million kina for a standalone setup. This would potentially translate into a cost per drum filled of between 10 and 30 toea per litre depending upon the volume of drums filled each year. However, drum filling operations are generally carried out in wholesale storage facilities where the facilities are shared with other wholesale activities. Drum filling at any particular storage depot may represent as little as 10% of the volume or as much as 70% of the volume of throughput for that facility. For this reason, the ICCC has not attempted to separate out equipment costs from other wholesalers' costs. Rather, equipment costs are recovered as part of the wholesaler's margin.

Old drums vs new drums

In 2019, the ICCC proposed to set separate drum filling margins for new and used drums.

The industry raised a number of concerns about this, including:

- It would cause customer confusion.
- Customers would be incented to fill drums by other, perhaps dangerous means.
- Customers will regard wholesalers with suspicion, believing that they are being pushed into buying a new drum.

Based upon this feedback, the ICCC decided not to proceed with the idea.

11.2 Estimating drum filling costs

The ICCC has estimated drum filling costs with a bottom-up model. The activities required to fill a drum are shown on Table 33.

Table 33: Activities required to fill a drum

Activity	New Drum	Return Drum
Unloading	Required	Required
Integrity Check		Required
Storage	Required	Required
Cleaning		Sometimes
Painting		Sometimes
Stencil		Sometimes
Filling	Required	Required
Loading	Required	Required
Gate / Admin	Required	Required

The inputs used in 2019 have been updated by assuming that all costs will have increased in line with the CPI. However, the ICCC invites wholesalers to provide submissions on their actual current costs. The main cost elements currently in the model are shown in Table 29.

Table 34: Input costs for drum filling model

Average annual cost of general staff (kina / year)	17,385
Average annual cost of supervisor (kina / year)	34,770
Cost of protective clothing (kina / year)	464
Ratio of staff to one supervisor	6
Paint cost (kina / litre)	57.95
Stencil cost (kina / stencil)	11.59
Material used to clean drum (kina / litre)	4.64
Cost of new drum seals (kina / seal)	0.58
Land value (kina / m2)	116
Rental allowance on land value	7%

The results of the calculation showed that:

- The cost of filling a new drum ranged from 4.2 toea per litre to 2.8 toea per litre with a volume weighted average of 3.8 toea per litre.
- The cost of filling a used drum ranged from 11.8 toea per litre to 9.9 toea per litre with a volume weighted average of 11.8 toea per litre.
- Assuming that a drum is used 7.5 times on average, a new drum will be used 13.3% of the time. This produces a weighted average drum filling cost of 10.2 toea per litre.

Determination

The ICCC will continue to use a separate drum filling margin to calculate the price for fuel sold in drums. This has been set at 10.2 toea per litre[36]

[36] *At the time of publishing this report, the latest CPI values have still not been published by the NSO. Therefore, once these are available, the wholesale rate will be inflated into its 2025 equivalent value.*

12 RETAIL MARGIN

Summary

Based upon input data provided by the industry, the ICCC has increased retail margins by an average of 9 toea per litre. Increases have been driven by a number of changes. Table 35 shows the magnitude of some of these changes. And Table 36 shows how total Land costs, operating costs and asset costs have changed.

Table 35: Reasons for increased retail margin[37]

Reason	Toea per litre
Reduced % of sales sold at peak	-1.8
Increased WACC to reflect construction risk	+3.2
Allowance for evaporation	+1.3
Allowance for the cost fuel used in Gensets	+1.4
Maintenance	+0.9
Inventory at the bottom of the tank	+0.1
Higher operating expenditures	+3.3
Improved information about sales volumes	-8.0

Table 36: Average changes by cost component (toea per litre)[38]

	New	Previous	Change
Land Costs	5.4	1.1	4.5
Operating Costs	21.3	17.3	4.0
Asset Costs	18.4	17.8	0.2
All average	45.0	36.0	9.0

Background

Prior to writing the draft report, the ICCC carried out a survey of retail service stations and visited 28 service stations. However, responses to the survey were limited and incomplete. Due to the ICCC's limited ability to contact service station owners directly, only 17 service station responses were received out of the 41 contacted.

At the industry workshop held in September, the ICCC focused upon this issue and requested the assistance of retailers and wholesalers to get a better response. Consequently, the ICCC received a total of 82 retailer responses to the survey. While many of the responses were incomplete, this is the best data set the ICCC has ever had for service stations.

As a result of input at the workshop, from submissions and from the survey data, substantial changes have been made to inputs of the retail model. This has consequently led to retail margins generally increasing above existing levels.

[37] Based upon simple average of margin across all geographic areas.

[38] The values in this table are simple averages of the values for each geographic area. Due to averaging effects the individual values do not add up to the totals.

Methodology

The ICCC has used the same methodology to set the retail margin as it did in 2019. This is based upon a bottom-up economic model of the cost of building and operating a new service station. This model was shared with all the wholesalers and any retailer who requested a copy. The model enabled a service station owner to input their own details and see the margin that the model estimated for their site.

The model sizes the requirements, capacity and the costs of the station based upon the geographic location and average sales volume for each site. The model estimates a separate margin for each of the 234 retail sites identified in the review based upon its volumes. The model estimates the cost of building and operating a new service station, required to supply existing volumes. To do this, it estimates the number of bowsers, size of the tanks and size of the canopy and sealed areas required to deliver the reported volume. So, the actual number of bowsers, size of tanks, canopy and sealed areas may be different. This is to be expected as sales volumes may change over time, while the design and capacity of a service station is likely to stay the same.

It is important that the price established will support the development of new sites. If this were not true no new sites will be built, which would not be good for PNG or its citizens.

However, it is also important that costs are not inflated to support sites and services that PNG's consumers cannot afford. For this reason, the ICCC has taken a minimalist approach in its modelling.

Retail cost components

The ICCC's methodology breaks the retail margin calculation down to its three major components to be more explicit about what is included in it. This is illustrated in **Figure 4** (Section 2.5)

The three component parts are:

- retail operating cost;
- retail asset cost; and
- retail landowners' cost.

Together these three components add up to be the "Retail Margin". One wholesaler commented in its submission that this had been helpful for conversations between various parties when negotiating commercial arrangements.

It is important to remember that the purpose of calculating a retail margin is only to determine the retail price. It does not provide any indication of what a retailer should pay to a wholesaler or vice versa. This is described and illustrated in more detail in section 2.5.

There are often arguments by retailers and wholesalers over the break-up of the retail margin. By describing the margin in its component parts, the ICCC is not regulating the way in which wholesalers and retailers split the component costs between themselves. Wholesalers and retailers remain free to enter into contracts with each other as they see fit and to divide the costs of delivering fuel to consumers between them as they see fit. The ICCC's only focus, in calculating these margin components, is to establish the cost of delivering fuel to a consumer via a retail site. This does not have any bearing on who will bear the cost of these components (wholesalers, retailers or landowners).

Because the circumstances at every retail site will be slightly different, the ICCC can not specify how the cost should be split between a retailer, a wholesaler and landowner.

12.1 Submissions

The ICCC has received written submissions from all the wholesalers both prior to the draft report and in response to the draft report. The ICCC has also met face to face with each wholesaler and for most wholesalers this occurred on more than one occasion. In most of these meetings the retail margin was a major focus with the main message being that the retail margin was too low.

The ICCC has also met individually with several retailers. Each retailer brought their own perspective and highlighted their own difficulties in continuing to operate in the market. In some cases, retailers who no longer operated contacted the ICCC and described the reasons they had left the market.

Misunderstandings about the retail margin

In the draft report the ICCC noted that some submissions indicated that there were still misunderstandings about the difference between the wholesale and retail margin. Following discussions with various stakeholders and the industry workshop, the ICCC believes that most of these misunderstandings have been clarified.

Is the retail margin sufficient?

Both before and after the draft report, most stakeholders emphasized that retail margins were too low for a retailer to survive.

The retail margin should cover actual investment costs. However, the output of the review must be retail prices for each different geographic area with only one price in each area.

There were 234 separate retail sites identified in the review. The ownership of each site is usually split between different parties with no two sites having exactly the same arrangements. It would be virtually impossible and certainly impractical to gather actual cost information from all the parties concerned. Because of these constraints, the ICCC must find other ways of estimating the costs that represent all stations and allows for their particular circumstances. The ICCC has sought to do this via the retail survey in the hope that this information will be representative of the industry as a whole. By setting different margins for different geographic areas and by modelling the way costs vary with the size of the service station, the ICCC can capture key cost differences faced by retailers.

It should also be noted that in any competitive market there will be some companies who fail financially. Failure could be due to inefficiency, possibly from being too small or because their costs are too high, possibly due to overinvestment. It is expected that the PNG petroleum market as a regulated market will also experience both these types of failure from time to time.

Survey Data Collection from retailers

The ICCC has surveyed retail owners and operators in each of the last three reviews. This has been its main source of information about their operating costs. In 2019, 24 responses were received. In the 2024 review prior to the draft report, only 17 responses were received. But after requesting further information an additional 65 responses were received to provide a total of 82 responses. ICCC staff also visited 28 sites during this review.[39]

The ICCC would like to thank all retailers who responded to the ICCC's requests and also to the wholesalers who put considerable effort into collecting this information from the retailers they supply. This had a substantial impact upon the ICCC's assessment of retail costs and the ICCC has modified its determination as a result.

As part of the survey, the ICCC has collected email addresses of retailers. It is hoped that this will improve the ICCC's ability to communicate directly with retailers in future reviews. However, the assistance of wholesalers will always be crucial.

Asset Costs

The survey data provides the ICCC with information about operating costs and land rental. However, it does not provide information about asset costs. For this the ICCC has relied upon information from wholesalers.

In this 2024 review, the ICCC has received various indicative numbers of what it costs to build a new service station. However, there were no submissions that gave a detailed breakdown of the cost of building a new service station. Consequently, for retail asset costs, the ICCC has relied upon 2019 data as follows.

- 2019 costs were inflated to reflect PNG inflation, international inflation and exchange rate driven inflation.
- Data from wholesalers' asset registers was used to check the cost of bowsers and tanks.
- Comments about the scalability of costs to reflect smaller and larger stations were noted and adjustments were made to the components assumed to be installed at each station depending upon its size.

Because most new service stations include other facilities[40] not related to selling fuel, this complicates cost estimation. In most cases, information about the total cost of building a new service station provided to the ICCC includes the cost of these facilities. Wherever possible, the cost of these other facilities has been removed from the information provided by wholesalers. For this reason, the ICCC believes the cost information produced by the retail model is less than wholesalers expect it to be. However, when wholesalers examine the individual cost components in the model, they appear to be about right.

Overall, the feedback from the industry was focused upon operating costs and land rent costs being too low. In comparison, there was very little feedback about asset costs. Consequently, the ICCC believes that asset costs produced by the model are about right. And the lack of detailed feedback about the model's asset costs inputs has been taken as confirmation that the numbers are correct.

[39] *This included sites in Port Moresby, Mt Hagen, Mendi, Goroka and Kimbe.*

[40] *This includes kai bars, grocery outlets, gas bottle sales, car washing and mechanical facilities*

12.2 Sales volumes

The sales volume is a major determinant of the retail margin. The ICCC's model identifies all the costs required to support a minimum level of sales. This includes the size of the site, the size of the tanks, the number of bowsers and the number of staff required to support that level of sales. Once the costs of all these items has been estimated, it is divided by the volume.

$$\text{Retail margin} = \frac{RetailSiteCosts}{AverageSalesVolume}$$

As volumes increase, this ratio of cost to volume tends to decline and stations become more economically efficient.

In this review the ICCC has taken a fundamentally different approach to sales volumes. In 2019 average sales volumes were estimated for each of the 29 geographic areas. These were then used to set a margin for that area. However, in this review, the ICCC has information about the sales volume for each of the 234 sites identified. So, a margin was calculated for each individual site and then this information was used to set a retail margin for each area.

This change has had a major impact upon retail margins. Table 37 compares the new margins to what they would have been if the 2019 volumes had been used to set the margin for each area, using the 2024 model.

Table 37: Change in margin due to change in volume settings

	New Retail Margin	2019 vol Setting	Impact of change
Alotau	38.6	40.7	(2.0)
Bulolo	38.8	48.2	(9.4)
Goroka	40.1	37.7	2.4
Kainantu	37.0	44.0	(7.0)
Kavieng	37.3	38.8	(1.5)
Kimbe	51.2	45.8	5.4
Kokopo	41.8	43.5	(1.6)
Kundiawa	36.9	56.2	(19.3)
Lae	50.4	43.5	7.0
Madang	43.5	38.9	4.5
Mendi	50.5	70.0	(19.5)
Mt.Hagen	50.0	51.9	(1.9)
Namatanai	51.9	80.0	(28.1)
Popondetta	39.9	50.1	(10.3)
Port Moresby	44.0	43.6	0.4
Ramu	36.7	69.7	(33.1)
Tari	58.9	83.1	(24.1)
Wabag	44.2	67.6	(23.4)

For most areas the change in approach has resulted in much lower retail margins. There are several reasons why this is likely to be case.

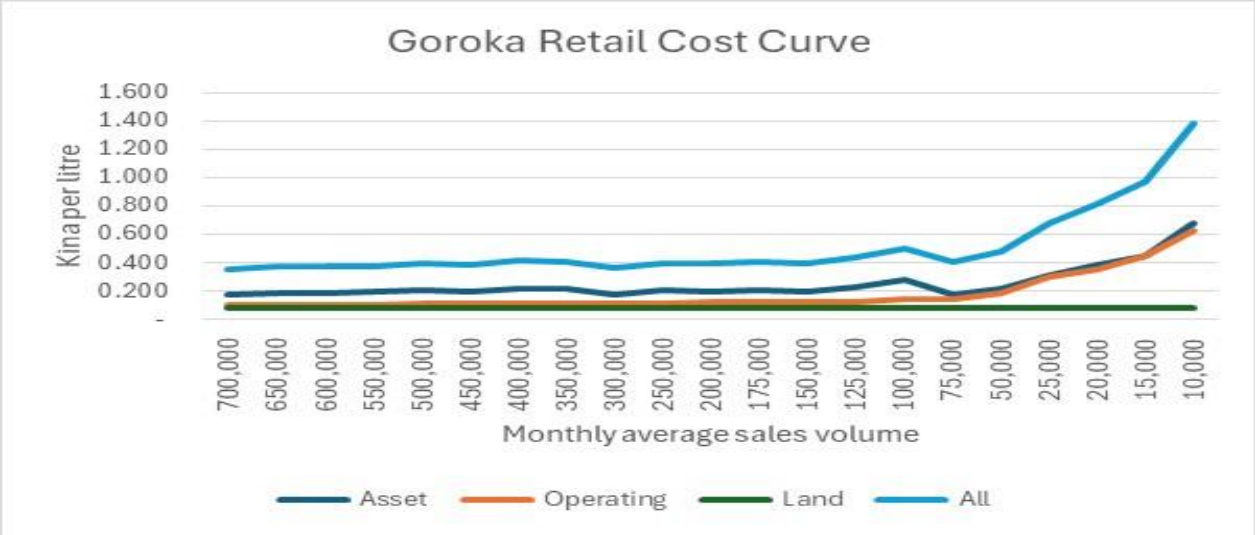
The 2019 approach would have tended to average in the smaller stations and therefore had the effect of setting overall volumes lower. The 2024 approach is based upon much better and more detailed data about volumes in each region.

In some areas, the effect is much less. For example, in Ports Moresby the effect is small probably because in 2019 the ICCC had reasonably good estimates of sales volumes in Port Moresby compared to some of the smaller centres.

Minimum volume

Very small service stations are likely to be inefficient. Figure 39 shows how the model's outputs change with volume for the region of Goroka[41]. As volumes fall below 50,000 litres per month, the average cost per litre increases substantially. To address this inefficiency effect, the ICCC has set the minimum size of a service station to 25,000 litre per month[42]. This means that, when determining retail margins in any geographic area, the costs of these small service stations have been excluded from the calculation.

Figure 39



Very Small Stations

One possible reason for the high indicative costs of these small service stations is that the model simply does not reflect their costs. To address this the ICCC estimated what it would cost to build a simple one bowser service station on a minimal budget in a rural area. This analysis indicated that it may be possible to build a simple site with costs low enough to able to compete at the regulated price.[43]

The ICCC discussed this at the industry workshop. However, there was no clear view communicated by those who were present as to whether or not this might be achievable.

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[41] *Goroka has been used here as an example, but all geographic areas show the same effect.*

[42] *This is a change from 2019, where the minimum was set at 20,000. This change has been made after considering the impact of including these small stations.*

[43] *In its analysis the ICCC investigated the use of moveable self-bunded tanks with built-in bowsers.*

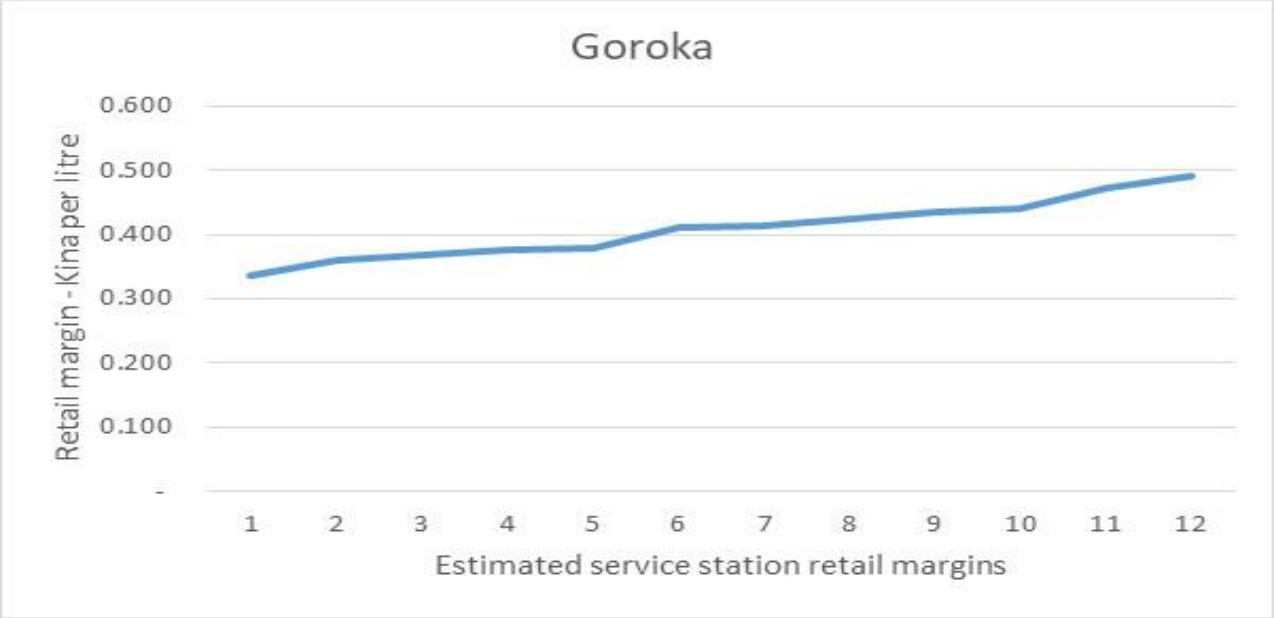
The ICCC suspects that innovative Papua New Guineans may be able to develop a solution to this by taking a different approach to a traditional service station. And the current regulatory regime would not prevent them from doing so[44].

Determining a Retail Margin

Figure 40 shows the model's outputs for the reported volumes of the actual service stations in Goroka.[45] It shows that margins range from 33 toea per litre to 49 toea per litre.

This creates a dilemma, because while every service station in a region has different costs, the ICCC must set a single price. If the ICCC sets prices too high, inefficient service stations will continue to operate, and consumers will pay too much for fuel. But if the ICCC sets the cost too low, retailers who are less efficient and not able to adapt will eventually go out of business. This could have the effect of reducing competition.

Figure 40



It is natural in competitive unregulated markets for inefficient companies to go out of business. Only the most cost-effective companies can continue to compete. If a company over-invests and then fails to achieve the sales volumes it envisages, it will not recover its costs. Also, as markets evolve, service stations which were efficient with high sales volumes when they were new may decline over time. At the end of the economic life of these service stations, the owner may decide that it is not worthwhile to replace the assets at that site. These older service stations may continue to operate for years before they finally close. There appear to be many older stations like this in parts of PNG.

In considering the effects of competition in natural markets, it is clear that the ICCC should not set prices to cover the costs of service stations that are inefficient compared to the overall market.

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[44]Such a business would still need to meet PNG's health and safety requirements.

[45]Service station with volumes of less than 25,000 kina have been excluded.

The ICCC has therefore adopted some guiding principles to assist with the trade-offs it must make when setting prices.

The objectives of settings prices are to:

- promote efficiency
- ensure efficient operators can earn a fair return on their investment
- promote competition
- ensure ongoing fuel supply to a region

The ICCC has therefore determined to set prices in each region using the following approach.

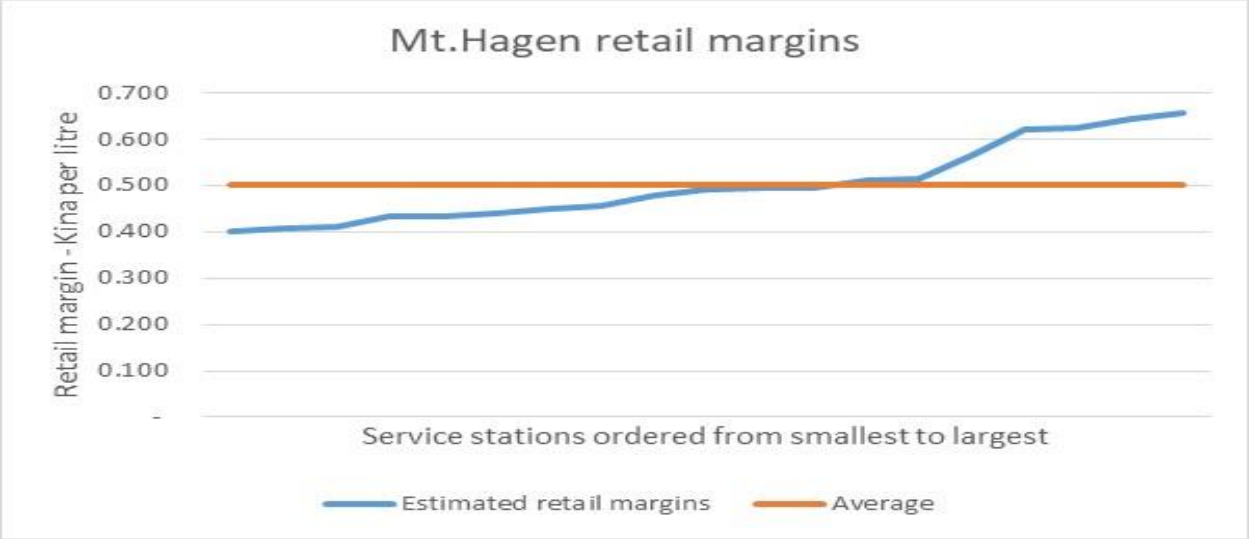
- Where there are four or fewer service stations in a region, the retail margin is based upon the highest cost operator.
- Where there are five or more service stations in a region, the retail margin is be based upon the average cost of all operators.
- Service stations which have monthly sales volumes of less than 25,000 litres are excluded from the calculation.

Using the highest retail margin in regions where there are four or fewer service stations supports all current operators to survive. And this maintains a level of competition.

Because small service stations are excluded, this ensures that only the more efficient operators in the region are considered. It must also be remembered that any particular petrol station in a region can choose to set their prices below the maximum price.

Using an average cost approach in areas which have more services stations reflects the dynamics of competition where only the most efficient can survive. It is illustrated here using Mt. Hagen where the average retail margin is 0.50 toea per litre. Figure 41 shows how this compares to the estimated costs of all the stations. For Mt Hagen, 80% of the volume is sold through stations which have costs below 0.50.

Figure 41[46]



Those stations which have higher costs than 0.50 will need to reduce their costs to survive in the long run. A large portion of service station costs is the asset cost. A high-cost service station may survive as long as it does not need to replace its assets. However, at some point, the assets will need to be replaced. At this time the owner can evaluate their options. They could decide to exit the market, or they could decide to move to a better location with potentially higher volumes.

The ICCC thinks that this average approach provides a balance between maintaining competition, encouraging efficiency, and protecting the interests of consumers.

[46] *Excludes stations with sales volumes of less than 25,000 litres per month.*

12.3 Retail margins and components

The retail margins calculated using the methods described in this section are shown in Table 38**.**

Table 38: New retail margins (Toea per litre)[47]

	Asset Cost	Operating Cost	Land Cost	New Retail Margin	Old Retail Margin	Change
Alotau	18.8	17.2	3.4	38.6	29.2	9.4
Bulolo	17.4	18.0	3.4	38.8	36.1	2.7
Goroka	18.8	13.3	8.0	40.1	34.2	5.9
Kainantu	15.7	17.2	4.0	37.0	30.7	6.3
Kavieng	18.7	17.8	3.4	37.3	27.6	9.7
Kimbe	17.4	27.3	6.5	51.2	36.8	14.4
Kokopo	17.2	12.2	12.5	41.8	32.2	9.6
Kundiawa	17.6	15.9	3.4	36.9	43.2	(6.3)
Lae	15.9	26.2	8.4	50.4	39.2	11.2
Madang	16.8	19.7	6.9	43.5	32.1	11.4
Mendi	19.0	27.5	4.0	50.5	39.1	11.4
Minj/Banz	23.9	23.5	3.5	50.9	37.6	13.3
Mt.Hagen	19.7	21.8	8.5	50.0	41.6	8.4
Namatanai	19.7	28.2	4.0	51.9	39.7	12.2
Popondetta	12.6	23.3	4.0	39.9	36.3	3.6
Port Moresby	17.1	20.6	6.3	44.0	37.5	6.5
Ramu	16.9	15.8	4.0	36.7	36.1	0.6
Tari	24.2	30.7	4.0	58.9	41.7	17.2
Wabag/	18.1	23.7	3.4	44.2	39.1	5.1
Wewak	19.8	23.8	6.5	50.0	30.7	19.3

Determination

The ICCC has determined a methodology to set retail margins. The ICCC has updated its retail model using data provided by the industry. The outputs of this model have been used to determine retail margins in each geographic area. Any operator with sales volumes of less than 25,000 litres per month has been excluded from calculation. For geographic areas where there are four or less retailers, the retail margin is based upon the highest cost operator. In areas where there are more than four retailers, the average of all retailers' costs has been used.

More detail on the inputs used in the retail model can be found in section 13.

[47] *At the time of publishing this report, the latest CPI values have still not been published by the NSO. Therefore, once these are available, the wholesale rate will be inflated into its 2025 equivalent value.*

12.4 Retail margins inflation adjustment

Some wholesalers expressed concerns that the CPI published by the NSO does not reflect the level of inflation they have experienced when importing equipment. This will be true if there have been significant changes in exchange rates or if international inflation on this imported equipment has been greater than PNG CPI changes.

To address this issue the ICCC will change the inflation adjustment to reflect changes in the value of the Kina and use the US producers price index (PPI) rather than PNG CPI.

This adjustment will only apply to the portion of the retail asset cost which is imported. This is estimated to be 18.5% of the retail margin. For other components of the retail margin the inflation adjustment will continue to be done as it is now using the CPI published by the NSO.

The source of exchange rate information will be the Bank of Papua New Guinea's published rates. These are published each month on the Banks website.[48] Each year, the ICCC will calculate the average of the daily rates for the USD to Kina exchange rate for the last 12 months ending 30th Sept. This rate will then get used in the inflation adjustment using the following formula.

$$\text{Exchange rate factor} = \frac{USD\ to\ Kina\ exchange\ rate\ \ Year{-}1}{USD\ to\ Kina\ exchange\ rate\ Year\ 0}$$

Where

USD to Kina exchange rate Year 0 = the average daily exchange rate for the most recent 12 months (ending 30th September).

USD to Kina exchange rate Year-1 = the average daily exchange rate for the 12 months prior to Year 0 (ending 30th September).

The source of the US PPI will be the producers price index for "Industrial Machinery Manufacturing". This is published on the Federal Reserve Bank of St. Louis web site.[49] A PPI change factor will calculated each month using the formula

$$\text{PPI factor} = \frac{PPI\ (Sept\ Previous\ year)}{PPI\ (Sept\ Current\ year)}$$

The two factors will then be combined using the following formula.

Overseas Inflation adjustment factor = Exchange rate factor x PPI Factor

[48] https://www.bankpng.gov.pg/publications/historical-exchange-rates

[49] https://fred.stlouisfed.org/series/PCU33323332

Example:

Average exchange rate 30 Sep 22 to 30 Sep 23 = 0.2822

Average exchange rate 30 Sep 23 to 30 Sep 24 = 0.2643

Exchange rate factor = $\frac{0.2822}{0.2643}$ = 1.0675

PPI 1st October 2023 = 243.847

PPI 1st October 2024 = 253.395

PPI factor = $\frac{253.395}{243.847}$ = 1.0392

Overseas inflation adjustment factor = 1.0675 x 1.0392 = 1.1093

This factor is combined with the CPI factor as described in section 17.6.

13 RETAIL MODEL ASSUMPTIONS

This section includes a detailed description of the retail model assumptions.

13.1 Retail operating margin

The retail operating margin is made up of the following components.

- staff costs,
- inventory costs
- utility costs
- bank charges
- security costs
- administration and overhead costs

These costs were estimated from the responses to the service station survey. To improve the statistical reliability of the results and to allow for geographic areas where no responses were received, responses were grouped together to reflect similar geographic characteristics. These groupings are shown in Table 39. So, for example, as no responses were received from any service station in Mendi, the modelled costs for service stations in Mendi were based upon a grouping of small service stations for which the ICCC did receive survey responses.

Table 39: Grouping of Geographic areas

Geographic Area	Grouping
Alotau	Medium
Arawa, Bougainville	Small
Banz / Minj	Rural
Bialla	Rural
Buka	Medium
Bulolo	Medium
Gabagaba	Rural
Goroka	Goroka
Jiwaka	Small
Kainantu	Small
Kavieng	Medium
Kerevat	Small
Kimbe	Kimbe / Wewak
Kiunga	Medium
Kokopo	Kokopo Rabaul
Kundiawa	Medium
Lae	LAE
Madang	Madang
Manus Island	Medium
Mendi/Ialibu	Small
Mt Hagen	Mt Hagen
Nadzab	Small
Namatanai	Small

NIP	Rural
Popondetta	Small
Porgera	Rural
Port Moresby	POM
Rabaul	Kokopo Rabaul
Ramu	Small
Rural ENB	Rural
Tari	Small
Vanimo	Small
Wabag	Medium
Wapenamanda	Small
Wewak	Kimbe / Wewak

Staff costs

As part of the retail survey, the ICCC collected information about the number of staff employed, the hours during which the site was open and the number of bowsers at each site. The ICCC also visited several sites and observed the activities of the staff on the forecourt.

- Many sites have a cashier, who for security purposes is locked in a separate room. Staff on the forecourt carry money from the customer in their car to the cashier.
- During off peak times fewer staff are required.
- During peak times there are often queues at some sites.
- Where a site employs more than 10 staff t it assumed that there will be a site manager as well as a supervisor. A supervisor will be present at all times, but a manager may come and go and may not be involved in everyday operations. The manager is also assumed to split their time between the fuel business and other activities on the site.

Staff hourly rates were calculated as a cost per productive hour using the following assumptions.

- Staff are paid for 2080 hours per year but work 1872 hours per year after allowing for annual leave, statutory holidays and sick days.
- All staff are paid a superannuation (Nasfund) allowance of 8.84%.
- An allowance of 4.5% of annual pay was allowed for training.
- Uniform costs are K114 per annum.

Based upon these observations, the ICCC has used the assumptions described in Table 40 and built these into the retail model.

Table 40: Assumptions about retail staff

Supervisor	• A supervisor is always on site whenever the site is open for business. • If a site only has one or two bowsers, it is assumed there will be no supervisor. • Supervisor costs were based upon the average reported hourly rate for each geographic area.
Manager	• Only at sites where there are more than 10 staff.

	• Managers were assumed to have a base salary of K45,000 per annum with additional costs of K6,117 per annum • 50% of a manager's time is spent on the fuel business.
Cashier	• A cashier will always be on site whenever the site is open for business. • The cashier is dedicated to the fuel side of the business and is not shared. • Where there were only one or two bowsers, it is assumed there will also be no cashier. • The cashier is paid at the same hourly rate as other forecourt staff.
Forecourt staff	• These staff are in addition to the supervisor and cashier. • It was assumed that during peak periods, there will be one forecourt staff person for every single bowser equivalent. • During off peak periods there will be less staff. A peak to off-peak staff ratio was calculated for each geographic area based upon survey results. • Average hourly rates for forecourt staff were calculated from survey results. • Forecourt staff did not include security staff. The cost of security was allowed for separately.
Hours	• Average opening hours in each geographic region were calculated from survey results. • It was assumed that there will be 4 peaks hours per day, Monday to Friday in all centres.
Volume during peak hour	• 60% of total sales volume is assumed to occur during peak hours. This is a material number as it determines the number of bowsers, and the size of the forecourt required to support average monthly volumes.

Inventory costs

Holding inventory is a working capital cost for retailers.

All respondents to the ICCC's survey said they received weekly or more frequent deliveries of fuel.

Submissions were also received which highlighted that there is a portion of fuel at the bottom of each tank which must be maintained to keep fuel pumps covered. This represents an additional quantity of fuel which must always be held. The ICCC assumed that this quantify is about 10% of the capacity of the tank. This added about 0.1 toea per litre to the retail margin.

The value of the inventory should be the price paid for the stock by the retailer. This was set as the retail price minus the retail margin based upon August 2019 prices for each centre.

$$\text{Inventory Value per Litre} = \text{Retail Price} - \text{RetailMargin}$$

The cost of holding this inventory was calculated by multiplying the value of the inventory by the WACC.

$$\text{Inventory Cost} = \text{Inventory Quantity (litres)} \times \text{Value per Litre} \times \text{WACC}$$

The WACC used was 14.04%[50]

Evaporation

One wholesaler raised the issue of evaporation losses at retail sites. They submitted that this represented a loss of about 0.3% of all sales volumes. The ICCC's research indicated that this was likely to be in the middle of the range of losses due to evaporation at a service station. The ICCC has therefore included an allowance for 0.3% evaporation in the retail model. This increased retail margins by about 1.3 toea per litre.

Utility Costs

In the 2019 determination, the cost of water and electricity was allowed for, but not the cost of fuel used for gensets[51]. Many retailers commented on their extensive use of gensets with frequent power outages. The ICCC therefore includes a question about fuel consumed by genset in its retail data survey.

The cost of water, electricity and genset fuel was calculated for each site that completed the survey and divided by the sales volume to calculate a utility cost per litre. The average utility cost per litre was then calculated for each geographic area. This cost per litre was then put into the model and applied to all sites in that geographic area.

Including genset fuel as a cost increased retail margins by about 1.4 toea per litre.

Bank Charges

There has been an increase in the use of credit cards and debit cards to pay for fuel. PNG's banks generally charge 1% of the value of the transaction to the retailer.

In the 2019 determination the ICCC included a fixed banking cost for each site. However, this cost has now become far more variable with sales volumes. So, in this determination the ICCC has calculated a fixed and variable component, based upon average reported bank charges in each geographic area. The fixed component was an allowance of K1000 per year and the variable component ranged from 0.25 toea per litre to 3.7 toea per litre.

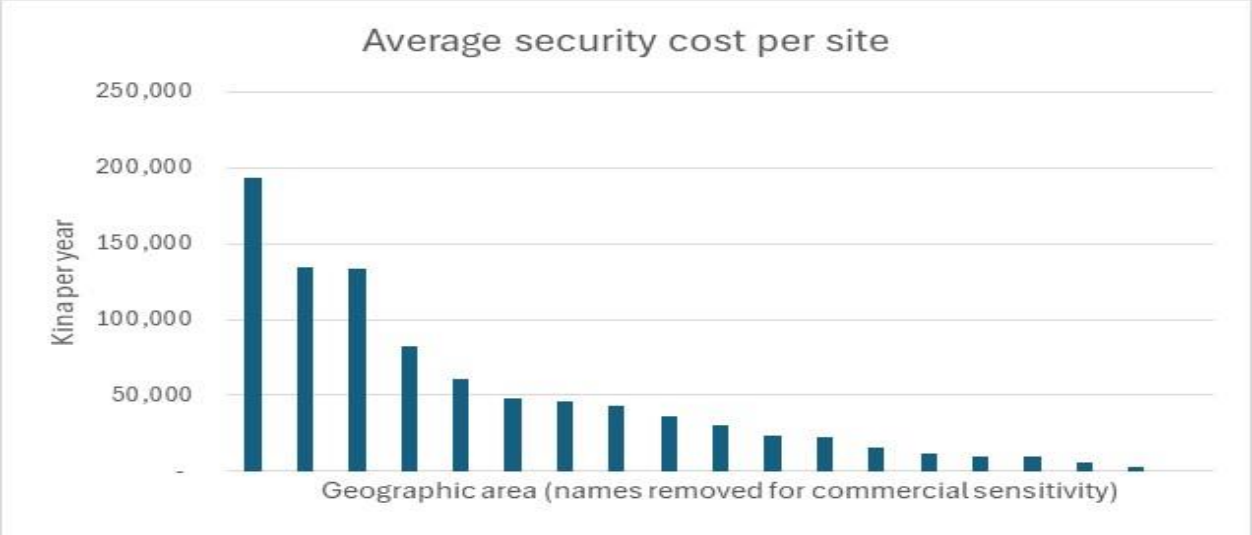
[50]*The WACC used here did not include the risk factors for building a new site. Inventory volumes can be managed so that they are direct reflection of actual sales volumes and does not represent an undiversifiable risk in the say that building a new service station does.*

[51]*In 2019 the capital cost of gensets was allowed for but not the cost of the fuel they consume.*

Security Cost

Many retailers and wholesalers focused upon security costs in their submissions and discussions with the ICCC. This appears to have become a greater focus than it was previously, especially with the riots and looting that occurred early in 2024. Figure 42 shows the average security cost per site in each geographic area. These costs include the cost of transporting cash to the bank, where security services were used for this purpose.

Figure 42



The ICCC also asked some survey respondents about theft. Based upon respondents replies, the ICCC estimated that theft represents a cost of about 1 toea per litre. However, this is not evenly spread across the market. A service station owner's experience of a large loss due to theft can be devastating and could even force a business to permanently close. None of the survey respondents had insurance against theft.

One wholesaler reported that on average the service stations they supply in Port Moresby had spent K85,000 in 2024 installing additional protective features following the riots. Based upon this submission, the ICCC included K85,000 per site as an additional asset cost in the retail model. However this was only applied to Port Moresby and and Lae.

The ICCC's analysis of security costs showed that they are highly variable from site to site even within a geographic area. For example, in Port Moresby the security costs ranged from K550,000 to K30,000 per year for a single site. Because of the high level of variability, the ICCC has applied an average cost by dividing total security spending in each geographic area by total sales volumes in each area. The resultant cost per litre was then included in the operating cost. Table 41 shows that the highest cost per litre is not in Port Moresby.

Table 41: Security cost per litre

	Security Cost (Toea per litre)
Kimbe / Wewak	3.9
Madang	3.9
LAE	3.8
Port Moresby	3.6
Small	2.1
Mt Hagen	2.0
Rural	1.8
Goroka	1.0
Medium	1.0
Kokopo Rabaul	0.6

The ICCC determined not to include the cost of the theft in the allowance on the basis that it is highly variable and that this is something that service station owners need to manage to avoid.

Administration and overhead costs

Administration and overheads include:

- IT Costs
- insurance
- cleaning
- office supplies
- other annual costs

For each of these the ICCC took the average total reported spending in a geographic area and divided it by the number of sites in that area which responded to the survey. This gave an average fixed cost per site.

For office supplies and other annual costs there were some very high reported values. The ICCC's interpretation of this is that they included costs of items that were not directly related to fuel sales, or they included costs that the ICCC has allowed for separately. Both items were capped at K20,000 per annum per site. The rationale for this is as follows.

- It is difficult to imagine what office supplies (stationery etc), might be required to support fuel sales, that would exceed K20,000. It is likely that these categories include consumable items required to support other sales activities on a service station site.
- All major cost items described by service station operators for their business were allowed for separately. It is likely that any major "other annual costs" either relates to an activity which is separate from fuel sales or has already been allowed for in a different cost category.

Retail operating margins

The resultant cost allowances for each geographic area are shown in Table 42.

Table 42: Average Operating Cost Components (in toea per Litre)

	Staff	Invent.	Evaporat.	Bank	Utilities	Security	Admin	All
Alotau	4.8	1.1	1.3	0.4	6.7	1.0	1.1	16.3
Arawa	4.2	1.1	1.3	1.2	4.8	2.1	2.5	17.2
Banz / Minj	9.7	1.2	1.3	1.4	4.6	1.8	7.4	27.4

Buka	3.9	1.1	1.3	0.4	6.7	1.0	0.5	14.7
Bulolo	5.2	1.1	1.2	0.5	6.7	1.0	2.1	17.7
Goroka	5.9	1.1	1.2	0.4	1.8	1.0	2.2	13.7
Jiwaka	7.4	1.1	1.2	1.3	4.8	2.1	7.3	25.2
Kainantu	3.2	1.1	1.2	1.1	4.8	2.1	1.8	15.3
Kavieng	5.2	1.1	1.3	0.5	6.7	1.0	2.1	17.8
Kerevat	4.0	1.1	1.3	1.2	4.8	2.1	3.4	17.9
Kimbe	4.6	1.1	1.2	3.8	6.5	3.9	5.3	26.4
Kiunga	4.7	1.2	1.3	0.4	6.7	1.0	1.1	16.3
Kokopo Rabaul	5.6	1.1	1.2	0.5	1.6	0.6	1.9	12.5
Kundiawa	4.4	1.2	1.3	0.4	6.7	1.0	1.0	15.9
Lae	6.3	1.0	1.2	1.8	3.3	3.8	8.8	26.2
Madang	5.6	1.0	1.2	1.2	3.1	3.9	3.7	19.7
Manus Island	5.7	1.1	1.3	0.5	6.7	1.0	1.8	18.0
Mendi	6.1	1.2	1.3	1.3	4.8	2.1	6.3	23.2
Mt.Hagen	6.9	1.2	1.3	2.3	4.3	2.0	3.9	21.8
Nadzab	5.9	1.0	1.2	1.3	4.8	2.1	6.5	22.8
Namatanai	8.3	1.2	1.3	1.3	4.8	2.1	9.1	28.2
NIP	3.2	1.2	1.3	1.2	4.6	1.8	0.9	14.2
Popondetta	4.2	1.2	1.4	1.2	4.8	3.5	4.2	20.6
Port Moresby	5.5	1.0	1.1	1.3	3.0	3.6	5.1	20.6
Ramu	3.4	1.1	1.2	1.2	4.8	2.1	2.0	15.8
Tari	9.4	1.3	1.4	1.4	4.8	2.1	10.3	30.7
Vanimo	3.2	1.1	1.2	1.2	4.8	2.1	2.7	16.3
Wabag	4.6	1.2	1.3	0.4	6.7	1.0	1.0	16.2
Wapenamanda	6.6	1.2	1.3	1.3	4.8	2.1	7.3	24.7
Wewak	3.5	1.1	1.2	3.7	6.5	3.9	2.0	21.9

13.2 Retail asset margin

In 2014/15 the ICCC was concerned about a lack of investment in new retail sites. To support new investment, the retail margin was set using the cost to develop a new retail site. The ICCC has used the same approach in this review.

The ICCC's asset cost model uses the reported volumes at each site to identify the capacity requirements for that site. This determined the size of tanks, the number of bowsers and the size of the forecourt. A minimalist approach has been used and attempts were made to exclude any costs that might be associated with non-fuel related activities on site, such as selling food or gas bottles.

The following assumptions were used.

- A site will need to have tanks that hold one week's fuel supply.
- The number of bowsers required is determined by the volume of fuel sold during peak hour.
- Peak hour was assumed to be four hours per day on a day with average daily sales, during which time 60% of the total sales volume would be sold. This is a material number as it determines the number of bowsers required to support the annual sales volume. And the number of bowsers determine the size of the site.
- Average time for a customer occupying a bowser was assumed to be five minutes.

- Average quantity purchased was assumed to be 18 litres, except in Port Moresby and Lae, where it was assumed to be 20 litres.
- All tanks were assumed to be double skinned.
- A mix of double and single bowsers was used according to the volume requirements.

The ICCC made assumptions about the size of forecourts as shown on Table 43[52].

Table 43: Forecourt area assumptions

	Sealed Area (m2)	Other Area (m2)	Canopy size (m2)
12 Bowsers	2000		500
11 Bowsers	2000		400
10 Bowsers	1600	-	400
9 Bowsers	1600	-	400
8 Bowsers	1600		400
7 Bowsers	1600	-	360
6 Bowsers	1500		280
5 Bowsers	1200		280
4 Bowsers	400	100	170
3 Bowsers	180	100	170
2 Bowsers	60	100	170
1 Bowsers	15	100	-

Table 44 shows the assumptions used to determine what might be included in at each site.

Table 44: On site assets

Number of Bowsers	10	9	8	7	6	5	4	3	2	1
Utilities										
Standby Generator Set	1	1	1	1	1	1	1	1	1	1
Fire Fighting System	1	1	1	1	1	1	1	1	1	1
PNG Power Supply	1	1	1	1	1	1	1	0.3	0.1	0.03
Water & Sewerage Services	1	1	1	1	1	1	1	1	-	-
Coms & Security System	1	1	1	1	1	1	1	1	1	-
Septic Tank	-	-	-	-	-	1	1	0.3	0.3	0.3
Other Equipment										
Fuel Management System	1	1	1	1	1	1	1	1		
POS System	1	1	1	1	1	1	1	1	1	
Yard light and Poles	9	9	9	3	3	3	3	1	2	
Canopy lights	16	16	12	10	6	4	4	2	2	
Professional Fees Scale Factor	1	1	1	1	1	1	0.3	0.2	0.1	-

[52] *This information was derived from information in valuation reports provided by wholesalers.*

Note: where decimals are used, this indicates a scaling down of spending from what might be spent at a large Port Moresby site. These have been adjusted since the draft report based upon feedback in submissions.

A complete set of development and asset costs was collected from various wholesalers to support cost estimates. These were applied to each site size to produce the estimates shown on Table 45.

Table 45: Cost estimates to develop site

	9 Bowsers	4 Bowsers	2 Bowsers
Signage and Graphics	261,851	69,637	45,637
Regulated Portion of Building Costs	100,850	81,372	52,155
Forecourt Cost	1,187,232	296,808	44,521
Canopy Cost	579,703	246,374	246,374
Ground Preparation	231,881	57,970	8,696
Utility Cost	485,346	356,551	224,875
Other Equipment Costs	433,022	358,428	161,464
Professional Fees	654,775	163,694	65,477
Forecourt and building costs	3,934,659	1,630,833	849,198

Note: that only 3 site sizes are shown here. The others are available from the ICCC on request.

These development costs were converted to annual costs using annuities[53] and the retail WACC. The site and underground tanks were assumed to have a 20-year life while bowsers were assumed to have an eight-year life. Examples of annualised costs are shown in Table 46. The annualised costs were divided by the average volume for each area to produce the retail asset margin.

Table 46: Annualised site development costs (samples)

	9 Bowsers (Port Moresby)	4 Bowsers (Kokopo)	2 Bowsers (Goroka)
Forecourt and building costs	4,438,511	2,659,845	411,460
Tank Costs	1,490,689	632,000	354,207
Bowser Costs	593,157	309,938	238,076
Total Site Development Costs	6,522,358	3,601,782	1,003,743
Maintenance Cost	195,671	36,018	10,037
Annualised Cost (kina / year)	1,424,187	713,337	208,207
Average Volume (litres per month)	789,050	266,000	99,675
Retail Asset margin (Toea per litre)	15.0	22.3	17.4

Calibrating the model

Information collected in the survey of service station owners included tank capacity and the number of bowsers. This information was used to test the reliability of the model to predict bowser and tank capacity requirements. This was done by entering the stated sales volumes into the model and then comparing the predicted bowser and tank requirements with actual bowsers and tank capacity.

[53] *Annuities are annualisation factors that, if charged as a revenue item, will provide an after-tax return to the investor equivalent to the WACC. They are used by multiplying the capital cost by the annuity value*.

The comparison was done by calculating a ratio of actual to predicted values. There were examples where these ratios were excessive. For example, one site reported having 16 bowsers where sales volumes only indicated that four were necessary. Reasons for this might include errors when completing the survey or a substantial decline in sales volumes from what the service station was designed for. To address this, in the analysis a filter was used that excluded ratios that exceeded two.

Tank capacity

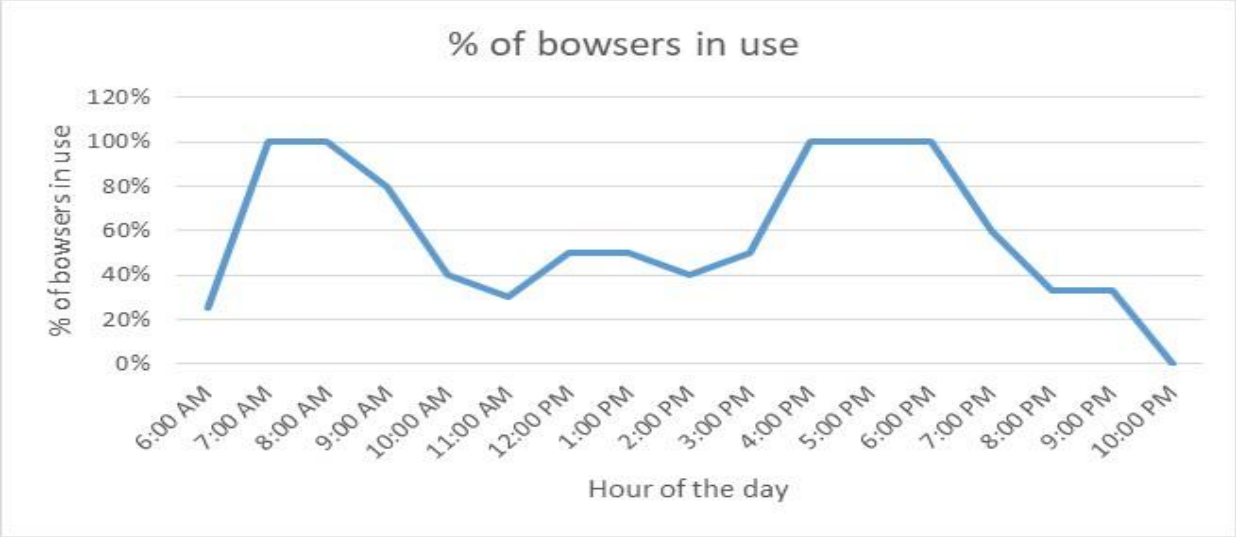
Analysis of tank capacity showed that average site capacity was about equal to one week's supply of fuel. This validated the ICCC's assumptions. In the survey many service stations indicated that they received deliveries more often than once per week, which would indicate that they have spare capacity in their tanks.

Number of bowsers

The model determines the number of bowsers required by estimating the average time a vehicle occupies a bowser at peak hour. The ratio of actual reported bowser numbers to predicted bowser numbers was 1.27. To calibrate the model so that the ratio of actual to reported was 1.00, required that 90% of sales occurred during peak hour. Clearly this would be impossible. Instead, it appears that average service stations have more bowsers than they need.

In 2019 the ICCC assumed that 70% of fuel sales were made at peak hour. However, further modelling has indicated that it is likely to be less than this. Figure 43 shows a profile of the percentage of bowsers that are likely to be in used through a typical business day. The percentage of sales that would occur at peak hour using this sales profile would be about 58%.

Figure 43[54]



The number of bowsers reported in the survey indicates that on average service stations may have over invested and installed more bowsers than they currently need. Possibly some service stations are planning for future growth, or some service stations have lost market share.

[54] *Peak hour was assumed to be anytime when 80% or more of the bowsers were in use.*

The ICCC has determined to set the % of sales at peak to 60%. In 2019 it was set at 70%. This change has reduced the retail margin by average of 1.8 toea per litre.

Maintenance costs

In the draft report, the ICCC proposed an allowance of 2.5% of the original costs of assets as an allowance for annual maintenance costs. One wholesaler submitted that this was too low. They presented data for maintenance costs for several service stations from 2019 until 2023. These included major spending on proactive maintenance across multiple service stations.

The ICCC also received maintenance cost data in the survey of service station owners. For most geographic areas this was less than 1% of the cost of a new site.

Possible interpretations of this are:

- Maintenance standards are higher in Port Moresby.
- Some operators may be spending more than they need to on proactive maintenance.
- Many stations may not be adequately maintaining their sites.
- Lack of maintenance could be due to retail operating margins being too low.

The ICCC has therefore taken the following approach. For Port Moresby, it has set the maintenance allowance at 3% of the replacement cost of assets. For all other geographic locations, it has set maintenance allowance at 1% of the replacement cost of assets. This will increase the retail margin by 0.9 toea per litre on average. This will allow service station owners in most other areas to increase their spending on maintenance.

13.3 Land rentals

The ICCC has calculated the average rent paid per litre, in each geographic area. This has then been applied to all service stations within that area.

At the time of producing the draft report, the ICCC had received only a few responses to its service station survey which included information about land rents. So, 2019 data was used and inflated to estimate likely current rent levels. Since the draft report was produced the ICCC has received more rent data from service station owners.

Based upon the data received, many service station owners own the land which their station occupies and so do not pay rent. From the survey responses it appears that about 25% of services station operators pay rent to a landowner.

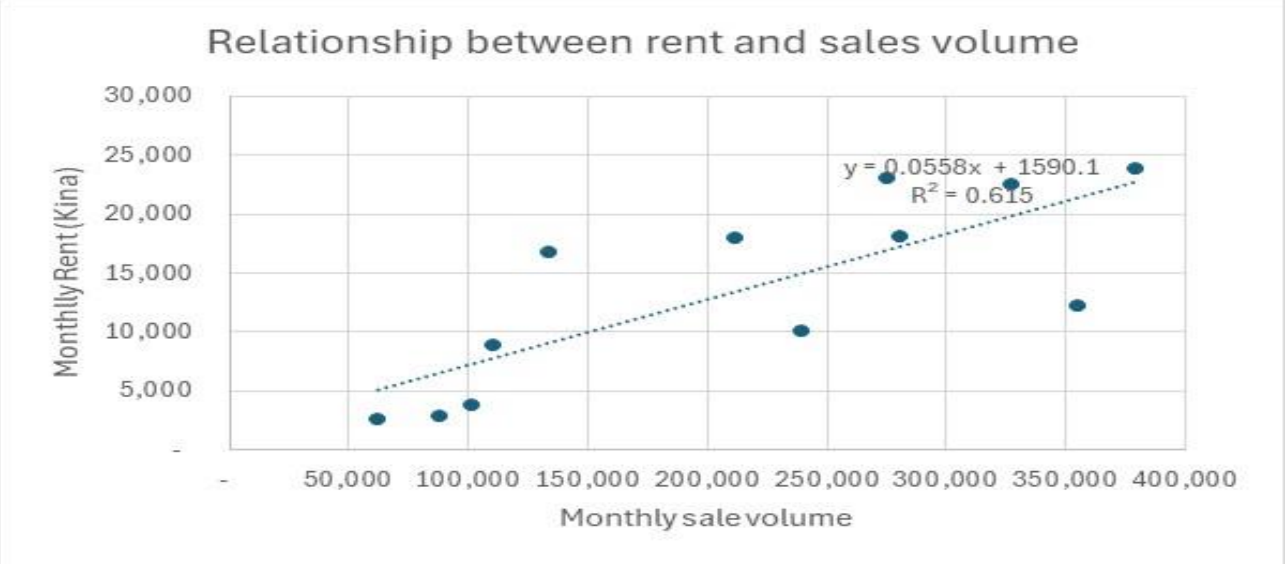
Even though a service station owner may own the land and pay no rent, it is still reasonable that they should receive a commercial return on this land. This reflects the underlying cost of the service station occupying the land and that the land cannot be used for another purpose. Therefore, a rent value is still needed for the purpose of setting retail prices even when no rent is actually paid.

In the 2019 review, the ICCC calculated a rent value per m2 of land and then estimated the rent for each site based upon the estimated land area required.

However, analysis of the data the ICCC has now received, shows that most rents do not appear to be related to the land area rented.[55] Therefore, the ICCC has not used this approach in this review.

Analysis did show that there was a reasonable relationship between monthly sales volumes and land rent.[56] This can be seen in Figure 44.

Figure 44



Possible explanation for this relationship is that sites with higher sales volumes tend to be located in more central areas, and the land in these locations is generally more valuable and in higher demand for commercial use. Landlords can therefore demand higher rents at these sites.

At the industry workshop, comments were made that some sites were so expensive that they should probably not be used for service stations. There is a natural trade-off between paying higher rents and having a site which attracts higher sales volumes.

Based upon its analysis, the ICCC has calculated the average rent paid per litre in each area. This has then been applied to all service stations within that area.

The resultant values are shown in Table 47. The rent per litre has been multiplied by the monthly sales value for each site using these values, to produce the land cost used in the retail margin as shown in Table 38 in section 12.3.

[55] *Regression analysis of land area vs rent had an r^2 of 0.07 showing almost no relationship between rent levels and land area.*

[56] *Regression analysis of land area vs sales volume had r^2 of 0.61, which demonstrated a relationship between them.*

Table 47: Rent costs by area groupings

	Avg. Monthly Rent	Avg. Volume	Rent per litre
Goroka	8,845	110,495	8.0
Kimbe / Wewak	18,126	280,400	6.5
Kokopo Rabaul	16,700	133,722	12.5
LAE	23,085	275,429	8.4
Madang	22,500	327,700	6.9
Medium	12,236	355,500	3.4
Mt Hagen	17,933	212,178	8.5
POM	23,860	379,344	6.3
Rural	2,700	77,800	3.5
Small	6,867	171,000	4.0

From Table 47 we can observe that rents in some areas are similar to others even though average sales volumes are lower. This results in high rent per litre values. For example, rents in Lae are very similar to Port Moresby, but average sales volumes are lower. This means that the average land rent per litre in Lae is about 25% higher.

13.4 Changes to the retail margin

This section breaks out the asset costs, operating costs and land costs for each area and compares them to the 2019 values. This enables readers to see the magnitude of the various changes. For comparison purposes, the 2019 values have been inflated into 2024 values.

Asset costs

Table 48: Change of retail asset costs from 2019 to 2024 (Toea per litre)

	2019	2024	Change
Alotau	16.2	18.8	2.6
Bulolo	19.9	17.4	(2.6)
Goroka	14.6	18.8	4.1
Kainantu	16.6	15.7	(0.9)
Kavieng	13.7	18.7	5.0
Kimbe	18.5	17.4	(1.2)
Kokopo	16.2	17.2	1.0
Kundiawa	22.9	17.6	(5.3)
Lae	18.2	15.9	(2.3)
Madang	18.9	16.8	(2.0)
Mendi	17.9	19.0	1.1
Mt.Hagen	18.2	19.7	1.6
Namatanai	16.3	19.7	3.4
Popondetta	19.9	12.6	(7.3)
Port Moresby	18.8	17.1	(1.6)
Tari	18.3	24.2	5.9
Wabag	17.9	18.1	0.2
Wewak	17.8	19.8	1.9
Average	**17.8**	**18.3**	**0.2**

Operating Costs

Table 49: Change of retail operating costs from 2019 to 2024 (Toea per litre)

	2019	2024	Change
Alotau	10.9	17.2	6.3
Bulolo	15.7	18.0	2.3
Goroka	19.2	13.3	(5.9)
Kainantu	13.6	17.2	3.6
Kavieng	12.9	17.8	4.9
Kimbe	17.2	27.3	10.1
Kokopo	13.9	12.2	(1.8)
Kundiawa	19.6	15.9	(3.7)
Lae	18.9	26.2	7.3
Madang	11.8	19.7	7.9
Mendi	20.5	27.5	6.9
Mt.Hagen	23.1	21.8	(1.3)
Namatanai	22.5	28.2	5.7
Popondetta	15.8	23.3	7.5
Port Moresby	16.5	20.6	4.1
Tari	22.5	30.7	8.2
Wabag	20.5	23.7	3.2
Wewak	11.8	23.8	11.9
Average	**17.1**	**21.2**	**4.3**

Land Costs

Table 50: Change of retail land costs from 2019 to 2024 (toea per litre)

	2019	2024	Change
Alotau	2.1	3.4	1.3
Bulolo	0.6	3.4	2.9
Goroka	0.4	8.0	7.7
Kainantu	0.5	4.0	3.5
Kavieng	1.2	3.4	2.3
Kimbe	1.1	6.5	5.4
Kokopo	2.2	12.5	10.3
Kundiawa	0.7	3.4	2.7
Lae	2.2	8.4	6.2
Madang	1.5	6.9	5.3
Mendi	0.7	4.0	3.3
Mt.Hagen	0.5	8.5	8.0
Namatanai	0.8	4.0	3.2
Popondetta	0.6	4.0	3.4
Port Moresby	2.2	6.3	4.1
Tari	0.8	4.0	3.2
Wabag	0.7	3.4	2.7
Wewak	1.1	6.5	5.4
Average	**1.1**	**5.4**	**4.5**

14 Jet A1

The ICCC has determined not to make any changes to current arrangements for Jet A1.

14.1 Background

Jet A1 is currently regulated under Section 32A of the PR Act for price monitoring purposes. In this monitoring process, the ICCC monitors the monthly prices of Jet A1 ex the Napa Napa refinery or the landed price where Jet A1 is imported by Puma Energy.

In 2019 the ICCC proposed to regulate the price of Jet A1 under Section 21 of the PR Act. However as various issues were raised during the review, the ICCC decided not to proceed at that time.

14.2 The Market

The Jet A1 market can be distinguished between domestic and international routes.

International aircraft have the option to "tanker" fuel. For example, an airline flying from Brisbane to Port Moresby can choose to carry enough fuel for the return flight to Brisbane. So, if fuel is cheaper in Brisbane than in Port Moresby, an airline can avoid the higher priced fuel by tankering.

However, domestic aircraft are generally smaller and so tankering is not an option. Domestic aircraft therefore have no choice but to pay the going rate for fuel at the airport from which they are departing.

Currently, Puma Energy is the only wholesale supplier of Jet A1 in PNG. At Jackson's Airport (Port Moresby) there are two distributors of Jet A1. These are:

- PNG Ground Services, which is owned by PNG Air and supplies all their requirements exclusively. In effect Airlines PNG has exercised its countervailing market power by purchasing Jet A1 directly from the refinery rather than from Pacific Energy Aviation PNG Limited (PEAL).
- PEAL serves the rest of the market and has contracts in place to supply Air Niugini.

Outside of Port Jackson, distribution within PNG is shared between Puma, PNG Ground services and Mission Aviation Fellowship (MAF) see Table 51. However, at each individual airport there is only one supplier.

Table 51: Fuel distributors at regional airports

Puma	PNG Ground Services	MAF
Lae Madang Mt Hagen Kavieng Tokua (Rabaul) Hoskins (Kimbe) Also, Kiunga and Tubugal (where only charter flights are available)	Alotau Popondetta Daru	Goroka

14.3 Submissions by wholesalers

Three wholesalers made submissions about Jet A1 including Puma. Two were in favour of regulation. However, Puma's submission warned that the outcomes of regulating the market might be higher prices for consumers.

Puma noted that volumes need to be sufficient to support a reasonable return on investment in the infrastructure required to support Jet A1. They observed that,

> *"There are currently two distributors of Jet A1 at Jacksons, Pacific Energy Aviation (PNG) Ltd (PEAL) and PNG Ground Services. This provides a competitive market proposition which can be exploited by customers should they wish to. As intimated in earlier comments, the level of investment at Jacksons airport does mean it is difficult for any provider to achieve an adequate return on investment without a corresponding large volume throughput."*

The ICCC notes that it is currently considering an application by PEAL to acquire PNG Ground Services, so the ICCC cannot currently comment on this.

Puma also noted

> *"Volume throughput is also critical at the 9 regional airfields throughout PNG that NGE operates aviation refuelling operations. However, the commercial return of these sites fluctuates from adequate to a loss, dependent on volume and margin throughput."*

> *"NGE's observation on the potential for importing is that setting up appropriate import facilities and supply chains is a very cost intensive process and current margins for the industry are unlikely to create a commercial return on such investment. Forcing a change in this dynamic by increasing margins would be detrimental to end user pricing and ultimately the flying consumer, so is unlikely to receive support in the aviation sector in PNG. Based on this observation, NGE sees the current supply as providing a competitive option."*

The ICCC's interpretation of these comments is that Puma is likely to manage its prices for Jet A1 with two constraints in mind.

- If its prices are too high, it may encourage a competitor to enter the market and airlines are likely to seek alternatives, such as tankering their own fuel where this is an option.
- If its prices are too low, it will not cover its own infrastructure costs.

One of the other wholesalers who made a submission said they

> *"Support enhanced competition of Jet A1 sales at airports and do not support introducing pricing controls for Jet A1."*

The other wholesaler said that competition in the Jet A1 market should be mandated for energy security and to support transport and the economy.

> *"There should be at least two players in the Jet fuel market. Each player to have a proven capacity and infrastructure and to whom volume is to be distributed as evenly as possible (equal number of large and small volume locations each)."*

The ICCC recognises that in other countries there are a variety of arrangements that allow competition over shared infrastructure.

This might include joint ownership of storage and fuel infrastructure at airports. These arrangements allow competing companies to bid to supply Jet A1 customers. However, it is beyond the scope of this review to consider these arrangements.

Determination

The ICCC will continue to monitor the prices of Jet A1 under section 32A of the PR Act and will keep the current reporting arrangements in place.

15 WEIGHTED AVERAGE COST OF CAPITAL (WACC)

The ICCC has used a WACC approach to determine the allowance for return on capital investment for wholesale and retail investments in the petroleum industry. The "**WACC**" approach, is widely used by regulators around the world to determine a reasonable return on investment for regulated entities. It is extensively described in finance literature.

The ICCC has calculated a WACC for the wholesale market and a risk adjusted WACC for the retail market. The ICCC has used its standard methodology for calculating a WACC. This requires the use of the following inputs.

- a US risk free rate
- a market risk premium
- a country risk premium for PNG
- an asset beta
- a debt margin
- a debt percentage
- US and PNG inflation rates

Since the draft report was published there has been some changes to some of the inputs into calculating the WACC. Therefore, the WACC calculation has been updated.

The risk adjusted WACC for the retail market reflects the additional non-diversifiable risk an investor takes when they build a single new petrol station.

Wholesale Pre-Tax real WACC	15.18%
Retail Pre-Tax real WACC	14.04%
Retail risk adjusted WACC for a single new service station	18.66%

The ICCC has used these values to determine the wholesale margin and the retail margin.

This section describes the latest inputs used to calculate a WACC.

15.2 Market Risk Premium and Risk-Free Rates

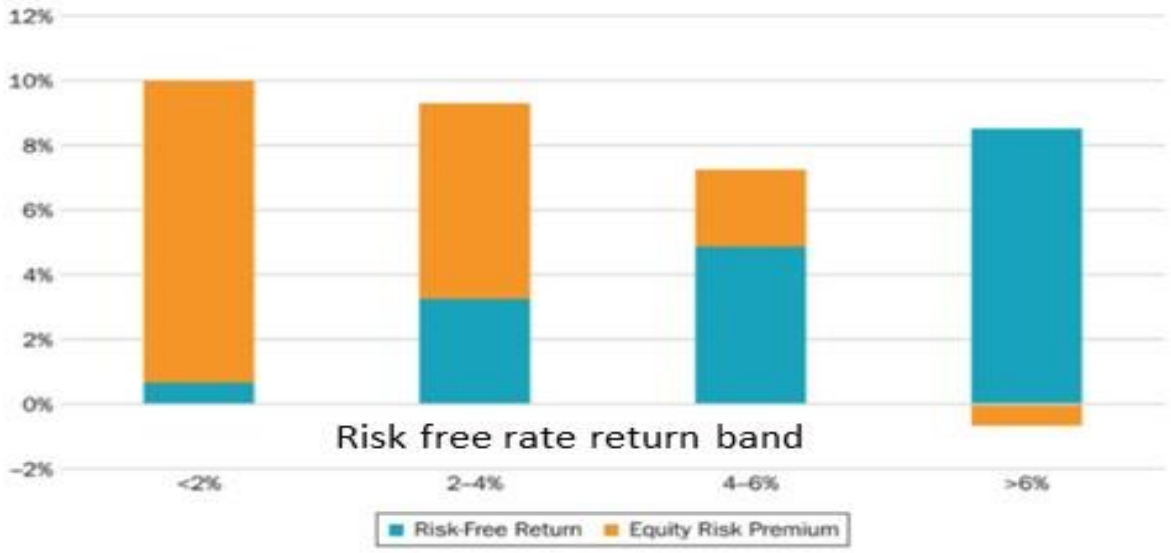
The risk-free rate represents the return an investor can receive without risking any losses. In the past the ICCC has used US government 10-year treasuries for this purpose and then added a country risk premium, to reflect the risk of investing in PNG.

Yields for US treasuries are readily available from multiple sources. Typically, the ICCC would take an average of daily yields for a recent month. However, in the recent review of the PNG Ports regulatory contract, the ICCC has reviewed its methodology for setting the market risk premium (MRP) and to be consistent has also used it in this determination. The methodology adopted requires an alignment of the US risk-free rate with the MRP.

The driver for this change was that in early 2024, US risk-free rates (US 10-year treasuries) had increased in value significantly since the last review. High risk-free rates are often accompanied by lower MRP's.

It is often observed that while the combination of these two parameters does not remain constant, changes in one can cancel out the other. (See Figure 45). Therefore, the ICCC wanted to evaluate what an appropriate current rate for MPR should be.

Figure 45: Relationship between risk-free returns and risk premiums[57]



The relationship between risk-free rates and MPR is not well defined. However, it is clear that they are related. Therefore, the ICCC wanted to make sure that its selection of both the risk-free rate and the MRP were consistent with each other. To be consistent they needed to be either both forward-looking or both backward-looking and they needed to be evaluated over the same time period.

Because of this investigation, the ICCC has chosen an approach which is a balance between forward-looking and backward-looking estimates of MRP and risk-free rates. This is described in Table 65. The approach is to place equal weighting on historic and forward-looking views and a survey of analysts' current practice.

The historic MRP is weighted 50% to 50-year market returns and 50% to 10-year market returns. The 50-year view captures both periods of high inflation and low inflation as well as major economic events, such as the 1970's oil crisis.

The survey of analysts current practice can be considered to be a mix of both forward and backward-looking views.

[57] https://www.evidenceinvestor.com/the-relationship-between-the-risk-free-rate-and-equity-risk-premium/

Table 52: Mix of methods used to determine MRP and risk-free rates.

MRP	Risk-free Rate	Weighting
50-year historic returns on the US market (S&P 500) (1974 to 2023) calculated as a geometric average.	Average of historic yields over 50 years on US 10-year Treasuries, calculated as a geometric average.	16.5%
10-year historic returns on the US market (S&P 500) (2014 to 2023) calculated as a geometric average.	Average of historic yields over 10 years on US 10-year Treasuries	16.5%
Forward-looking view using DDM (Dividend Discount Model and a 2024 survey of market analysts MRP expectations. Each of these will have 50% weighting.	Average of September yields on 10-year US Treasury yields as reflective of the current market's forward-looking view.	33%
Survey of analysts	Average of September yields on 10-year US Treasury yields as reflective of the current market's forward-looking view.	33%

This is a balanced approach. While the weighting used is somewhat arbitrary, testing of the results by changing the weighting of each of these inputs did not materially change the WACC. For example, removing the survey of analysts from the inputs and using a 50% weighting on the forward-looking DDM, produced almost the same result.

The values derived from this methodology are shown in Table 66.

Table 53: Risk- free rates and MRP's from chosen methods.

Measure	Risk- Free Rate	MRP
50 Year historic returns	6.12%	4.97%
10 Year historic returns	1.46%	10.44%
DDM using Damodaran published results	3.72%[58]	4.63%
Survey of analysts	3.72%	5.50%
Weighted average	3.74%	5.94%

The ICCC has used this weighted average as the inputs into risk-free rate and MRP to calculate WACC's for the petroleum industry.

Further discussion about MRP can be found in Appendix 18.4.

[58] *https://fred.stlouisfed.org/tags/series?t=treasury*

15.3 Country risk premium

Country risk premiums (CRP) for countries like PNG are difficult to establish and there is frequently debate about them. The ICCC has used 5.8% based upon a paper it commissioned Gravelroad Services PNG Ltd to produce. An excerpt of this is included in appendix 18.5.

The value 5.8% is an average of estimates from multiple sources, including Damodaran[59].

Response to a wholesaler's submission

After discussion on this topic one wholesaler submitted that the ICCC should update its assumptions for CRP, from 5.8% to 8.4% based upon data published by Damodaran on his website.

This submission is based upon a misunderstanding of Damodaran's numbers.

The ICCC is using country risk premium (CRP) for the purpose of estimating an "international risk-free rate" for PNG. This is essentially an estimate of the rate that an international investor would want to receive if they were investing in bonds issued by the PNG Government. Damodaran refers to this as the "default spread". This is the difference between the yield on government bonds issued in USD for a particular country and the yield on US Treasury bonds. For Papua New Guinea (PNG), Damodaran currently reports the default spread as 5.18%.

However, what Damodaran refers to as the "Country Risk Premium" applies to equities. He currently reports this as 6.72% for PNG, although it was previously reported as 8.4% when the wholesaler checked. This would be the premium that an investor would want to receive if they were to invest in shares on the PNG share market. So, while Damodaran refers to this as a "Country Risk Premium" it is not the same as the CRP which the ICCC is estimating.

The ICCC's methodology, on the other hand, accounts for the return on equities by applying an industry-specific beta value and a Market Risk Premium (MRP). Both these factors are applied on top of the international risk-free rate.

It is interesting to note that if the ICCC has only used Damodaran as a data source, both the MRP and the CRP would be lower and so would the WACC.

15.4 Inflation

US inflation

The current inflationary environment in the US continues to have a higher level of uncertainty than might normally be expected. However, it is also the subject of intense scrutiny by investors and there is no shortage of forecasts to choose from. The ICCC chose the following forecasts as a basis for their estimates.

- The US Federal Reserve Monetary Policy Report.[60]
- The OECD's inflation forecast[61]
- The IMF's country forecasts

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[59] *Aswath Damodaran (Stern School of Business New York University) https://pages.stern.nyu.edu/~adamodar/New_Home_Page/home.htm*

[60] *https://www.federalreserve.gov/monetarypolicy/fomcprojtabl20240320.htm*

[61] *https://data.oecd.org/price/inflation-forecast.htm*

Implied inflation was also estimated by comparing the difference between nominal yields on US treasuries and yields on Treasury Inflation Protected Securities (TIPS)[62]. Table 54 shows the overall range of US inflation forecasts.

Table 54: Range of US inflation forecasts

	2024	2025	2026	2027	2028
US Federal Reserve PCE[63] (median rate)	2.4%	2.2%	2.0%	2.0%	2.0%
US Federal Reserve Core[64] (median rate)	2.6%	2.2%	2.0%		
OECD (US Forecast) June year	3.1%	2.2%	falling		
IMF (US CPI)	2.8%	2.4%	2.2%	2.1%	2.1%
Implied from 10-year TIPS	2.3%				
Implied from 5-year TIPS	2.45%				

The ICCC took an average of these results to arrive at an inflation forecast of 2.1%.

PNG inflation

For PNG inflation forecasts the ICCC used the following data sources

- The Bank of PNG[65]
- PNG Department of Treasury[66]
- The IMF country forecasts[67]

The forecast figures are shown in Table 55. The ICCC has used an average of these figures to arrive at a forecast of 4.8% for inflation in PNG.

Table 55: PNG inflation forecasts

	2025	2026	2027	2028	2029
Bank of PNG	4.0%				

[62] https://www.cnbc.com/quotes/US10YTIP and https://www.investing.com/rates-bonds/u.s.-10-year-bond-yield

[63] *PCE is personal consumer expenditure*

[64] *This is PCE excluding food and energy.*

[65] https://www.bankpng.gov.pg/monetary-policy/bi-annual-statements/

[66] https://www.treasury.gov.pg/wp-content/uploads/2023/11/2023-Budget-Volume-1-1-94_compressed.pdf *Economic and Development Policies Vol2 page 154.*

[67] https://www.imf.org/en/Countries/PNG

Treasury	5.3%	5.8%	4.8%		
IMF	4.8%	4.8%	4.6%	4.5%	

15.5 Debt Margin

The debt margin is the extra cost a borrower pays on top of a "risk-free" interest rate when borrowing money. It reflects the lender's compensation for the risk of lending to that borrower.

The ICCC has based the debt margin on yield from BBB rated US corporate bonds. The margin is calculated by subtracting the US risk-free rate from this yield. Therefore, debt margins have been updated by subtracting the average yield on 10-year US Treasuries from average yields on BBB rated US corporate bonds as reported by the FRED.[68]

15.6 Asset Beta and gearing ratio

Asset betas reflect the level of risk for an industry. It is measured by measuring the volatility of the share prices of companies in that industry.

Because companies which have higher levels of debt are riskier, the level of debt must be taken into account. The beta value which is measured directly from share price movements is referred to as the leveraged beta, or equity beta. This value is then adjusted based upon its debt-to-equity ratio to remove the effect that debt might be having on its volatility. This adjusted beta is referred to as the asset beta or unleveraged beta.

In the 2014 and 2019 reviews the ICCC has used beta values for the oil and gas distribution industry to represent wholesalers. This grouping does not include companies which are engaged in exploration or refining and is the closest reported group to PNG wholesalers which is readily available to the ICCC.

For retailers the ICCC uses the “Retail (Groceries and Food)” classification. This is because very few publicly listed companies exist which only retail fuel. Retailers of groceries and food arguably have a similar level of business risk as fuel retailers. Both food and fuel tend to be inelastic products. The quantity of these products purchased by customers tends not to change much even when the price changes. Therefore, the Food and Grocery retailers are seen as a valid proxy for fuel retailers.

The values used in this review are shown in Table 57.

Table 56: Beta values and Debt ratios[69]

	Industry Used for Beta	Asset Beta (unleveraged)	Debt / (Debt + Equity)
Wholesale	Oil and Gas Distribution	0.52	41.30%
Retail	Retail (Groceries and Food)	0.35	35.80%

[68] *Federal Reserve Bank of St. Louis https://fred.stlouisfed.org/categories/32348.*

[69] *Source: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html (27 November 2024)*

A submission was received from a wholesaler which suggested that the ICCC had used the wrong industry values. The submitter referred to Damodaran, which is the source of the figures that the ICCC has used for this input. In checking the values used it was noticed that the values had been updated on Damodaran's website[70] and they may have possibly changed since the submitter had referenced them. It is also likely that the submitter had referred to leveraged beta values rather than unleveraged values. The values used by the ICCC are the most recently updated values.

15.4 WACC parameters used

The parameters used to determine the WACC for both wholesale and retail are shown in Table 57. Most of these parameters are the same as those recently determined by the ICCC for the PNG Ports review.

This section briefly describes the source of these inputs.

Table 57: Summary of inputs used to estimate the WACC

	2009 Determined	2014 Determined	2019 Determined	2024 Draft	2024 Determined
US risk-free Rate	3.73%	3.35%	2.06%	4.36%	3.74%
Country Risk Prem.	3.0%	4.3%	5.3%	5.8%	5.8%
PNG risk-free rate	15.5%	11.2%	9.9%	13.3%	12.7%
US Inflation	1.8%	2.0%	2.1%	2.1%	2.1%
PNG Inflation	10.0%	5.2%	4.4%	4.8%	4.8%
Debt Margin	3.1%	2.8%	1.62%	1.22%	1.24
Return on Debt	19.6%	14.0%	11.5%	14.6%	13.9%
Market Risk Premium	6.0%	6.0%	6.0%	4.1%	5.94%
Wholesale Asset Beta	0.81	0.77	0.67	0.65	0.55
Wholesale Debt %	10%	47%	50%	41%	41%
Wholesale return on equity	20.9%	19.7%	17.9%	17.8%	17.8%
Retail Asset Beta	0.81	0.78	0.54	0.31	0.35
Retail Debt%	10%	21%	46%	36%	36%

[70] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

Retail return on equity	20.9%	17.1	15.8%	15.3%	15.9%

Table 58: Comparison of the WACC to previous determinations

	2009 Determined	2014 Determined	2019 Determined	2024 Draft	2024 Determined
Pre-tax Real WACC - Wholesale	17.0%	15.5%	13.5%	15.4%	15.18%
Pre-tax Real WACC - Retail	17.0%	16.1%	12.5%	13.8%	14.04%

15.4 Retail non-diversifiable Risk

In discussions at the industry workshop held on 26th September 2024, participants submitted that the ICCC's WACC did not reflect the risk that a retailer took when building a new service station. It was argued that returns would need to be at least 20%, to compensate for the risk. The ICCC has considered this further and has determined that there are additional risks which the WACC does not allow for.

When constructing a new service station there are two material risks for an investor.

- Construction risk – the risk that there will be cost over-runs or unforeseen costs. This is a common experience for any major building project.
- Volume risk – the risk that the site chosen will not attract the expected sales volumes. Service station volumes are highly sensitive to their location and to changes in traffic flows.

If an investor were building multiple new service stations at multiple sites, this investment risk could be avoided or reduced by diversification. Higher unexpected costs experienced at one site could be compensated for by lower costs at another site. And lower sales volumes at one site could be compensated for by higher sales volumes at another site. But when an investor is only building a single site, then it is not possible to use diversification to protect against this risk. In PNG most investors own only one service station, although there have been examples of investors building multiple service stations at the same time.

To estimate the magnitude of these risks the ICCC used cashflow modelling. The cashflow model calculated the expected investment cashflow for a new service over a 25-year period based upon regulated prices. Different scenarios were tested using the model. For each scenario the additional return required to compensate for unexpected outcomes was estimated. The findings are summarised in Table 59.

Table 59. Construction cost and sales volume risk estimates

Scenario	Return Impact	Explanation
Construction costs exceeded expected costs by 10%	1.4%	To compensate for higher construction costs an additional return of 1.4% was required.

Long term sales volumes are 90% of expected sales volumes	3.2%	If sales volumes were 10% lower than the volume a service station was designed for, returns would need to be 3.2% higher. The results for this varied depending upon the design volume. To allow for this an estimate was made of the likely size of a new service station in various geographic locations across PNG and the average of these results was used.

The ICCC needs some way of evaluating how much of this should be added to the WACC to reflect the probability that this risk might occur. Is a 10% variation a reasonable reflection of risk?

Information about cost overruns for building projects in PNG is not generally available. However, it does seem reasonable to assume that some cost overrun is likely to occur from time to time and that there is a reasonable probability that it will occur.

To consider potential for volume variation, the ICCC examined the difference in volumes between service stations in areas which had a large number of service stations. For each service station the ICCC identified the difference in volume between it and the next smaller station. Table 60 shows the results. So, for example, in Port Moresby, the average service station was 6% larger than the next smaller one. Whereas in Lae it was 10% larger etc.

Table 60: Volume variations

	Average volume variation between service stations
Port Moresby	6%
Lae	10%
Goroka	15%
Mt. Hagen	13%

In this context allowing for a 10% volume variation seems a reasonable allowance.

In the absence of better information, the ICCC has determined to increase the return on capital by adding these risk adjustments to the WACC to create a risk adjusted WACC for retail service stations (see Table 61). This will only be applied to the development costs of a new site and not to inventory or other capital costs.

Table 61: Risk adjusted WACC

Retail WACC	14.04%
Construction risk	1.40%
Volume variability risk	3.22%
Risk adjusted WACC	18.66%

Determination

The ICCC will apply a risk adjustment on top of the WACC to calculate the cost of capital for building new retail service stations. The additional risk allowance will be 1.4% for construction risk and 3.2% for volume risk.

16 PRICE BUILD UP

Table 62 shows how the cost components build up to form the retail price for diesel in each centre. The numbers shown use the IPP, coastal shipping and road freight costs for July 2024.

Table 62: Price build up for diesel based upon component costs

	Retail Margin	Whole-sale Margin	Coastal Shipping	Road Freight	IPP + Excise	New Price Incl. GST	July 2024 price	% Change
Alotau	0.39	0.28	0.61	0.04	2.72	4.44	4.36	2%
Bulolo	0.39	0.28	0.25	0.14	2.72	4.17	4.15	0%
Goroka	0.40	0.28	0.25	0.32	2.72	4.38	4.33	1%
Kainantu	0.37	0.28	0.25	0.18	2.72	4.18	4.13	1%
Kavieng	0.37	0.28	0.63	0.07	2.72	4.49	4.40	2%
Kimbe	0.51	0.28	0.55	0.06	2.72	4.53	4.39	3%
Kokopo	0.42	0.28	0.20	0.10	2.72	4.09	4.00	2%
Kundiawa	0.37	0.28	0.25	0.47	2.72	4.51	4.59	-2%
Lae	0.50	0.28	0.25	0.04	2.72	4.18	4.08	3%
Madang	0.43	0.28	0.22	0.05	2.72	4.08	3.97	3%
Mendi	0.50	0.28	0.25	0.64	2.72	4.84	4.73	2%
Minj/Banz/Kindeng/Kumdi	0.51	0.28	0.25	0.51	2.72	4.71	4.58	3%
Mt.Hagen	0.50	0.28	0.25	0.48	2.72	4.66	4.58	2%
Namatanai	0.52	0.28	0.63	0.19	2.72	4.78	4.66	3%
Popondetta	0.40	0.28	0.63	0.32	2.72	4.80	4.77	0%
Port Moresby	0.44	0.28	0.21	0.04	2.72	4.08	4.02	1%
Ramu	0.37	0.28	0.25	0.15	2.72	4.15	4.16	0%
Tari	0.59	0.28	0.25	0.89	2.72	5.21	5.04	3%
Wabag	0.44	0.28	0.25	0.62	2.72	4.76	4.72	1%
Wewak	0.50	0.28	0.56	0.05	2.72	4.52	4.32	5%

17 FORM OF REGULATION

This section outlines the ICCC's Price Order for petroleum products, which will apply in the next regulatory period (2025-2029).

17.1 Period of price direction

The forms of regulation as specified below will apply to petroleum products for a period of five years, commencing 1st January, 2025 and ending on 31st December, 2029.

17.2 Import parity price (IPP)

The ICCC will monitor the IPP for petrol, diesel, kerosene and Jet A1 under Section 32A of the PR Act on a monthly basis. In addition, the ICCC will also monitor the monthly volumes of petrol, diesel and kerosene produced from the Napa Napa refinery, the advance nominations for supply from each distributor and the imports of regulated products by each distributor including Puma Energy, under Section 32A of the PR Act.

Puma Energy, on a monthly basis, will provide daily data to the ICCC on the components of the IPP as specified in the project agreement (as amended by the state as per the 20th May, 2008 NEC decision or according to any decision made by the state after release of this Final Report). At the end of each month and prior to the 8th day of each month, Puma Energy must provide the impact of the change in IPP to the ICCC for verification.

In addition, Puma Energy will also provide monthly volumes of petrol, diesel and kerosene produced at the Napa Napa refinery, the advance nominations for supply from each distributor and the imports of regulated products by Puma Energy, to the ICCC on a quarterly basis. The other wholesale distributors will also provide monthly volumes of petrol, diesel and kerosene, being their advance nominations for supply from Puma Energy, and their imports of regulated products by means other than Puma Energy.

17.3 Wholesale margin

The ICCC will regulate the wholesale margin (for petrol, diesel and kerosene) under Section 21 of the PR Act whereby it will adjust the margin for each subsequent year by the factor of (1+CPI+X) where X for each year of the regulatory period is as follows:

Year	X-Factor
2026	-0.85%
2027	-0.85%
2028	-0.85%
2029	-0.85%

The starting wholesale margin for 2025 will be 28.26 (adjusted to 2025 values using CPI)[71] toea per litre and will be adjusted as follows:

Annual Adjustment in the years 2026, 2028 and 2029

$$NWM = OWM \times CPI \times (1 - 0.0085)$$

Annual Adjustment in 2027

$$NWM = OWM \times CPI \times (1 - \ 0.0085) + ACS$$

And where:

NWM = New Wholesale Margin (Current Month)

OWM = Old Wholesale Margin (Previous Month)

CPI = the CPI adjustment as described elsewhere in this report

0.0085 = the X factor described in this section.

ACS = the Additional Capital Spending factor

$$ACS = \frac{(Actual\ capital\ spending - base\ line\ capital\ spending)}{K215\ million} \times 4.73\ TOEA\ PER\ LITRE$$

Where:

Actual capital spending = all wholesalers capital spending between 1 January 2024 and 30 September 2026.

Base line capital spending = K102.3 million inflated using CPI

The CPI for each year t will be calculated as follows;

$$CPI_t = \left(\frac{CPI_{Mar(t-1)} + CPI_{Jun(t-1)} + CPI_{Sept(t-1)} + CPI_{Dec(t-2)}}{CPI_{Mar(t-2)} + CPI_{Jun(t-2)} + CPI_{Sept(t-2)} + CPI_{Dec(t-3)}}\right)$$

Where:

CPI means the underlying Consumer Price Index (excluding alcoholic drinks, tobacco and betel-nut) published by the National Statistical Office

Year $_t$ is the year for which the wholesale margin is being set,

Year $_{t-1}$ is the previous regulatory year,

Year $_{t-2}$ is the regulatory year two years previous, and

Year $_{t-3}$ is the regulatory year three years previous.

[71] *At the time of publishing this report, the latest CPI values have still not been published by the NSO. Therefore, once this is available, the wholesale rate will then be inflated into its 2025 equivalent value.*

Where the CPI data for the September quarter of year t-1 is not available in time to allow the analysis to be performed and notified before 31st December in year t-1, the CPI data ending on the prior quarter shall be substituted. Thus, the CPI will be developed from comparison of the four quarters ending on the June quarter of the t-1 year to the four quarters ending on the June quarter of the t-2 year.

The ICCC also will inform the industry by or before 31st of December of each subsequent year of the new wholesale margin to take effect from 1st January of each year of the regulatory period.

17.4 Domestic shipping costs

The ICCC will continue to monitor domestic shipping costs under Section 32A of the PR Act on the current basis, which in effect allows a 'pass through' of the costs incurred for sea freight.

The ICCC will also collect actual cost information on each voyage using a template and use this to calculate a cost per litre for petrol, diesel, kerosene and Jet A1.

Wholesalers, including Islands Petroleum, Mobil and Puma and any other wholesaler who transports fuel by ship, will complete the ICCC's template for each individual voyage and provide it to the ICCC at the end of each quarter.

For clarity, this excludes the cost of importing fuel by ship into PNG and only includes the cost of transporting fuel between domestic ports within PNG.

17.5 Road freight charges

The ICCC will continue to monitor the road freight charges under Section 32A of the PR Act. As part of this monitoring responsibility, the ICCC will compare the freight costs on individual routes with competitive routes in the market overall. Where the cost change on route is inconsistent with changes occurring more generally in the market, the ICCC will seek an explanation as to the reason for the divergence and, if the ICCC is not satisfied with the road freight being charged or the explanation provided, the ICCC may recommend to the Minister that road freight be declared for price control purposes.

Where more than one wholesaler transports products on the same route, the costs per litre for all operators on that route will be averaged by the ICCC to provide a single cost allowance for road freight to that centre.

Wholesalers (including wholesalers who are participating in the retail market) and selected retailers advised by the ICCC will provide road freight charge submissions to the ICCC at the end of each quarter.

17.6 Retail margin

The ICCC will continue to regulate the retail margin for petrol, diesel and kerosene under Section 21 of the PR Act for the next regulatory period. The ICCC has calculated margins to use in the calculation of the retail prices for each of 29 centres. The retail margins will be adjusted annually to cater for inflation but without any X-factor adjustment.

Inflation will be adjusted for using the following formula.

IAF = 0.185 x OIAF + 0.815 x CPI

Where

OAIF = Overseas Inflation adjustment factor (described below)

CPI = the CPI calculation for year t described in section 17.3

0.185 = the portion of the Retail margin which is estimated to be imported.

0.815 = the portion of the retail margin which is estimated to be domestic.

The ICCC will inform the industry by or before the 31st of December of the new retail margins to take effect from 1st January of each subsequent year of the regulatory period.

Exchange rate factor $= \frac{USD\ to\ Kina\ exchange\ rate\ \ (Year-1)}{USD\ to\ Kina\ exchange\ rate\ Year\ 0}$

Where

USD to Kina exchange rate Year 0 = the average daily exchange rate for the most recent 12 months (ending 30th Sept).

USD to Kina exchange rate Year-1 = the average daily exchange rate for the 12 months prior to Year 0 (ending 30th Sept).

The source of the US PPI will be the producers price index for "Industrial Machinery Manufacturing". This is published on the Federal Reserve Bank of St. Louis web site.[72] A PPI change factor will be calculated each month using the formula;

PPI factor = $\frac{PPI\ (Sept\ Current\ year)}{PPI\ (Sept\ Previous\ year)}$

The two factors will then be combined using the following formula.

Overseas Inflation adjustment factor (OIAF) = Exchange rate factor x PPI Factor

The initial retail margins are as described in Table 63. The column headed retail margin is the total retail margin being made up of the retail asset cost, the retail operating cost and the retail landowner's cost.

[72] https://fred.stlouisfed.org/series/PCU33323332

Table 63: Retail margins[73]

Area	New Retail Margin
Alotau	38.6
Bulolo	38.8
Goroka/Bena/Asaro	40.1
Kainantu	37.0
Kavieng	37.3
Kimbe	51.2
Kokopo	41.8
Kundiawa	36.9
Lae	50.4
Madang	43.5
Mendi/Ialibu	50.5
Banz/Minj/Kindeng/Kumdi/Kaupena/Togoba	50.9
Mt.Hagen	50.0
11Mile/Nadzab/40Mile/Markham	40.8
Namatanai	51.9
Popondetta	39.9
Port Moresby/Kwikila	44.0
Rabaul	49.0
Ramu	36.7
Tari	58.9
Toma/Kerevat	38.9
Wabag/ Wapenamanda/Porgera	44.2
Wewak	50.0

17.7 Drum filling

The ICCC will continue to regulate the drum filling margin under Section 21 of the PR Act. The drum filling margin will be initially set at 10.2 toea per litre. This will be adjusted annually to cater for the changes in the CPI but without any X- factor adjustment over the next regulatory period.

The CPI calculation is the same as that specified in section 17.3. The ICCC will inform the industry by or before 31st of December of each subsequent year of the new drum filling margin to take effect from 1st January of each year of the regulatory period.

17.8 Jet A1

The ICCC will continue to monitor the landed price of Jet A1 under Section 32A of the PR Act. The ICCC will monitor the prices ex Napa Napa refinery (or the landed price where Puma Energy import the product) and the benchmark index price. To the extent that the margin between the prices ex Napa Napa refinery and the benchmark index price varies materially over time, the ICCC will seek an explanation for the changes.

[73] *At the time of publishing this report, the latest CPI values have still not been published by the NSO. Therefore, once this is available, the wholesale rate will then be inflated into its 2025 equivalent value.*

Puma Energy is required to provide monthly data on Jet A1 prices ex the Napa Napa refinery. Wholesalers are required to provide monthly data on the volumes and final prices sold to customers.

18 APPENDICES

18.1 Forecast fuel demand

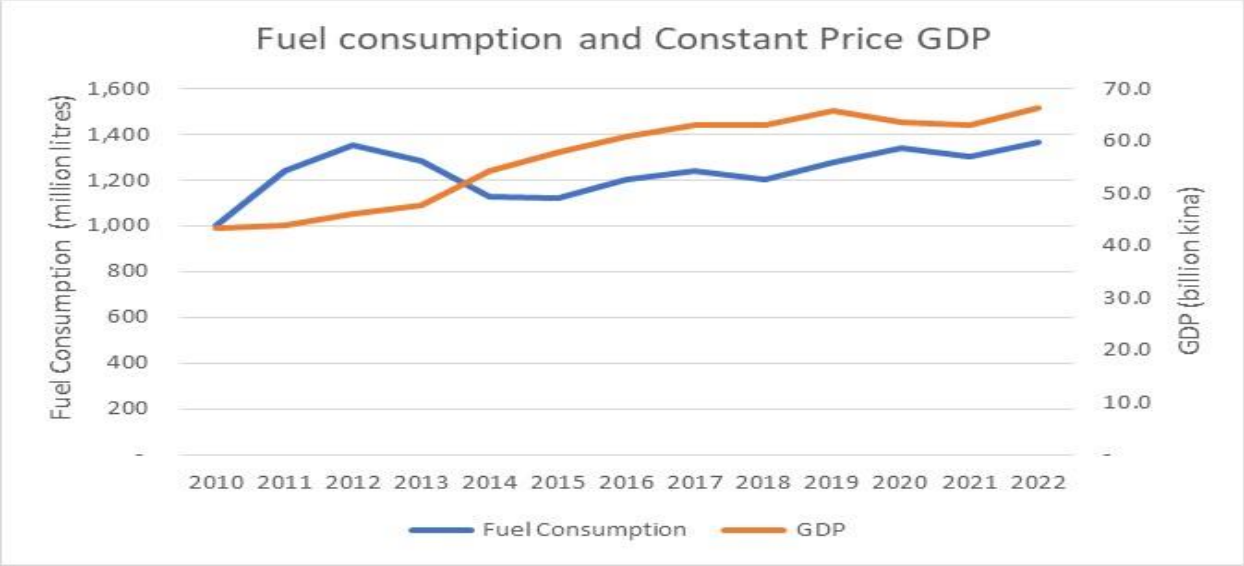
To arrive at an acceptable forecast, two methodologies were explored.

1) Using the relationship between GDP and Fuel consumption
2) Using the line of best fit to estimate a long-term trend

The relationship with GDP

It is reasonable to assume that fuel consumption is related to economic activity. To test this, a regression analysis was done to see how correlated GDP and fuel consumption are. Figure 46 shows these two variables from 2010 to 2022[74].

Figure 46



There are two immediate problems with this analysis. First, it is clear that the change in fuel consumption between 2010 and 2014 had no relationship with GDP. The second problem is that data is extremely limited with a sample size of only 13 data points. This means that any statistical analysis will have extremely high levels of uncertainty.

The changes in fuel consumption from 2010 to 2014 are assumed to be due to changes in activity driven by the PNG LPG project at that time. A more sophisticated approach to regression analysis would explore many other variables to try and find measures that could explain this variation. This might include things such as changes in employment, changes in consumer and business confidence, changes in trade volumes, price changes, levels of investment in capital projects and / or changes in average salaries. In PNG a lot of this information is not readily available. Consequently, the analysis was kept relatively simple.

[74] *The National Statistics office have not yet released 2023 GDP figures.*

The results of the r^2 outputs of the regression analysis is shown in Table 64.

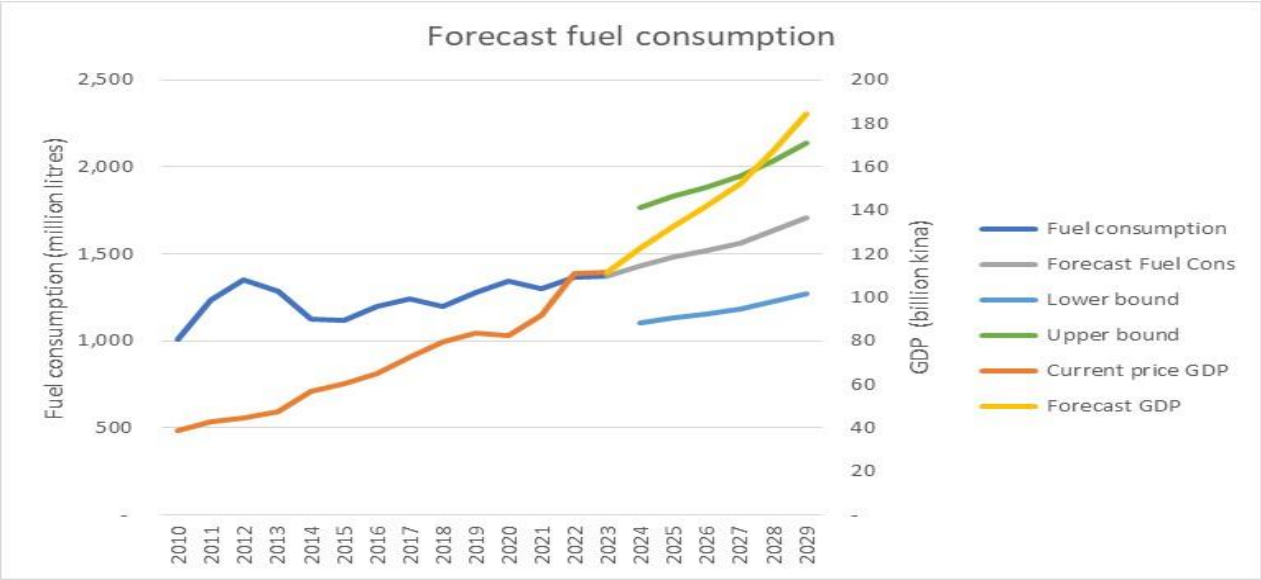
Table 64: Results of regression analysis

GDP variant	Time Period	Adjusted r^2 result
Constant Price GDP	2010 to 2022	0.05
Constant Price GDP	2014 to 2022	0.69
Current Price GDP	2014 to 2022	0.81
Non-mining GDP	2010 to 2022	0.29

Inclusion of the years 2010 to 2013 in the analysis produced very poor results. Using constant price analysis, only 5% of the variation in fuel consumption could be explained by changes in GDP. Using non-mining GDP improved this to 29%. This implies that some of the non-mining portion of the economy better explains the consumption of fuel, but the result is still poor.

Excluding the years 2010 to 2013 significantly improved the results, with an r^2 of 0.69. Removing inflation adjustments (i.e. using current price GDP), improved this result even further to an r^2 of 0.81. However, doing this means that the analysis is only based upon 10 data points. This means the margin of uncertainty is very high. Figure 47, shows the resultant forecast using current price GDP and Government forecast for GDP. This graph shows the upper and lower bounds of a 95% confidence interval. This means that from the data there is a 95% probability that future fuel consumption will be somewhere between these upper and lower points. From this graph we can see that 95% confidence intervals are very broad. The conclusion from this analysis is that it is not likely to produce a forecast with a high level of confidence simply because the number of data points will always be too low. Even if more data variables were available, the effort and sophistication is not likely to produce more reliable forecasts.

Figure 47

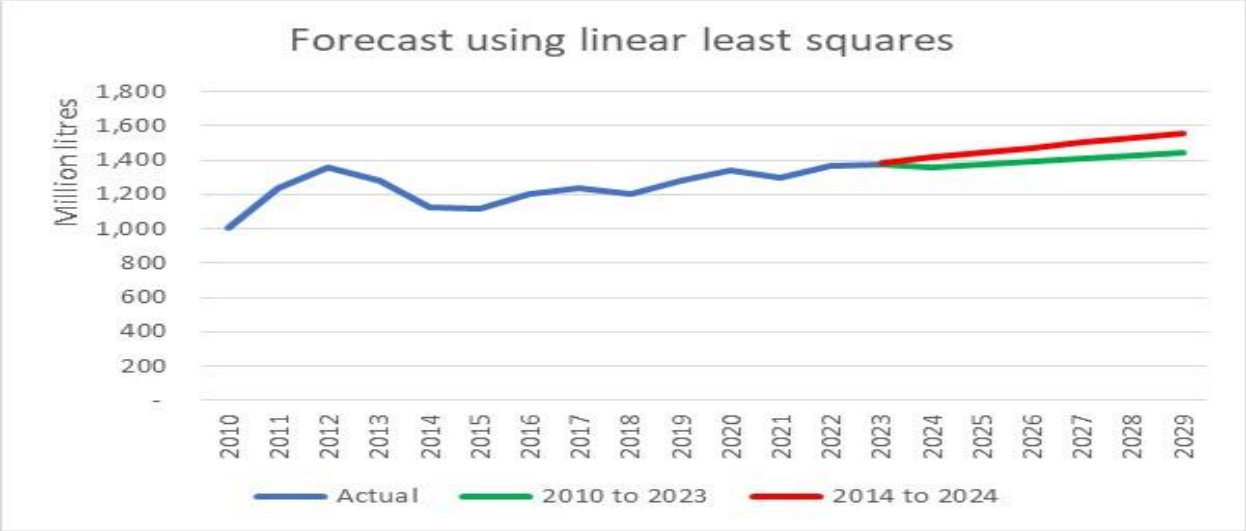


Line of best fit

A linear least square analysis can be used to establish the line of best fit for a set of data. This approach was used to calculate an equation of the form Y = mx + c, where Y = fuel consumption, x = the number of years from the first year in the data and m = the slope of the curve and C = a constant.

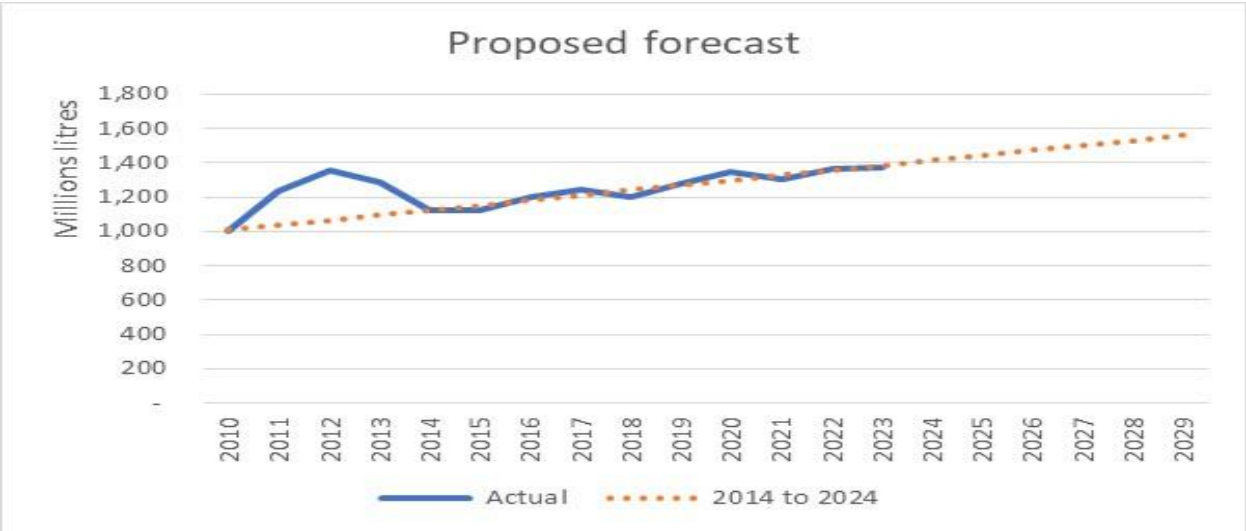
This equation was calculated for both the 2010 to 2023 time period and the 2014 to 2023 time period. Figure 48 shows the forecasts produced using each of these time periods. The longer time period which includes the hump from 2010 to 2014, produces a lower forecast than when this is excluded.

Figure 48



However, when the forecast using the 2014 to 2023 is extrapolated back to 2010 (see Figure 49), this produces what can convincingly be seen as the long-term trend line which might have occurred if the 2010 PNG LPG project did not occur.

Figure 49



Based upon this analysis, the ICCC is proposing to use the forecast shown in Figure 49.

18.2 The Project Agreement

In 1997, the PNG Government entered into an agreement with InterOil, referred to as the Project Agreement. The agreement was that InterOil would build a refinery in PNG. In return for doing so, InterOil would have a monopoly on the supply of petrol, diesel and kerosene in PNG. The agreement envisaged that all wholesalers would purchase product from this refinery. InterOil subsequently built a refinery at Napa Napa. Puma Energy purchased this refinery in 2014.

The Government supported this agreement with the "Independent Consumer and Competition ICCC (Oil Refining Facility State Agreement Exception) Regulation 2003. This regulation required the Government to do several things. In particular, it required them to make every effort to encourage wholesalers to purchase their fuel requirements from the refinery. If wholesalers did not do this, the Government was to take practical steps such as introducing an import tariff on fuel. The regulation also limited the powers of the ICCC by removing its authority to regulate the prices described in the Project Agreement.

In 2007, a crisis at the refinery resulted in the refinery running out of fuel. Consequently, Mobil started to import fuel at that time. It has continued to do so ever since. Mobil now usually supplies Islands Petroleum and Niugini Oil with imported products.

In 2007 InterOil sought modifications to the IPP. In 2008 the Government determined an interim formula which is still in effect. The 2008 changes made to the original formula included:

- Changing the calculation to use Mean of Platts Singapore (MOPS) prices instead of Singapore Posted Prices;
- The addition of a margin which was set at (4.01 US$ per barrel (bbl.) for Diesel, 3.01 US$ per bbl. for Jet A1 and 5.26 US$ per bbl. for Petrol); and
- The exchange rate used was specified to be the published Westpac Bank foreign exchange sell rate.

Both the Project Agreement and the Regulation specify the price at which wholesalers must be able to purchase fuel from the refinery. This is referred to as the Import Parity Price (IPP). This price is for product delivered in bulk f.o.b. (free on board) at the refinery in quantities similar to what an importer could purchase in Singapore.

The ICCC has no legislative power or authority to make changes to the Project Agreement or the IPP. However, the IPP has a material impact upon the retail price. And the Project Agreement significantly impacts upon the nature of competition in PNG's fuel market. Therefore, while the ICCC cannot make changes to the IPP or the Project Agreement, it is appropriate to comment on them for the benefit of others.

The ICCC currently monitors the IPP. At the end of each month the ICCC independently verifies the calculation of the variables in the IPP to ensure that Puma Energy's calculations are consistent with the ICCC's calculations. As part of this monitoring arrangement, the ICCC informs the Minister for Treasury on the monthly IPP changes and its impact on maximum retail prices. A public notice is also provided to media outlets describing the price changes for Port Moresby. The details of the pricing for all other centres in PNG is made available to all petroleum wholesalers so they can inform all their retail fuel sites to adjust their prices to those retail prices that are calculated by the ICCC under the various price control or monitoring arrangements.

The ICCC also currently monitors the volumes of petrol, diesel and kerosene produced at the Napa Napa refinery, the advance nominations for supply from each distributor and the imports of regulated products by the distributors, including Puma Energy.

18.3 Weighted average cost of capital (WACC).

The WACC approach for calculating the cost of capital for a company is widely used and accepted. We understand that it is the preferred methodology of most regulators around the world. The WACC estimates the expected rate of return on total company assets. It can be thought of as reflecting the minimum return sought by investors, who have an unlimited choice of where to invest.

The method estimates the corporation's cost of capital by combining the return on debt and equity of a company. These returns are weighted using the proportion of their values to the total value of a typical company operating in the industry.

In its simplest form the equation for WACC is as follows.

$$WACC = R_e \, x \frac{E}{V} + R_d \, x \, \frac{D}{V}$$

Where

R_e = The return on Equity

R_d = The return on debt

$\frac{D}{V}$ = the proportion of debt (gearing)

$\frac{E}{V}$ = the proportion of equity

Because the cost of debt is a tax-deductible expense for companies, tax has the effect of reducing the cost of debt. This is allowed for the post-tax WACC calculation.

$$Post\ Tax\ WACC = R_e \, x \frac{E}{V} + R_d \, x \, (1 - t) \, x \frac{D}{V}$$

Where t = the tax rate.

Both the return on equity and the return on debt are estimated by adding a margin to a risk-free rate.

To estimate a risk-free rate for PNG, we have used current average returns on 10-year US treasury bonds and added a country risk premium for PNG. US treasuries are considered to be the most risk-free bonds in the world. Yields on these can be found at wide variety of published sources.

The country risk premium for PNG has been sourced from information published by Aswath Damodaran at New York University
https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

Return on debt

The cost of debt is based upon the yields on US BBB rated corporate bonds[75]. From these the US risk-free rate is subtracted to estimate a debt margin. This debt margin is then added to the risk- free rate for PNG.

Return on equity

Return on is calculated using the following formula.

$$R_e = R_f + \beta_e \times (R_m - R_f)$$

Where

R_f is the risk-free rate.

β_e is the equity beta which is a measure of correlation between a business's risk and that of the overall market.

R_m is the whole market rate of return.

And $(R_m - R_f)$ $(R_m - R_f)(R_m - R_f)$ is the Market Risk Premium ("MRP").

Beta values and debt levels were estimated based upon data provided by Aswath Damodaran at New York University. [76] As in the 2014 and 2019 reviews, the ICCC has used oil distribution companies as the benchmark for wholesalers, and retail grocers as the benchmark for petroleum retailers.

18.4 Market risk premium

In the recent review of the PNG Ports regulatory contract, the ICCC has reviewed its methodology for setting the market risk premium (MRP). This is an excerpt from the Final 2024 PNG Ports price review report which explains the logic behind the methodology.

Having noted PNG Ports' comments on MRP, the ICCC wants to ensure that its approach to estimating a WACC is robust. It has therefore decided to use the approach used by IPART which was described by PNG Ports.

> *"The one Australian regulator that continues to give weight to DDM estimates, is the Independent Pricing and Regulatory Tribunal (IPART). Its approach involves estimating the MRP using a combination of backward-looking measures (based on historical excess returns) and forward-looking approaches (involving current estimates)."*[77]

The ICCC has adopted this method for the following reasons.

- The ICCC wants to ensure that the MRP is consistent with the risk-free rate used. This means that both the MRP and the risk-free rate should be either forward-looking or backward-looking over the same time periods.
- Both the risk-free rate and the MRP should be based upon data from the same economy.

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[75] *Sourced from US Federal Reserve – FRED economic data* https://fred.stlouisfed.org/series/BAMLC0A4CBBB/

[76] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html

[77] *PNG Ports letter to ICCC dated 24th October 2024.*

- The US economy is the most appropriate economy to use as PNG's economy is highly dependent upon gas prices which are denominated in USD.
- The US and world economic outlook is still recovering from inflationary pressures and is quite different now than it was in 2019. The ICCC therefore considers that it is more important now to consider the forward-looking view when choosing an MRP than it was in 2019.
- US stock markets are at an all-time high with high price to earnings multiples. This implies that market premiums have a higher probability of being lower over the next regulatory period. This increases the value of having a forward-looking estimate of MRP.

IPART's Approach

IPART describes their rational for their method in two review documents published in 2013[78] and 2018[79]. From these documents we note the following points.

- IPART is estimating MRP's for the Australian market, so the ICCC cannot simply use their numbers, but must instead derive numbers from the US market.
- IPART estimates a historical MRP and a forward-looking MRP and then takes the midpoint between them. This provides an equal weighting on backward looking and forward-looking MRP's.
- IPART always calculates the MRP by using the risk-free rate and total market return from the same time period. This is based upon confirmed observations that over time, MRP and the risk-free rates tend to vary inversely.
- IPART used six methodologies to estimate a forward-looking MRP. It takes the median of the results and use this as its forward-looking estimate of MRP. The six methodologies are
    - Damodaran 2013 method
    - Bank of England 2002 method
    - Bank of England 2010 method
    - Bloomberg method
    - SFG (now Frontier Economics) analysts forecast method
    - SFG (now Frontier Economics) market indicator method.
- The ICCC is relying upon the Damodaran methodology because the results are freely published and the ICCC does not have the resources to purchase the data and analysis required to use the other methods. IPART's analysis confirms that it is reasonable to do this because Damodaran's results are close to the median of the methods it uses. In January 2024, results of three of the methods were above and two were below the result using Damodaran.[80]

[78] *Review of WACC Methodology- IPART 2013* *https://www.ipart.nsw.gov.au/sites/default/files/documents/final_report_-_review_of_wacc_methodology_-_december_2013.pdf*

[79] *Review of Our WACC Method - IPART 2018* *https://www.ipart.nsw.gov.au/sites/default/files/documents/final-report-review-of-our-wacc-method-february-2018_0.pdf*

[80] *IPART WACC Fact Sheet Biannual Update 2024 – Table 3.* *https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Fact-sheet-WACC-Biannual-Update-22-February-2024.PDF*

Using Analyst Surveys

Ferandez et al of IESE Business School, University of Navarra carry out an annual survey of market analysts to identify what MRP's are being used[81]. In 2024, their survey showed that the average rate used in the US was 5.5% with a median of 5.5%. The survey was based upon 1,287 responses.

IPART also evaluated the use of this survey.

In its 2013 review it employed SFG consulting who wrote:

"Of most concern in the application of the survey is the sources used to support the MRP estimate. These responses suggest that respondents relied primarily upon historic average returns to estimate the MRP. There were 1,719 sources listed by respondents to justify their answer and at least 40% of sources are likely to represent estimates based upon historical returns. We have no way of knowing whether the participants rely upon historic returns because they consider this to be the best estimate of the prevailing market risk premium, or because they simply use a long-term MRP estimate for all valuations, regardless of market conditions."

Consequently, IPART did not use this survey because it did not view it as being representative of a forward-looking view.

However, the ICCC's reading of this survey is that it does represent what market experts in the US are currently using in their decisions. And it is based upon a large number of responses. While it might be a mix of historic and forward-looking views of MRP, this is still a valuable consensus. Consequently, the ICCC has chosen to include this value in the mix of values to determine an MRP.

The ICCC's Approach

Consistent with the IPART methodology, the ICCC has chosen the approach described in Table 65. The approach is to place equal weighting on historic and forward-looking views and a survey of analysts' current practice.

The historic MRP is weighted 50% to 50-year market returns and 10-year market returns. The 50-year view captures both periods of high inflation and low inflation as well as major economic events, such as the 1970's oil crisis.

[81] *Market Risk Premium and Risk-free Rate used for 96 countries in 2024. Pablo Fernadez et al.*

Table 65: Mix of methods used to determine MRP and risk-free rates.

MRP	Risk-free Rate	Weighting
50-year historic returns on the US market (S&P 500) (1974 to 2023) calculated as a geometric average.	Average of historic yields over 50 years on US 10-year Treasuries, calculated as a geometric average.	16.5%
10-year historic returns on the US market (S&P 500) (2014 to 2023) calculated as a geometric average.	Average of historic yields over 10 years on US 10-year Treasuries	16.5%
Forward-looking view using DDM (Dividend Discount Model and a 2024 survey of market analysts MRP expectations. Each of these will have 50% weighting.	Average of September yields on 10-year US Treasury yields as reflective of the current market's forward-looking view.	33%
Survey of analysts	Average of September yields on 10-year US Treasury yields as reflective of the current market's forward-looking view.	33%

This is a balanced approach. While the weighting used is somewhat arbitrary, testing of the results by changing the weighting of each of these inputs did not materially change the WACC. For example, removing the survey of analysts from the inputs and using a 50% weighting on the forward-looking DDM produced almost the same result.

The values derived from this methodology are shown in Table 66.

Table 66: Risk- free rates and MRP's from chosen methods.

Measure	Risk- Free Rate	MRP
50-year historic returns	6.12%	4.97%
10-year historic returns	1.46%	10.44%
DDM using Damodaran published results	3.72%[82]	4.63%
Survey of analysts	3.72%	5.50%
Weighted average	3.74%	5.94%

Damodaran as a data source

In choosing to use Damodaran as a source for a current measure of forward-looking MRP, the ICCC has noted that PNG Ports' view of Damodaran is as follows.

> *The ICCC "is endorsing an estimation approach consistent with that theory without considering whether that approach actually results in a reliable estimate of the MRP.*

[82] *https://fred.stlouisfed.org/tags/series?t=treasury*

At minimum, there should be some explanation of Damodaran's methodology and the reasonableness of the assumptions applied. This includes an objective critique of the strengths and weaknesses of this method. If the DDM is to be applied, it may need to be in combination with other specifications."

The ICCC notes that this view appears to conflict with PNG Ports' view that Australian regulators demonstrate best practice. IPART in particular has tested Damodaran's methodology and has continued to use it over the last decade following two reviews of its methodology. However, to support the ICCC's decision to use Damodaran's results we have described his methodology further in this this section.

The DDM estimates the expected market return by combining the current dividend yield with an assumed growth rate of dividends or earnings.

The formula is:

Expected Market Return = Dividend Yield + Growth Rate

The MRP is then calculated as the difference between this expected market return and the current risk-free rate.

Damodaran calculates an implied forward-looking MRP by using an adjusted DDM on broad market indices, such as the S&P 500. His method combines dividend yields, earnings forecasts, and long-term GDP growth to calculate an expected return. A more detailed explanation can be found on his web page[83].

A key factor for the ICCC in choosing to use Damodaran as a source is that he freely publishes his findings. The ICCC could find no other source of DDM analysis that was freely available.

Damodaran is a professor at Sturn School of Business at New York University. His method for calculating the Market Risk Premium (MRP) is widely used and respected for its ability to incorporate current market conditions through an implied equity risk premium approach based on the Dividend Discount Model (DDM). This method is considered valid for capturing investor expectations, particularly in volatile markets, as it reflects real-time data on dividends and growth forecasts. However, its reliability is often debated due to its sensitivity to assumptions, such as growth rates and analyst forecasts, which can lead to significant variations and volatility in the MRP estimate. Studies suggest that while Damodaran's method is valuable, it should ideally be used alongside other approaches—such as historical averages or multi-model estimates—to offset its inherent sensitivity and improve stability in long-term applications. This balanced approach is often favoured by regulators and practitioners to achieve a more comprehensive and robust MRP estimate.

18.5 Country Risk Premium

When calculating a risk-free rate for PNG for a WACC calculation, the ICCC's standard practice is to use the US risk-free rate and then add a country risk premium (CRP) for PNG. This is an excerpt from a paper prepared for the ICCC by Gravelroad Services PNG Ltd in April 2024.

[83] *https://pages.stern.nyu.edu/~adamodar/New_Home_Page/home.htm*

Should a country risk premium be applied?

There is a view that using a CRP overstates the country risk. This view is supported by Bachelor[84] who argues that an investor can diversify against country risk and that therefore country risk is not systematic risk and should not be considered as part of a WACC analysis for a particular company. Instead, he argues that it should only be the risk of the particular company under consideration. A company's risk will be driven more by the industry in which it operates than by the country in which it operates. The argument supports the view that by including a country risk factor, the value of the company being considered is often undervalued, because the WACC is too high.

Bachelor's argument therefore questions whether a country risk premium should be included in the risk-free rate at all? The method commonly used to determine country risk reflects government risk rather than company risk. However, the companies which the ICCC regulate are typically owned by the government.

To answer this question of whether to include a country risk premium, the ICCC needs to have a view of the answers to two questions.

- Does a company operating in PNG have a higher cost of debt because it resides in PNG?
- Are equity investors less likely to invest in PNG than in the USA because of risk?

We think the answer to both these questions is yes.

Domestic investment

We note that in both Australia and New Zealand regulators do not include a country risk factor when deriving the WACC's they use to set prices. This is despite a country risk existing. Allan Huang identifies the country risk for both Australia and New Zealand as being 0.65%.

However, when regulators determine WACC's in Australia and New Zealand, they determine a risk-free rate based upon their own country's government bonds. These bonds are highly liquid and are domestically traded in the respective countries. This provides a local domestic investor's perspective on what is a risk-free return. Therefore, this is consistent with not including a country risk premium.

In PNG we think this approach would be valid if investment in PNG Ports was limited to PNG entities.

It could be argued that the PNG Government as an equity investor in PNG Ports should have a local PNG view of risk and so would not consider country risk in their investment decisions. However, this argument may not be valid if the PNG Government is financing its equity investment with overseas debt.

We also expect the most likely sources of debt for PNG Ports are likely to be overseas investors, who would consider country risk as material part of their decision-making.

The other consideration for this to be a valid approach would be the liquidity of PNG Government bonds. To adequately evaluate a domestic perspective of risk using this approach, PNG Government bond price would need to be driven by domestic purchases by PNG investors and to be frequently traded. We expect that this is not currently occurring.

Common practice continues to be to include a country risk premium in the risk-free rate calculation. We don't think there is a strong argument for moving away from including a country risk premium.

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[84] *Excess risk premiums when evaluating companies in emerging markets. – Thomas Stefeldt Batchelor. Copenhagen Business School, https://research.cbs.dk/en/studentProjects/35260d6d-f306-4f6e-a8bf-87599d1b5823*

Recommendation - continue to include a country risk premium with a US risk-free rate.

Estimating the country risk premium

There is debate as to how to establish a country risk premium (CRP) for countries like PNG. One way is to look at emerging countries that issue government bonds denominated in US dollars. The fact they are in US dollars is helpful because it removes the inflation differential particular to any one country. There will be a spread of interest rate difference between the 10-year US Government bond yield and that of the particular country. This difference gives some indication of the extent of the country risk premium.

The PNG Government issued 10-year bonds in 2018, which were denominated in US dollars. These are traded on the Frankfurt exchange. Figure 50 shows the how the price for these bonds has changed since they began trading in 2020.

Figure 50[85]

The change in prices tells us that international perception of PNG sovereign risk increased (i.e. falling bond prices) till late 2022. However, since then perception of risk has decreased and now appears to be more stable.

The current bond price indicates a yield to maturity of 10.28%. An equivalent US Government bond with an equivalent life to maturity, currently has a yield of 4.43%, so this implies a country risk premium of 5.85%.

The two major credit rating agencies both rate PNG as Stable.[86]

- S&P give a B- rating. In 2019 their rating was B
- Moody's give a B2 rating which is the same as their 2019 rating.

[85] https://www.boerse-frankfurt.de/bond/usy6726sap66-papua-new-guinea-government-of-8-375-18-28

[86] https://tradingeconomics.com/papua-new-guinea/rating

A common approach to assessing country risk is to use the bond yields for governments that issue US dollar denominated bonds. Countries with the same credit rating are then compared to each other.

There are two academics we are familiar with who publish results using this method. Allan Huang from San Jose State University and Aswath Damodaran from NYU Stern School of Business. Their results are shown in Table 67.

Table 67: Country Risk Estimates

Source	Estimate	Comments
PNG Government Bonds	5.85%	Current spread comparing US yield to maturity with PNG Government bonds yield to maturity with the same time to maturity. (Same method used by FTI). This is as at 1 April 2024.
Damodaran	6.0%	https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html Default spread based upon a risk rating of B2.
Allan Huang (San Jose State University)	5.5%	https://www.sjsu.edu/faculty/watkins/countryrisk.htm Based upon a risk rating of B2.
FTI Analysis	7.75%	Average of countries shown in Table 68, excluding PNG.

FTI in their report also carried out this analysis as at 1 September 2023, for six countries, including PNG as shown in Table 68. The average result was a CRP of 7.75% excluding PNG.

Table 68

	Remaining Term (years)	Average Yield (%)	Average yield on US Government bond (%)	Implied CRP (%)
Angola	8.62	11.86	4.22	7.64
Barbados	5.36	7.95	4.31	3.64
Bolivia	4.55	15.99	4.38	11.62
Nigeria	5.56	10.97	4.30	6.67
PNG	5.10	10.25	4.31	5.94
Tajikistan	4.04	13.63	4.45	9.18

In their report, FTI note the wide variation in CRP's between the countries they evaluated. Seemingly this implies that the markets see other factors not considered by Moody's and S&P, which are driving perception of risk.

We note that evaluating PNG bond prices implies a CRP which is very similar to that derived by Damodaran and Huang. We think this lends weight to using their results. If we take a simple average of Damodaran, Huang and the PNG Government bond price, this will produce a CRP of 5.8%.

FTI recommended a CRP of 5.9% but also said they expected this would get updated closer to the date of the final determination.

In this paper we have used 5.8%.