



ENERGY PRICES & MARKETS IN SINGAPORE

MAY 2023

ADVANCED EDITION

BY INTRATEC SOLUTIONS LLC

ENERGY PRICES & MARKETS

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This report is part of a subscription program providing monthly reports on energy commodity prices and markets, with each report focused on a specific country. The program covers the following 33 countries: United States, Australia, Belgium, Brazil, Canada, Chile, China, Colombia, Czech Republic, Finland, France, Germany, Hungary, India, Indonesia, Italy, Japan, Mexico, Netherlands, Norway, Philippines, Poland, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Taiwan, Thailand, Turkey, and United Kingdom.

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To protect proprietary data, numerical values have been replaced with "X" placeholders and charts have been intentionally blurred. Nonetheless, this preview faithfully reflects the structure and depth of the commercial report, including the types of tables, charts, and descriptions presented.

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Preamble

Understanding Intratec Energy Prices & Markets Program

Amid a global push for renewable sources and ever-evolving geopolitical dynamics, energy markets have never been more complex or unpredictable. Shifting trade alliances, supply chain disruptions, and volatile pricing trends create a landscape that demands constant monitoring and strategic foresight.

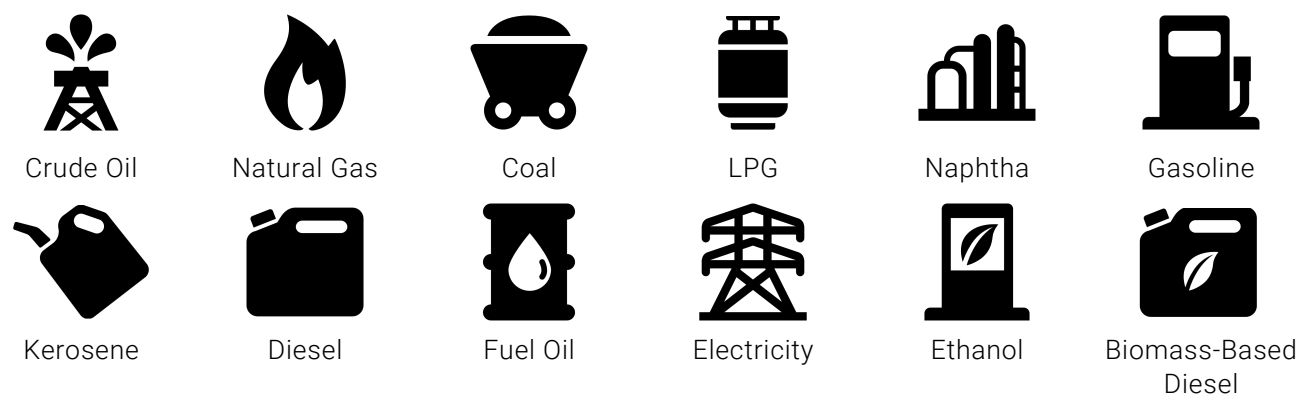
To help businesses and decision-makers navigate such uncertainties, we designed the Intratec Energy Prices & Markets, a subscription-based program that provides monthly reports with comprehensive and up-to-date assessments into the energy prices and markets worldwide.

Each report helps subscribers answer essential questions around a country's energy market, such as:

- * How have energy prices changed historically, and recently?
- * What are the price forecasts for energy commodities?
- * How do local energy prices compare to global market prices?
- * What are the key trends in the country's energy production and consumption?
- * How are freight and insurance costs affecting the competitiveness of energy imports and exports?
- * To what extent is the country self-sufficient in energy production?
- * Who are its main energy trade partners, and how reliant is it on energy imports or exports?
- * How exposed is the country to financial or supply risks in its energy trade relationships?

Commodities Approached by Report

Every report under Intratec Energy Prices & Markets program includes price and market assessments on essential energy commodities:



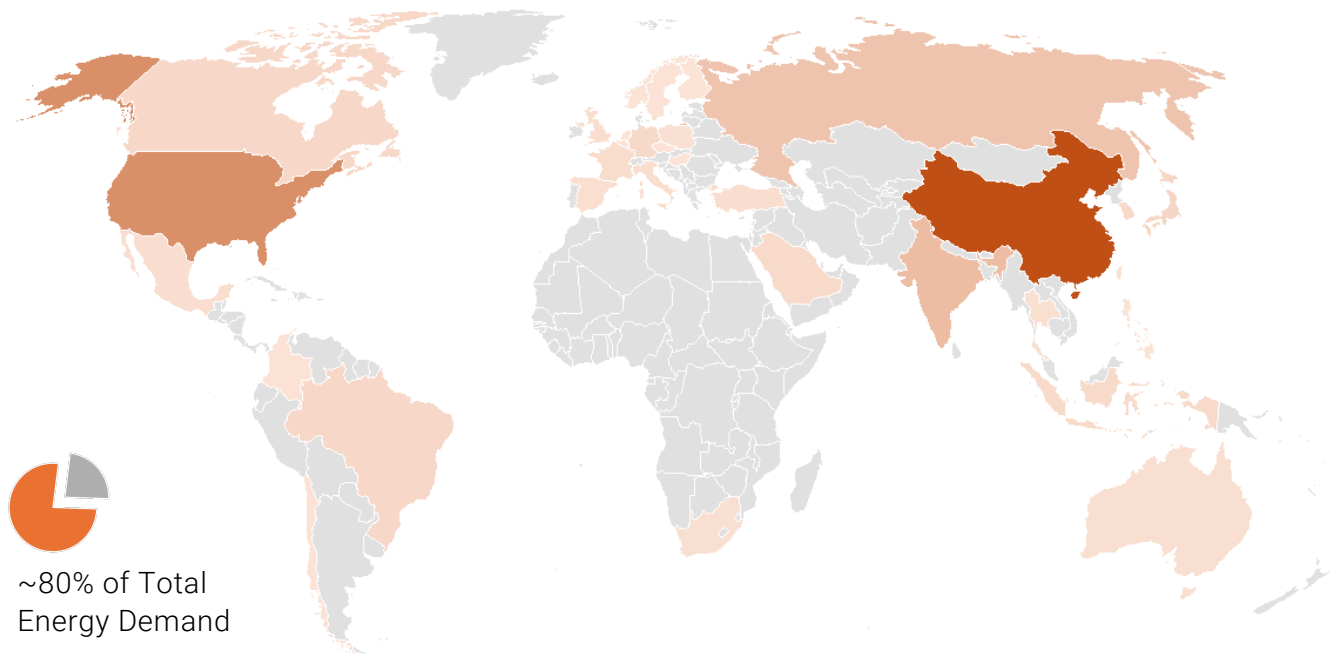
Each report is focused on a specific country. Subscribers receive new PDF reports every month, featuring the latest data and analyses, allowing them to stay informed about market trends.

Available Reports

The Intratec Energy Prices & Markets program offers a selection of 33 country-specific reports, allowing subscribers to choose the countries that matter most to them. Upon subscription, they can tailor the coverage to their specific needs and receive only the selected reports monthly.



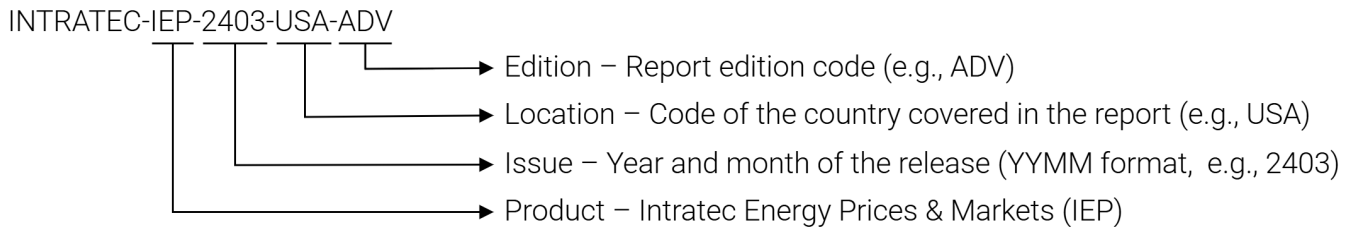
Such selection of countries covered in the program encompasses key players in the global energy landscape. These countries collectively account for significant shares of global energy production and demand, ensuring that subscribers gain insights into the most relevant markets influencing supply chains, price dynamics, and industry trends.



How the Program is Organized

Each Intratec Energy Prices & Markets report is dedicated to a specific country, delivering in-depth analyses tailored to the selected location. The scope and depth of insights vary according to the subscription plan, ensuring that subscribers receive the level of detail that best suits their needs. Reports are released at the beginning of each month, providing timely updates on energy prices, forecasts, market trends, and key trade dynamics.

To ensure clarity and consistency, each report follows a structured identification format, which includes a unique code representing the subscription plan, the country covered, the release month and year, and the Intratec Energy Prices & Markets program designation:



This organization allows subscribers to effortlessly track their reports and stay up to date with the latest energy market developments in their regions of interest.

Subscription Plans

To meet the diverse needs of our customers, Intratec Energy Prices & Markets is offered through three subscription plans, each providing reports with increasing levels of data coverage and analysis. These reports include key market insights and are released monthly, with different access features depending on the chosen plan.

- * **Starter Plan.** Reports in this plan include the latest monthly prices for key energy commodities, along with a 1-year price history. Reports are updated on the 8th business day of each month. This plan provides online access to read-only PDFs for up to 2 users, making it ideal for those who need essential, regularly updated pricing data.
- * **Pro Plan.** In addition to all the content available in the Starter Plan, reports in this plan include 3 years of historical price data, price forecasts, and key global price benchmarks. Reports are updated earlier, on the 5th business day of each month. This plan allows downloading of PDFs and includes global access for up to 3 users, making it suitable for professionals who require deeper market insights.
- * **Advanced Plan.** This plan provides the most comprehensive reports, covering everything in the Pro Plan plus 10 years of historical prices, global price comparisons, trade balance data, freight and insurance costs, production and demand analysis, and electricity generation by source. Reports are updated on the 3rd business day of the month. The plan also includes advanced access features such as Excel and Power BI integration, API access, and unrestricted internal use for up to 5 users.

For more details on each subscription plan's features, please refer to the full plan comparison at:

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About this Report

Report Content

This report, focused on Singapore, was released on May 2023 and is organized in fourteen parts:

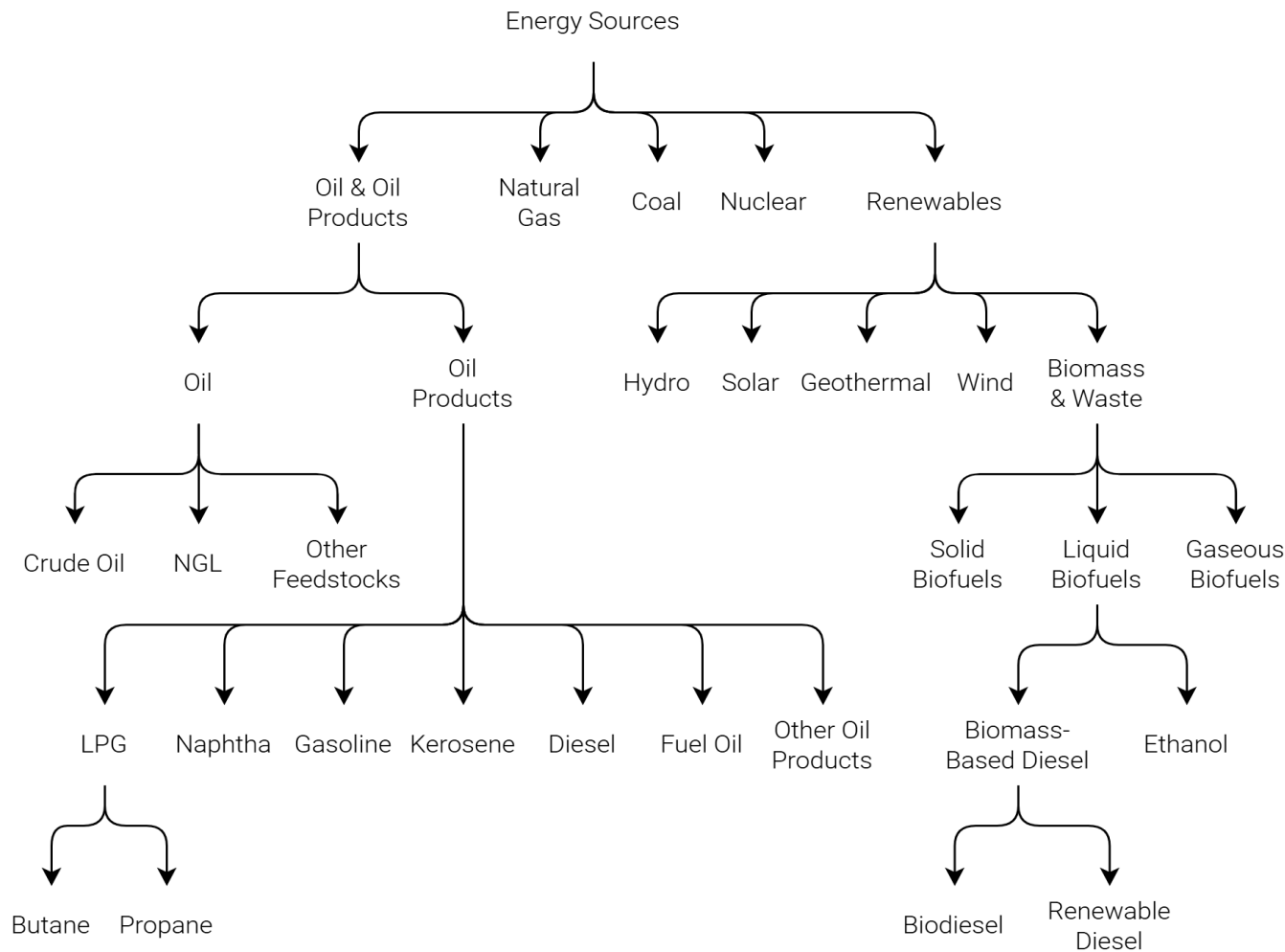
- * Executive Summary: Brief context of key energy prices and recent market changes.
- * Current Prices: Summary of variations from previous month and year for all assessments.
- * Historical Prices: Evolution of energy commodity prices.
- * Price Forecasts: Short-term forecasts for selected energy price assessments.
- * Market Outlook: Information on energy market, imports, exports, production, and demand in recent years.
- * Freight and Insurance: Analysis of freight rates and insurance costs for key trade routes.
- * Glossary and Methodology (Appendix): Presentation of key terms and methodology.
- * Currency and Unit Conversion Factors (Appendix): Summary of currency rates and unit conversions.
- * Alternative Data Delivery Methods (Appendix): Explanation of Intratec's data delivery formats.
- * Price Models Accuracy (Appendix): Evaluation of Intratec's preliminary price model accuracies.
- * Price Forecasts Accuracy (Appendix): Assessment of relevant global sources price forecast accuracies.
- * Global Prices Comparison (Appendix): Comparison of the Singapore energy prices with other countries.
- * Frequently Asked Questions (Appendix): Answers to questions about pricing methodologies, data reliability, and key concepts.

Analytical Approach

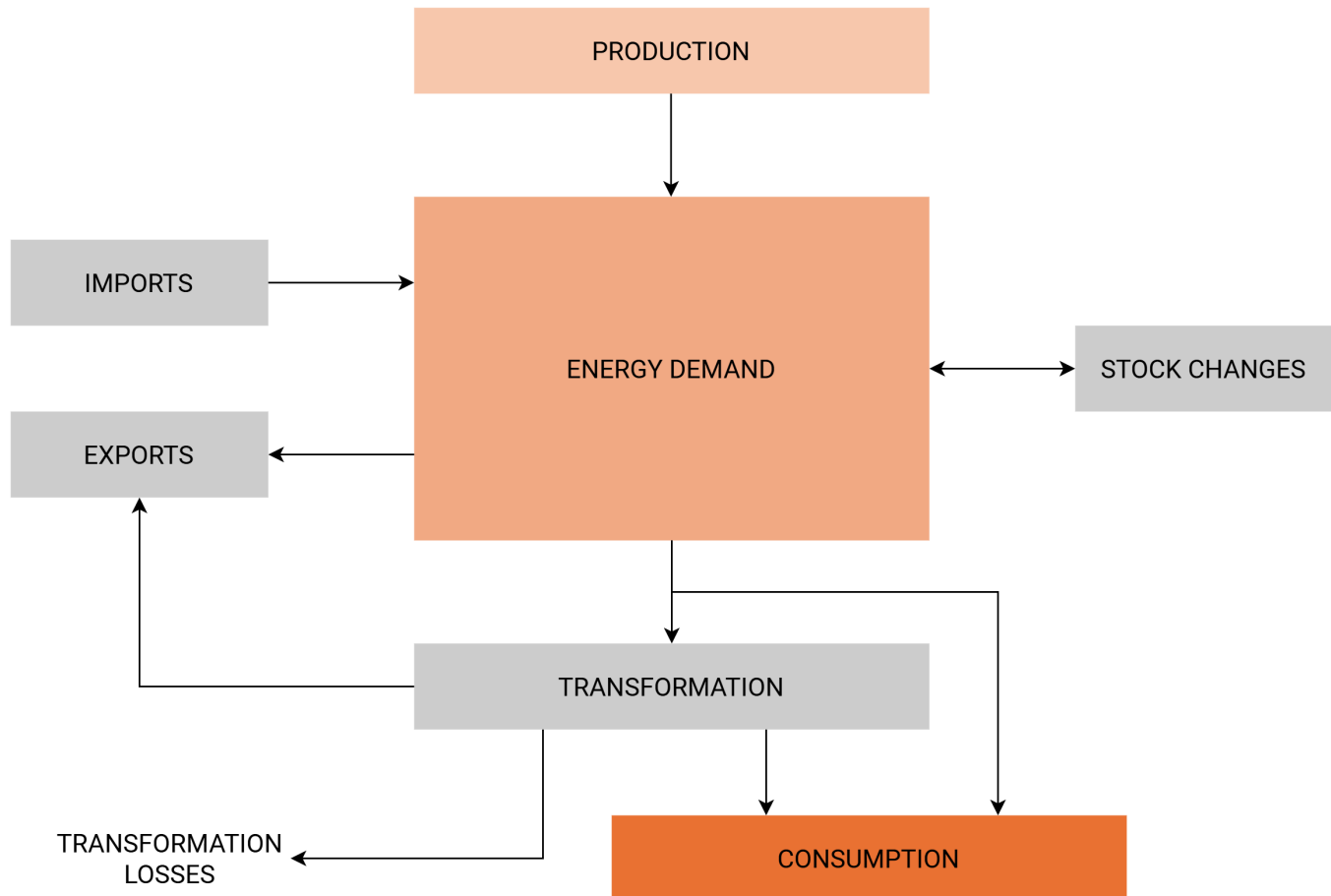
This report examines energy commodities from multiple perspectives, considering them both individually and in groups aligned with specific assessment types. To enhance clarity, this section outlines the key commodity groupings used throughout the analyses.

* Market Assessments

In market assessments, energy commodities are categorized based on distinctions between primary and secondary energy sources, exploring their transformation into usable energy products. The following diagram illustrates the classification framework used:



Additionally, the energy flows analyzed in this report are represented in the diagram below:

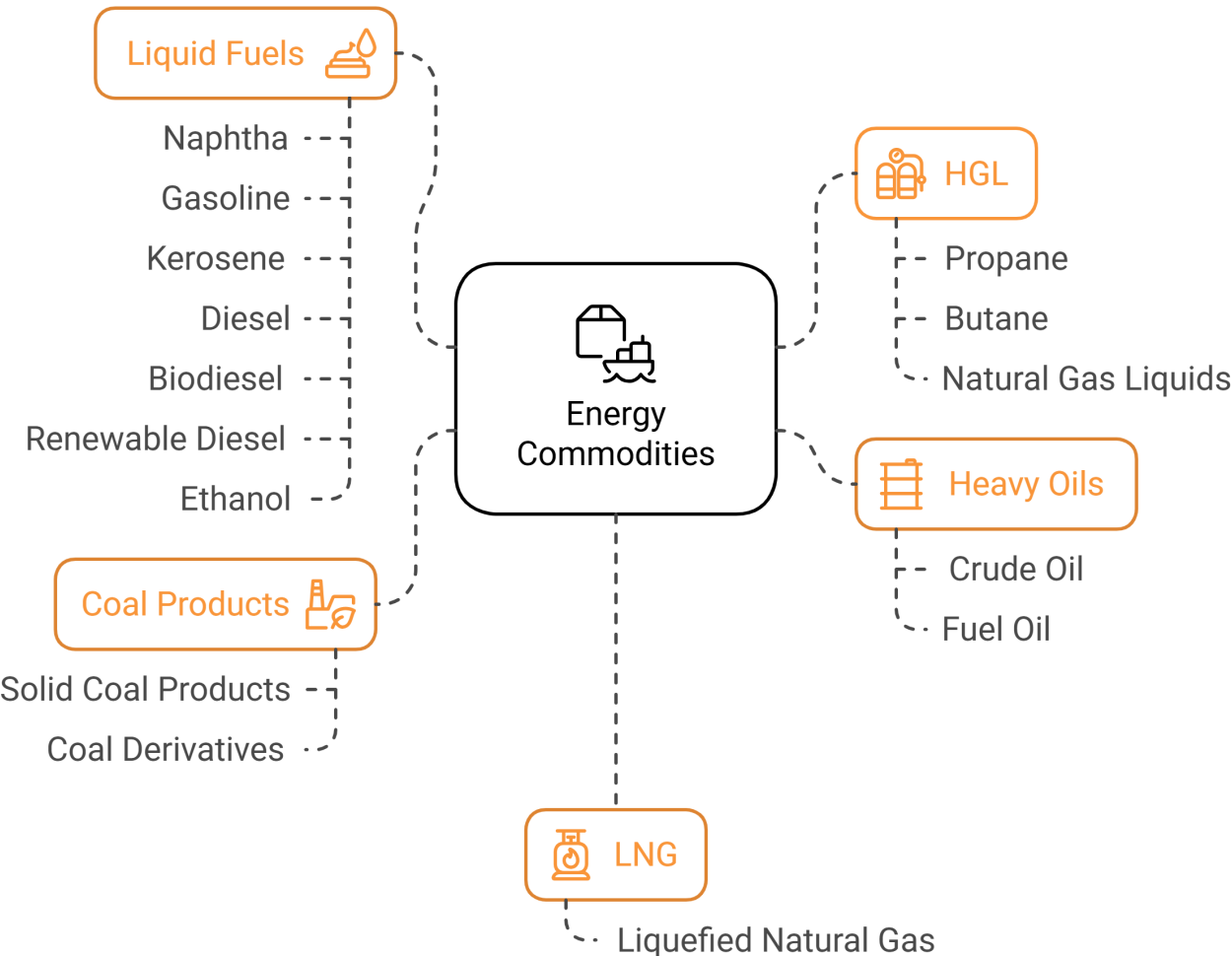


* Freight Cost Assessments

For transportation and freight cost assessments, energy commodities are classified according to industry standards commonly used in maritime shipping. This approach reflects both logistical considerations and the distinct physical and economic characteristics of different fuel types. The main categories include:

- * Heavy Oils
- * Liquid Fuels
- * Hydrocarbon Gas Liquids (HGL)
- * Liquefied Natural Gas (LNG)
- * Coal Products

These categories streamline classification and transportation, ensuring consistency with shipping practices. The diagram below illustrates how energy commodities are grouped for freight cost assessments:



How to Use This Report

Intratec Energy Prices & Markets delivers reliable, data-driven insights by relying on official trade statistics and advanced computational models, rather than subjective estimates from market participants. Unlike competitors that base assessments on buyer and seller quotes – often reflecting expectations rather than actual trades – Intratec data are primarily based on effectively closed international trade deals. This ensures transparent, auditable, and unbiased energy assessments, providing a clear, objective view of market conditions.

In this context, over the years, our reports have been successfully used to:

- * Track historical energy price movements and short-term forecasts.
- * Assess procurement strategies and cost planning.
- * Evaluate a country's energy self-sufficiency and trade dependencies.
- * Compare local energy prices with global market prices.
- * Identify trends in freight rates and their impact on energy imports and exports.
- * Support investment analyses and commercial decision-making.

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Chapter 1

Executive Summary

1.1 Overview

Assessments Variations



Crude Oil price ↑ 3.4%

Crude Oil prices rose from Mar 23 to Apr 23



Electricity price ↓ 5.8%

Industrial Electricity prices declined from Mar 23 to Apr 23



Natural Gas price ↓ 12.8%

Natural Gas prices decreased from Mar 23 to Apr 23



Gasoline price ↑ 2.1%

Gasoline prices accelerated from Mar 23 to Apr 23



Oil Products price ↓ 16.1%

On average, the prices of Oil Products fell from Mar 23 to Apr 23



Average energy price ↔ 1.2%

The general energy price showed stability from Mar 23 to Apr 23



Energy consumption ↑ 15.5%

Energy consumption ramped up from Nov 22 to Dec 22



Energy production ↑ 1.2%

Energy production strengthened from Nov 22 to Dec 22



Energy exports ↑ 2.4%

Energy exports have gone up from Nov 22 to Dec 22



Energy imports ↑ 5.8%

Energy imports expanded from Nov 22 to Dec 22



Electricity consumption ↓ 1.1%

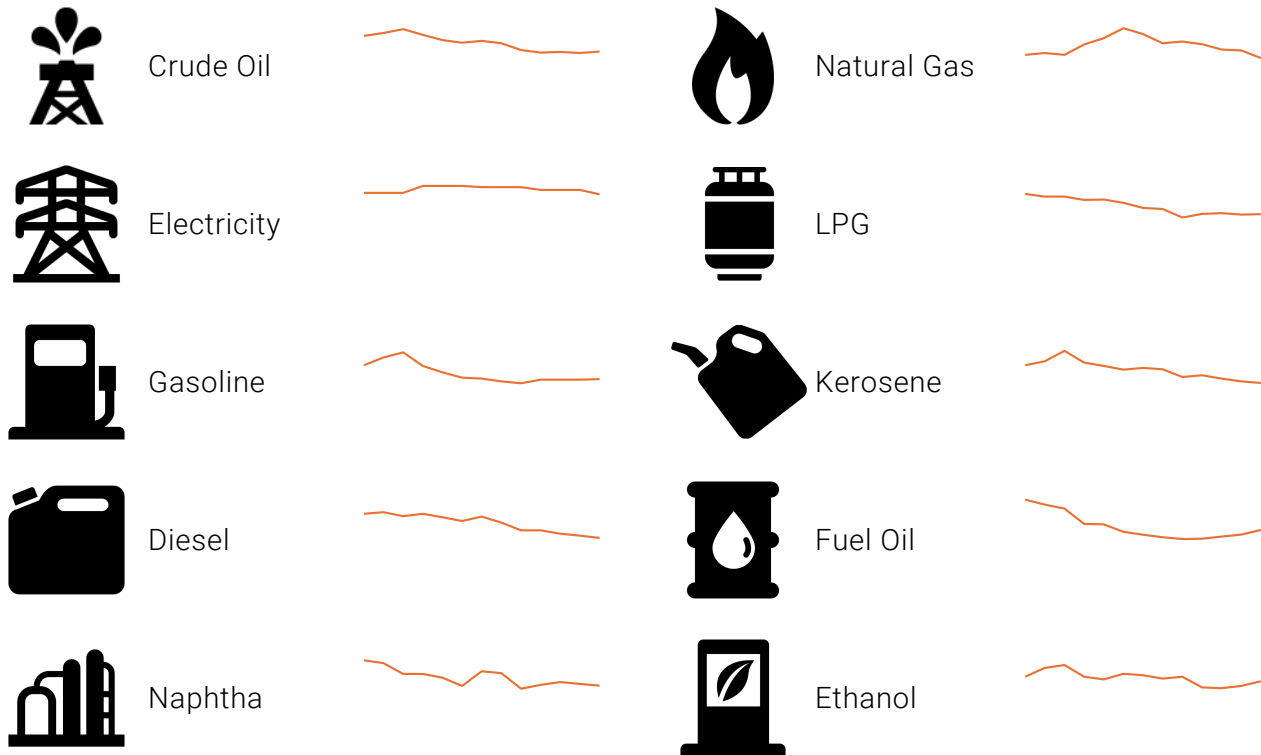
Electricity consumption tumbled from Nov 22 to Dec 22



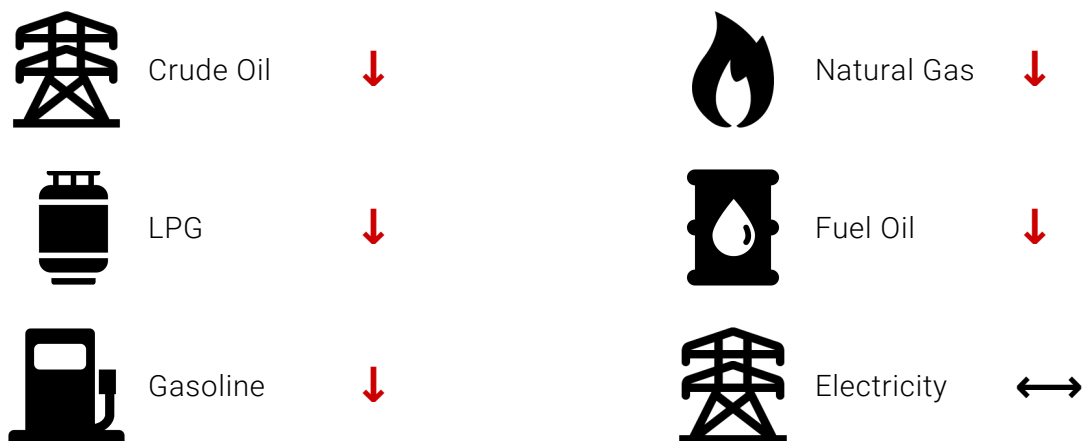
Energy self-sufficiency ↓ 7.6%

Dependency on imports dropped from Nov 22 to Dec 22

Energy Prices (Last 12 Months)



Expected Energy Prices Trend (Forward Month)



1.2 Current Prices

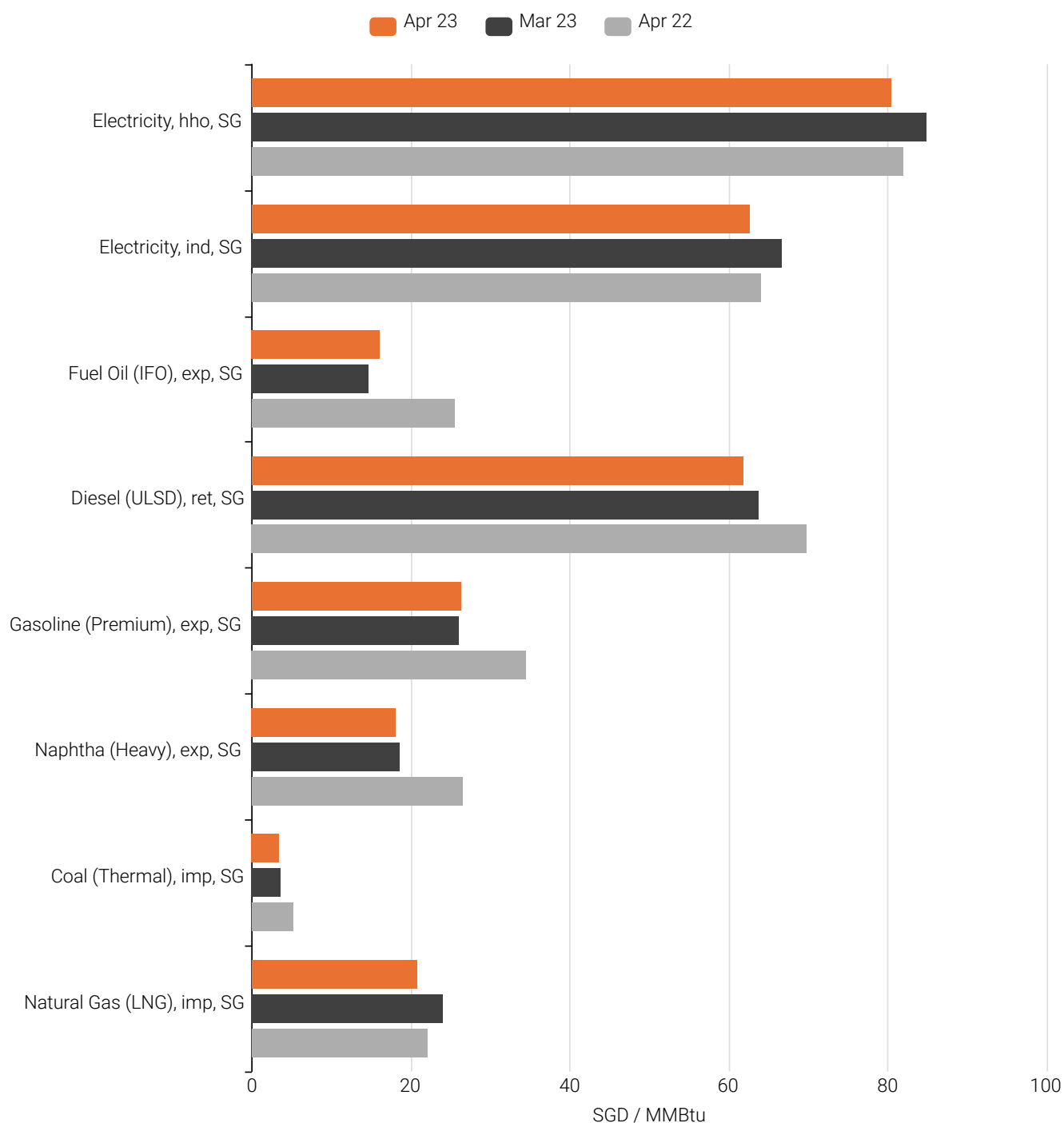


Figure 1.1 Current Energy Prices in Singapore

Table 1.1 Energy Price Summary - National Currency

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Natural Gas (liquified), import spot, cif (SGD/MMBtu)	20.8	24.0	24.4	-21.8 ↓	-3.6 ↓
Coal (thermal), import spot, cif (SGD/mt)	98.0	103	99.9	-11.9 ↓	-31.1 ↓
Naphtha (heavy), export spot, fob (SGD/mt)	778	801	828	-2.0 ↓	-29.2 ↓
Gasoline (premium), export spot, fob (SGD/Bbl)	134	132	132	+0.9 ↑	-21.2 ↓
Diesel (ultra-low-sulfur), retail (SGD/Bbl)	356	367	377	-7.0 ↓	-9.0 ↓
Fuel Oil (intermediate), export spot, fob (SGD/mt)	619	566	539	+18.8 ↑	-34.5 ↓
Electricity, industrial sector (SGD/kWh)	0.214	0.227	0.227	-6.8 ↓	0.0 ↔
Electricity, household (SGD/kWh)	0.274	0.289	0.289	-5.8 ↓	+0.5 ↑

Table 1.2 Energy Price Summary - US Dollars

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Natural Gas (liquified), import spot, cif (USD/MMBtu)	15.6	15.6	15.6	-22.4 ↓	-3.7 ↓
Coal (thermal), import spot, cif (USD/mt)	73.6	73.6	73.6	-12.2 ↓	-31.9 ↓
Naphtha (heavy), export spot, fob (USD/mt)	584	584	584	-2.0 ↓	-29.9 ↓
Gasoline (premium), export spot, fob (USD/Bbl)	100	100	100	+1.0 ↑	-21.7 ↓
Diesel (ultra-low-sulfur), retail (USD/Bbl)	267	267	267	-7.2 ↓	-9.2 ↓
Fuel Oil (intermediate), export spot, fob (USD/mt)	465	465	465	+19.2 ↑	-35.3 ↓
Electricity, industrial sector (¢/kWh)	16.0	16.0	16.0	-7.0 ↓	0.0 ↔
Electricity, household (¢/kWh)	20.6	20.6	20.6	-5.9 ↓	+0.5 ↑

1.3 Price Forecast

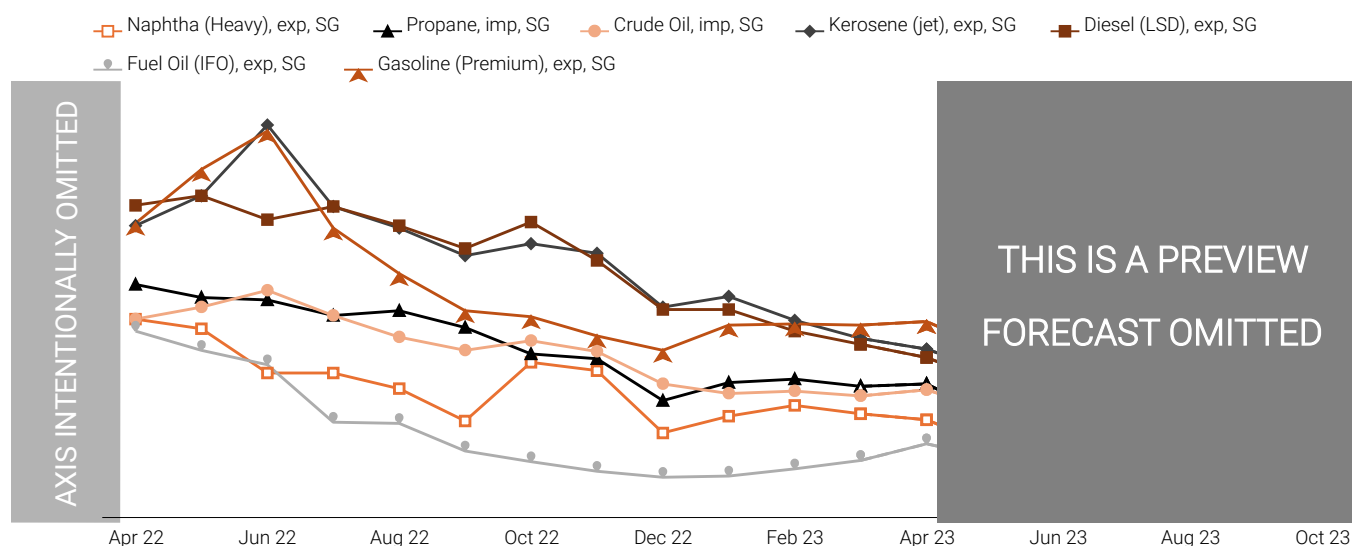


Figure 1.2 Energy Price Forecasts in Singapore

Table 1.3 Energy Price Forecasts

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Naphtha (heavy), export spot, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX
Propane, import spot, cif (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX
Crude Oil, import spot, cif (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX
Fuel Oil (intermediate), export spot, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (premium), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX

1.4 Market

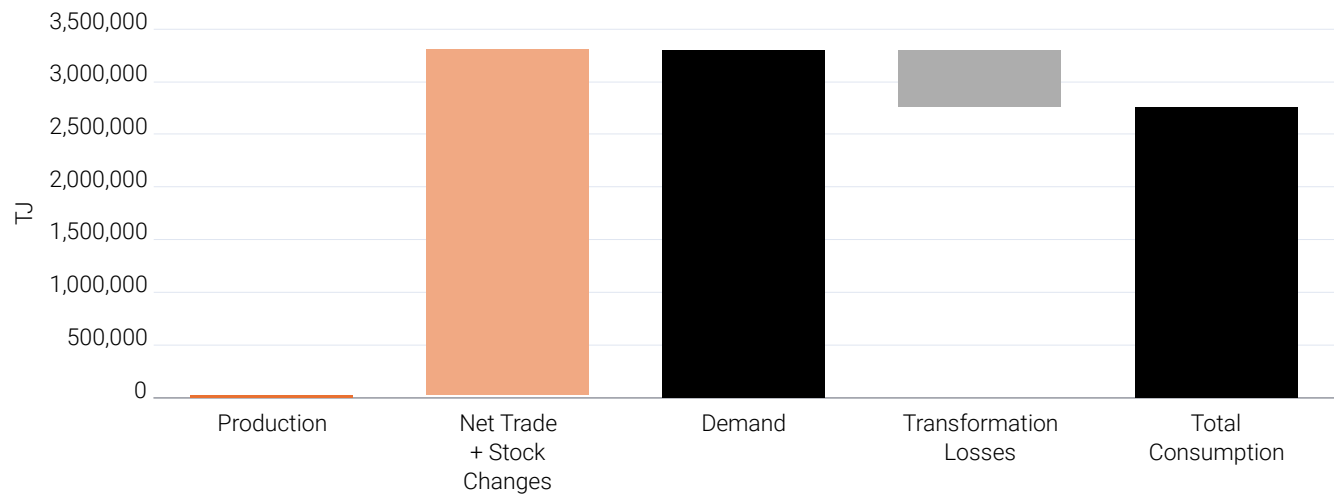


Figure 1.3 Energy Balance in Singapore (Jan 22 - Dec 22)

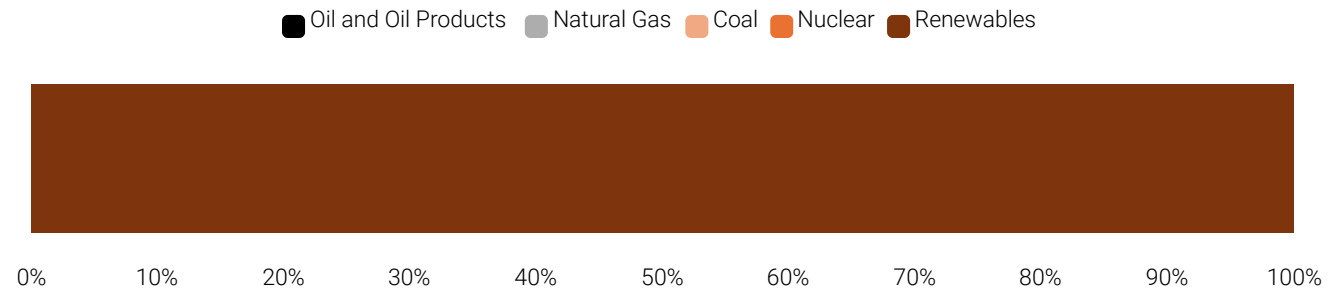


Figure 1.4 Energy Production by Source in Singapore (Jan 22 - Dec 22)

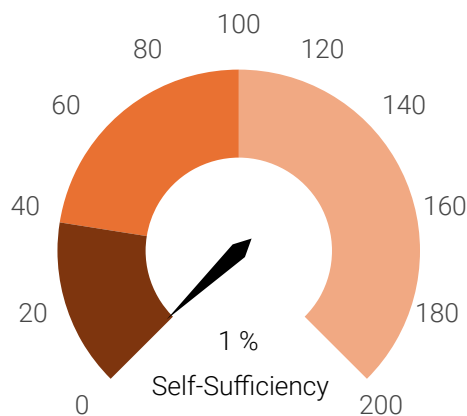


Figure 1.5 Energy Self-Sufficiency in Singapore (Jan 22 - Dec 22)

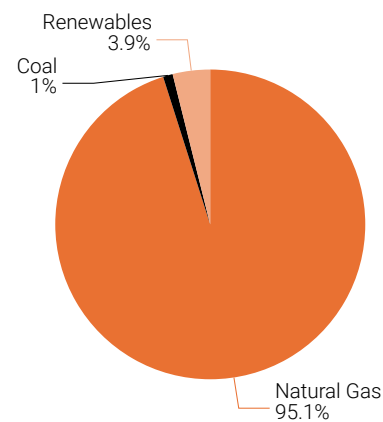


Figure 1.6 Electricity Generation by Source in Singapore (Jan 22 - Dec 22)

1.5 Global Prices Comparison



Figure 1.7 Average Energy Price Comparison

Chapter 2

Current Prices

This chapter provides an overview of the most recent energy prices in Singapore, focusing on key commodities such as Crude Oil, Natural Gas, Gasoline, and Electricity. The analysis is presented through charts and tables, offering a comprehensive view of price trends and assessments.

To ensure clarity, readers can refer to “Appendix A. Glossary and Methodology” for explanations of key terms used to define the basis and types of prices of the assessments presented (e.g., “contract,” “spot,” and “transaction”). For more detailed information on Intratec’s methodologies and assessment specifications, additional resources are available:

- General Methodology: <https://intrat.ec/m?f=/iep-methodology-general>
- Assessment Guides: <https://intrat.ec/m?f=/iep-assessments-sg>

2.1 Crude Oil

Figure 2.1 illustrates Crude Oil prices over the past 13 months.

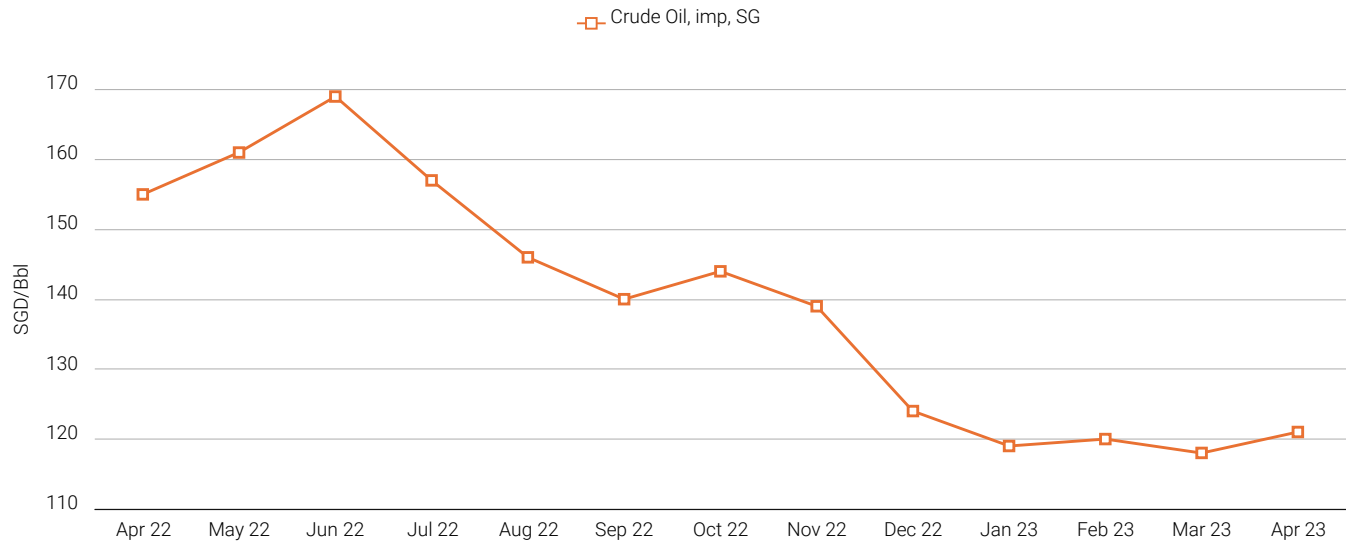


Figure 2.1 Singapore Crude Oil Prices (Apr 22 - Apr 23)

Table 2.1 presents the most recent Crude Oil prices, along with quarterly and yearly price changes.

Table 2.1 Singapore Crude Oil Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Crude Oil, import spot, cif (SGD/Bbl)	121	118	120	+1.1 ↑	-19.9 ↓

Crude Oil (Apr 23). The Crude Oil, import spot, cif price was around 121 SGD per Bbl, which represents a rise of 3.4% compared to the previous month’s value. On a year-over-year basis, Crude Oil, import spot, cif prices decreased by 19.9%.

Illustrative Case Study: Applying Intratec Data

An energy importer located in Singapore received a Crude Oil quote of SGD 125 per Bbl in February 2023. To estimate the price for April 2023, they used Intratec’s “Crude Oil, import spot, cif” assessment as a market reference. Intratec’s February assessment was SGD 120 per Bbl, and by April, it was SGD 121 per Bbl.

Using Intratec’s price trend, the expected price in April would be approximately SGD 126 per Bbl, calculated by applying the percentage change in Intratec’s assessments. This approach helps validate supplier quotes and negotiate fair prices based on market trends.

2.2 Natural Gas

Figure 2.2 illustrates Natural Gas prices over the past 13 months.

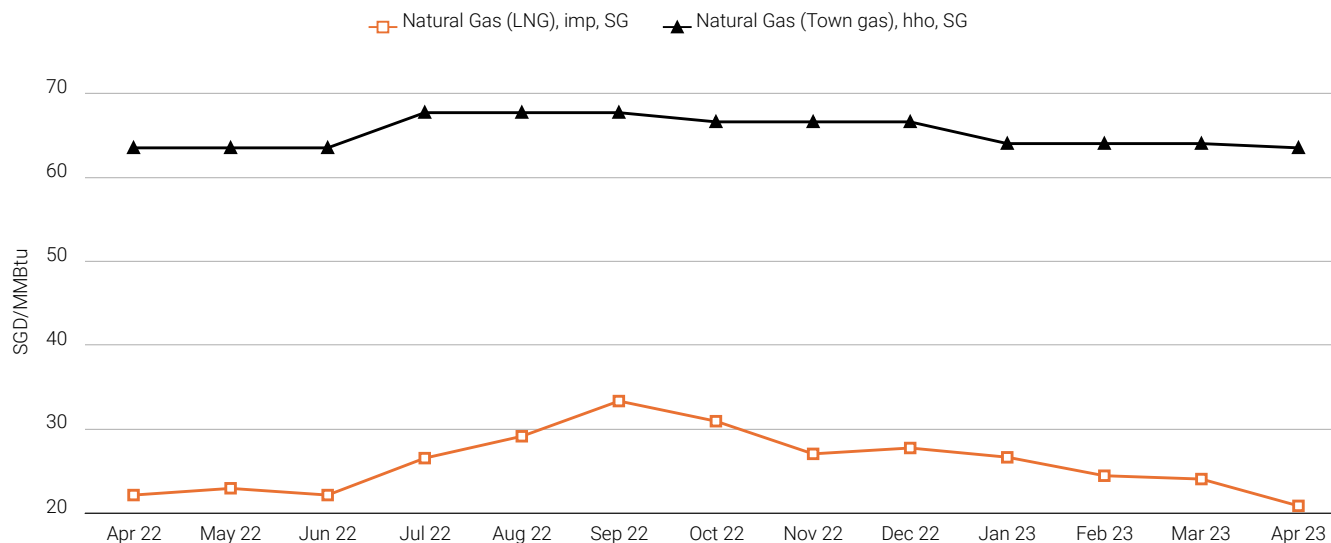


Figure 2.2 Singapore Natural Gas Prices (Apr 22 - Apr 23)

Table 2.2 presents the most recent Natural Gas prices, along with quarterly and yearly price changes.

Table 2.2 Singapore Natural Gas Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Natural Gas (liquified), import spot, cif (SGD/MMBtu)					
	20.8	24.0	24.4	-21.8 ↓	-3.6 ↓
Natural Gas (town gas), household (SGD/MMBtu)					
	63.5	64.0	64.0	-1.2 ↓	+2.5 ↑

Natural Gas (Apr 23). The Natural Gas (liquified), import spot, cif price was around 20.8 SGD per MMBtu, which represents a fall of 12.8% compared to the previous month's value. On a year-over-year basis, Natural Gas (liquified), import spot, cif prices decreased by 3.6%. Meanwhile, the average price of Natural Gas (Town gas), hho, SG amounted to 63.5 SGD per MMBtu, from 63.5 SGD per MMBtu one year earlier. On a month-over-month basis, the Natural Gas (Town gas), hho, SG price is close to the price one month before.

2.3 Coal

Figure 2.3 illustrates Coal prices over the past 13 months.

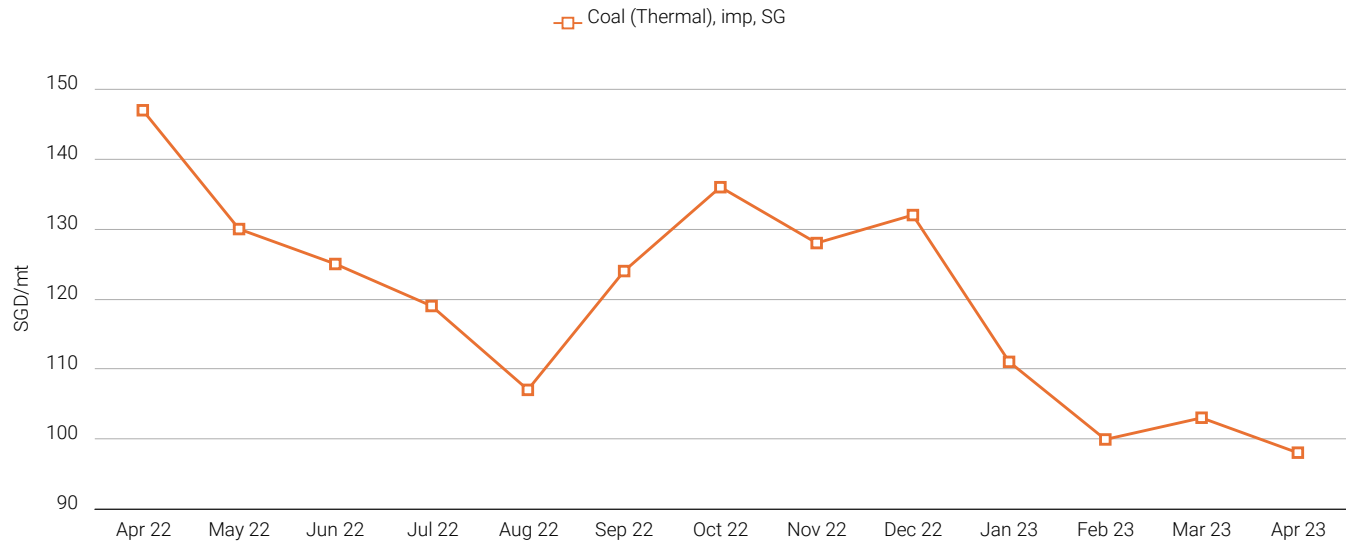


Figure 2.3 Singapore Coal Prices (Apr 22 - Apr 23)

Table 2.3 presents the most recent Coal prices, along with quarterly and yearly price changes.

Table 2.3 Singapore Coal Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Coal (thermal), import spot, cif (SGD/mt)	98.0	103	99.9	-11.9 ↓	-31.1 ↓

Coal (Apr 23). The Coal (thermal), import spot, cif price was around 98.0 SGD per mt, which represents a fall of 4.4% compared to the previous month's value. On a year-over-year basis, Coal (thermal), import spot, cif prices decreased by 31.1%.

2.4 Liquified Petroleum Gases

Figure 2.4 illustrates Liquified Petroleum Gases prices over the past 13 months.

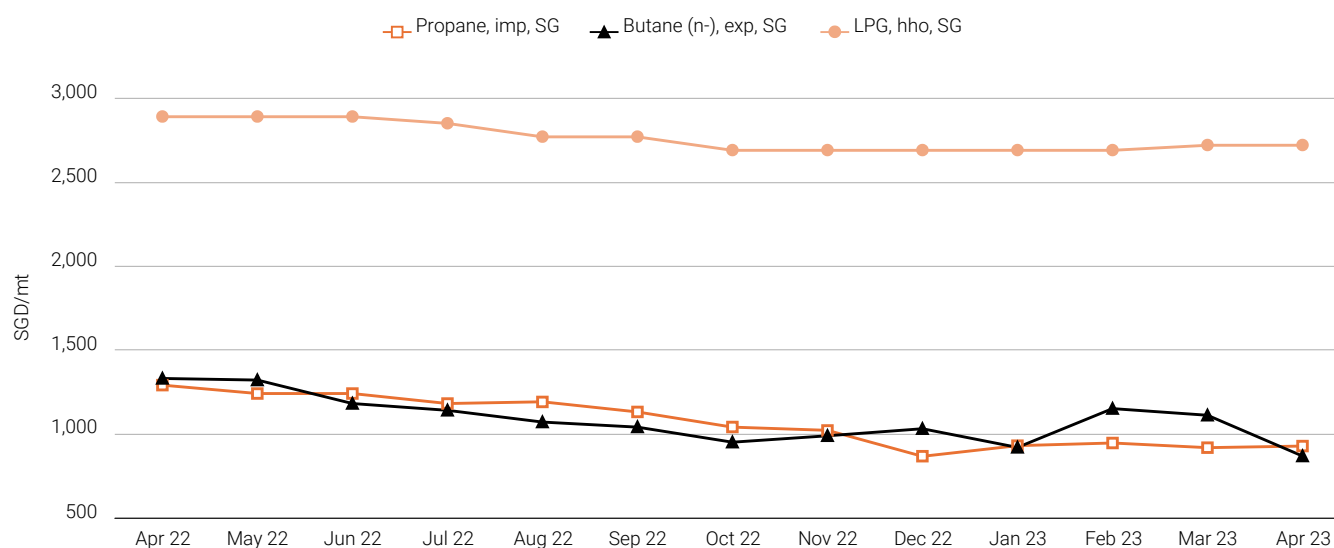


Figure 2.4 Singapore Liquified Petroleum Gases Prices (Apr 22 - Apr 23)

Table 2.4 presents the most recent Liquified Petroleum Gases prices, along with quarterly and yearly price changes.

Table 2.4 Singapore Liquified Petroleum Gases Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Propane, import spot, cif (SGD/mt)	927	917	945	-0.8 ↓	-25.8 ↓
Butane (n-butane), export contract, fob (SGD/mt)	867	1,110	1,150	-6.0 ↓	-32.4 ↓
LPG (propane, butane and isobutane), household (SGD/mt)	2,720	2,720	2,690	+0.5 ↑	-3.7 ↓

Liquified Petroleum Gases (Apr 23). The Propane, import spot, cif price was around 927 SGD per mt, which represents a rise of 1.7% compared to the previous month's value. On a year-over-year basis, Propane, import spot, cif prices decreased by 25.8%. Meanwhile, the average price of Butane (n-), exp, SG amounted to 867 SGD per mt, from 1,330 SGD per mt one year earlier. On a month-over-month basis, the Butane (n-), exp, SG price is 21.4% lower than the price one month before. Another notable point is that the current LPG, hho, SG price, when

compared to the average price last month, edged up by 0.5% and is 3.7% below the average price one year ago.

2.5 Naphtha

Figure 2.5 illustrates Naphtha prices over the past 13 months.

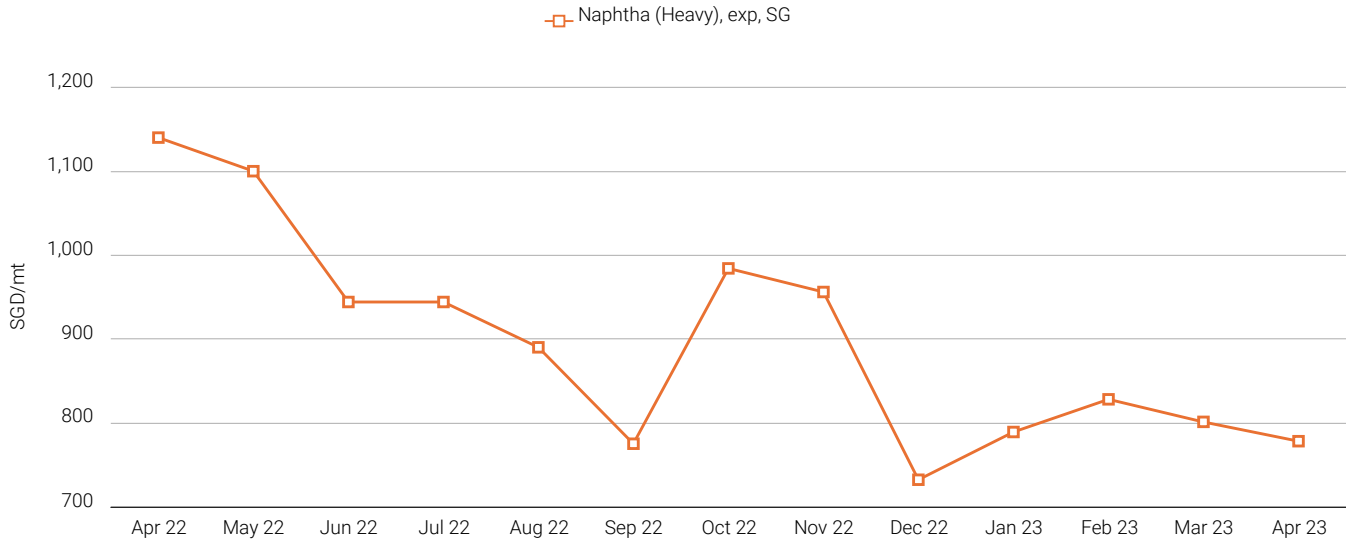


Figure 2.5 Singapore Naphtha Prices (Apr 22 - Apr 23)

Table 2.5 presents the most recent Naphtha prices, along with quarterly and yearly price changes.

Table 2.5 Singapore Naphtha Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Naphtha (heavy), export spot, fob (SGD/mt)	778	801	828	-2.0 ↓	-29.2 ↓

Naphtha (Apr 23). The Naphtha (heavy), export spot, fob price was around 778 SGD per mt, which represents a fall of 2.3% compared to the previous month's value. On a year-over-year basis, Naphtha (heavy), export spot, fob prices decreased by 29.2%.

2.6 Gasoline

Figure 2.6 illustrates Gasoline prices over the past 13 months.

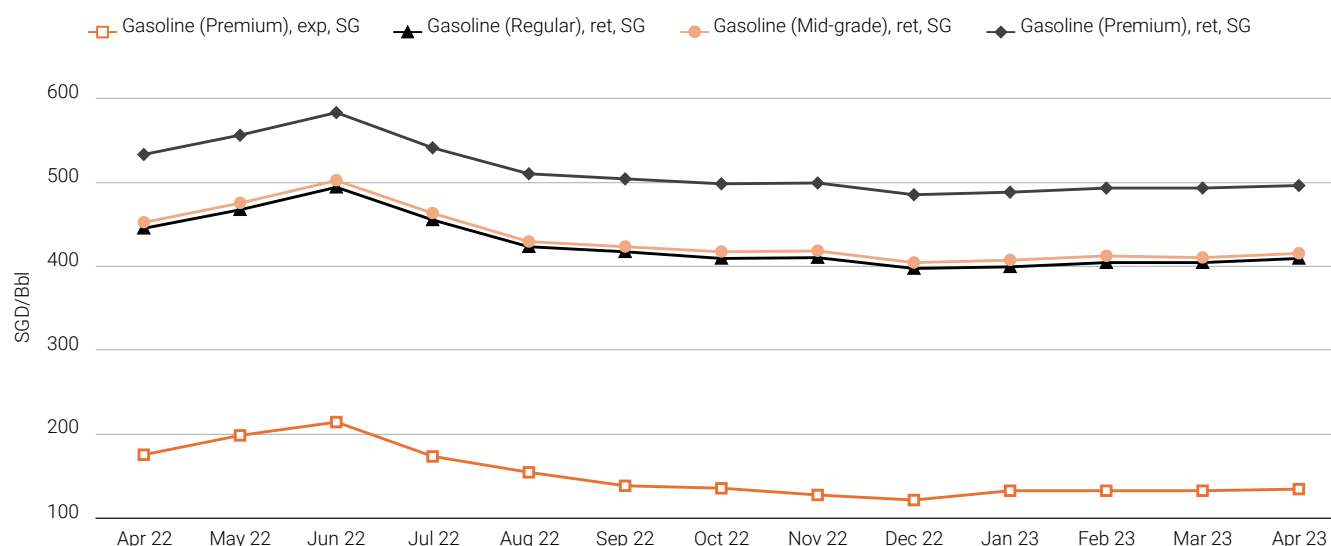


Figure 2.6 Singapore Gasoline Prices (Apr 22 - Apr 23)

Table 2.6 presents the most recent Gasoline prices, along with quarterly and yearly price changes.

Table 2.6 Singapore Gasoline Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Gasoline (premium), export spot, fob (SGD/Bbl)	134	132	132	+0.9 ↑	-21.2 ↓
Gasoline (regular), retail (SGD/Bbl)	409	404	404	+1.5 ↑	-5.7 ↓
Gasoline (mid-grade), retail (SGD/Bbl)	415	410	412	+1.5 ↑	-5.6 ↓
Gasoline (premium), retail (SGD/Bbl)	496	493	493	+0.8 ↑	-4.4 ↓

Gasoline (Apr 23). The Gasoline (premium), export spot, fob price was around 134 SGD per Bbl, which represents a rise of 2.1% compared to the previous month's value. On a year-over-year basis, Gasoline (premium), export spot, fob prices decreased by 21.2%. Meanwhile, the average price of Gasoline (Regular), ret, SG amounted to 409 SGD per Bbl, from 445 SGD per Bbl one year earlier. On a month-over-month basis, the Gasoline (Regular), ret, SG price is 2.1% higher than the price one month before. Another notable point is that the current Gasoline (Mid-grade), ret,

SG price, when compared to the average price last month, edged up by 2.1% and is 5.6% below the average price one year ago.

2.7 Kerosene

Figure 2.7 illustrates Kerosene prices over the past 13 months.

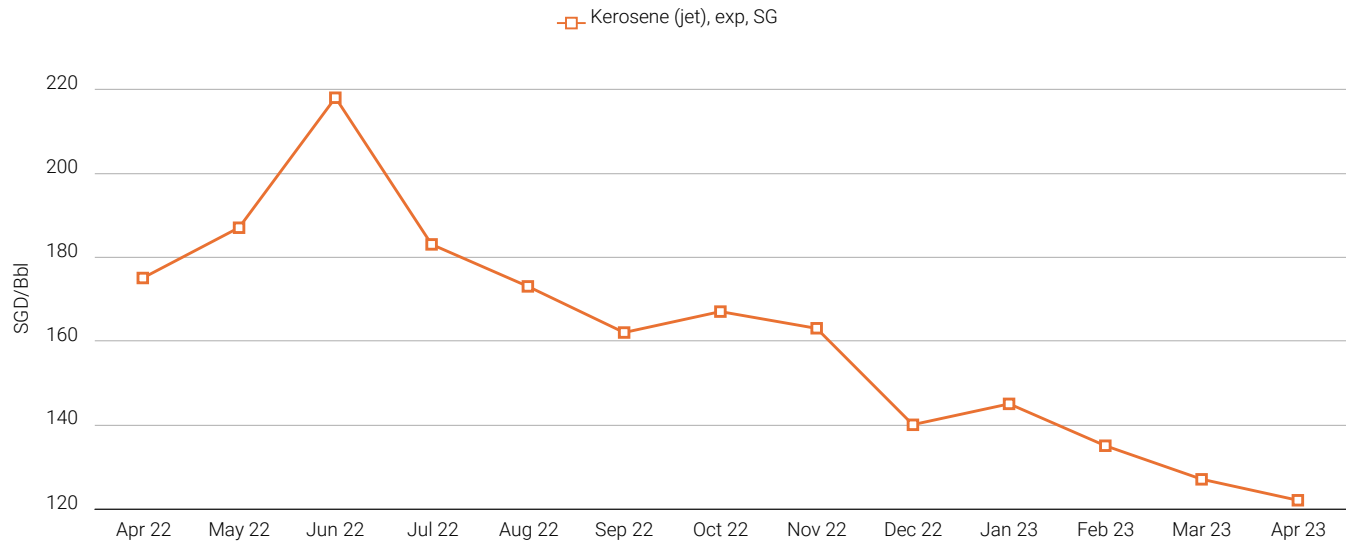


Figure 2.7 Singapore Kerosene Prices (Apr 22 - Apr 23)

Table 2.7 presents the most recent Kerosene prices, along with quarterly and yearly price changes.

Table 2.7 Singapore Kerosene Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	122	127	135	-15.7 ↓	-27.4 ↓

Kerosene (Apr 23). The Kerosene (jet fuel), export spot, fob price was around 122 SGD per Bbl, which represents a fall of 2.8% compared to the previous month's value. On a year-over-year basis, Kerosene (jet fuel), export spot, fob prices decreased by 27.4%.

2.8 Diesel

Figure 2.8 illustrates Diesel prices over the past 13 months.

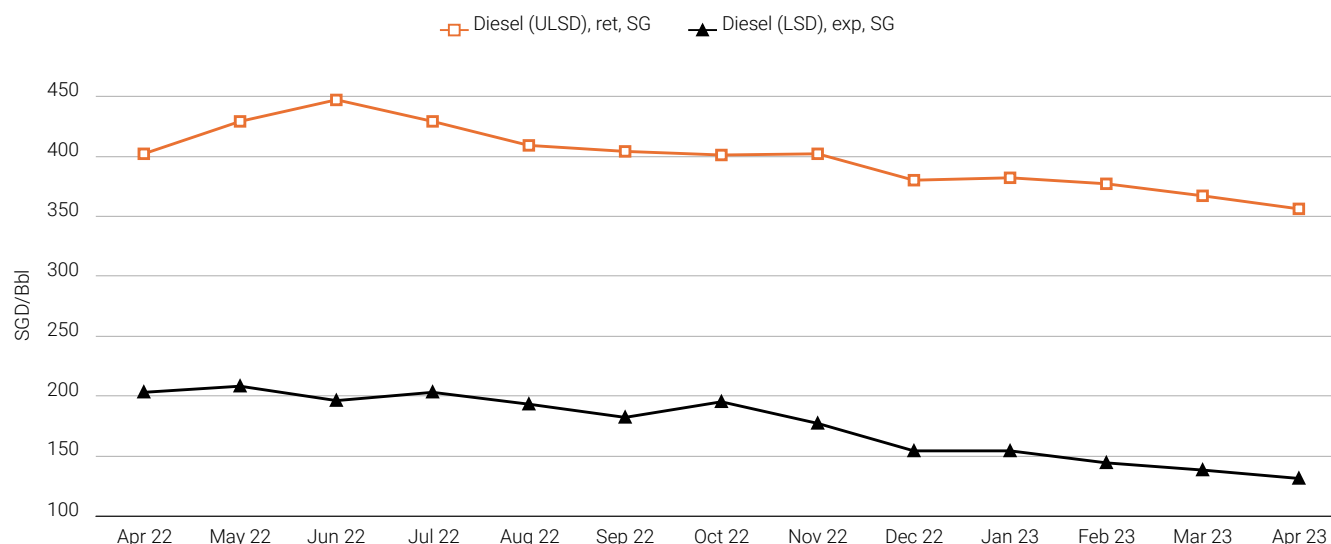


Figure 2.8 Singapore Diesel Prices (Apr 22 - Apr 23)

Table 2.8 presents the most recent Diesel prices, along with quarterly and yearly price changes.

Table 2.8 Singapore Diesel Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Diesel (ultra-low-sulfur), retail (SGD/Bbl)	356	367	377	-7.0 ↓	-9.0 ↓
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	131	138	144	-14.6 ↓	-32.8 ↓

Diesel (Apr 23). The Diesel (ultra-low-sulfur), retail price was around 356 SGD per Bbl, which represents a fall of 2.3% compared to the previous month's value. On a year-over-year basis, Diesel (ultra-low-sulfur), retail prices decreased by 9%. Meanwhile, the average price of Diesel (LSD), exp, SG amounted to 131 SGD per Bbl, from 203 SGD per Bbl one year earlier. On a month-over-month basis, the Diesel (LSD), exp, SG price is 4% lower than the price one month before.

2.9 Fuel Oil

Figure 2.9 illustrates Fuel Oil prices over the past 13 months.

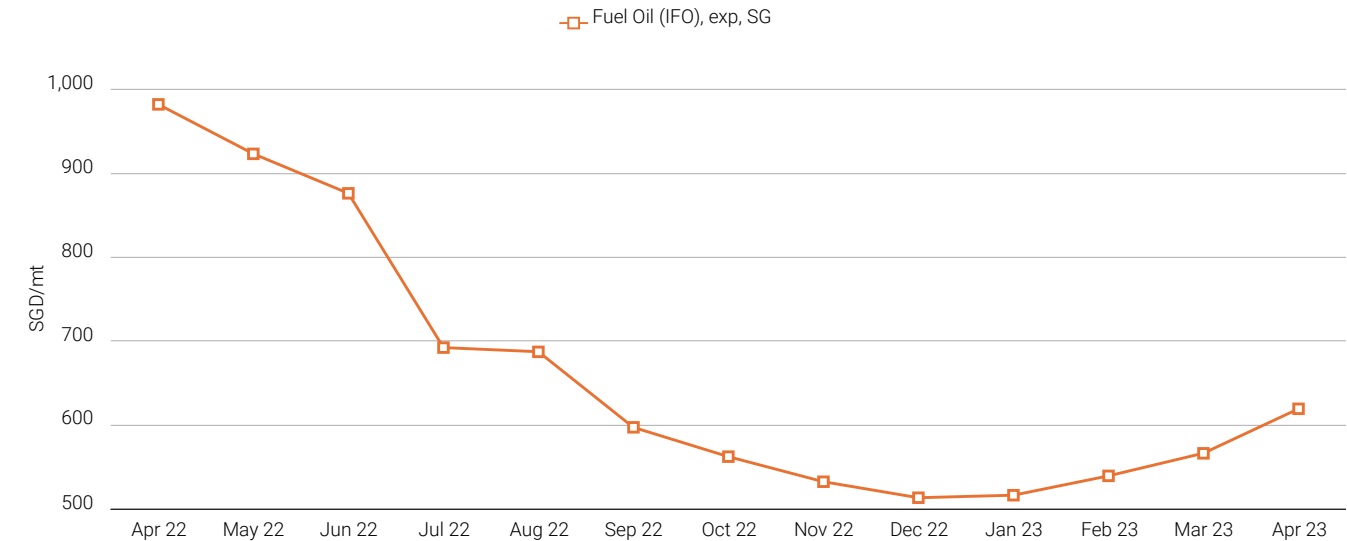


Figure 2.9 Singapore Fuel Oil Prices (Apr 22 - Apr 23)

Table 2.9 presents the most recent Fuel Oil prices, along with quarterly and yearly price changes.

Table 2.9 Singapore Fuel Oil Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Fuel Oil (intermediate), export spot, fob (SGD/mt)	619	566	539	+18.8 ↑	-34.5 ↓

Fuel Oil (Apr 23). The Fuel Oil (intermediate), export spot, fob price was around 619 SGD per mt, which represents a rise of 10.1% compared to the previous month's value. On a year-over-year basis, Fuel Oil (intermediate), export spot, fob prices decreased by 34.5%.

2.10 Electricity

Figure 2.10 illustrates Electricity prices over the past 13 months.

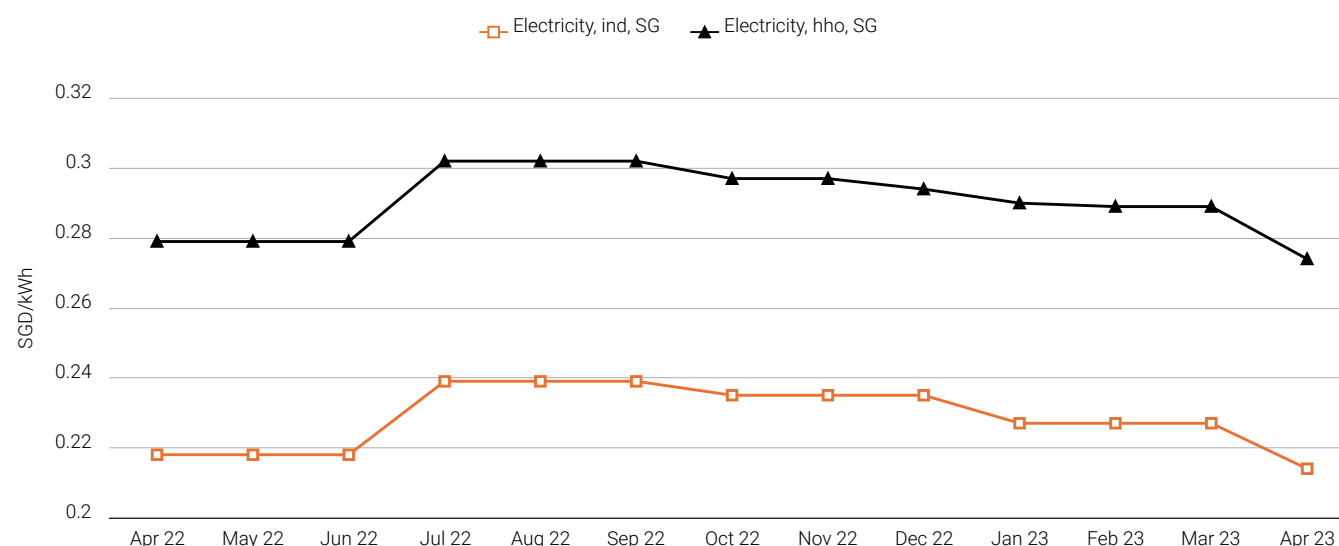


Figure 2.10 Singapore Electricity Prices (Apr 22 - Apr 23)

Table 2.10 presents the most recent Electricity prices, along with quarterly and yearly price changes.

Table 2.10 Singapore Electricity Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Electricity, industrial sector (SGD/kWh)	0.214	0.227	0.227	-6.8 ↓	0.0 ↔
Electricity, household (SGD/kWh)	0.274	0.289	0.289	-5.8 ↓	+0.5 ↑

Electricity (Apr 23). The Electricity, industrial sector price was around 0.214 SGD per kWh, which represents a fall of 5.8% compared to the previous month's value. On a year-over-year basis, Electricity, industrial sector prices did not vary considerably. Meanwhile, the average price of Electricity, hho, SG amounted to 0.274 SGD per kWh, from 0.279 SGD per kWh one year earlier. On a month-over-month basis, the Electricity, hho, SG price is 4.6% lower than the price one month before.

2.11 Ethanol

Figure 2.11 illustrates Ethanol prices over the past 13 months.

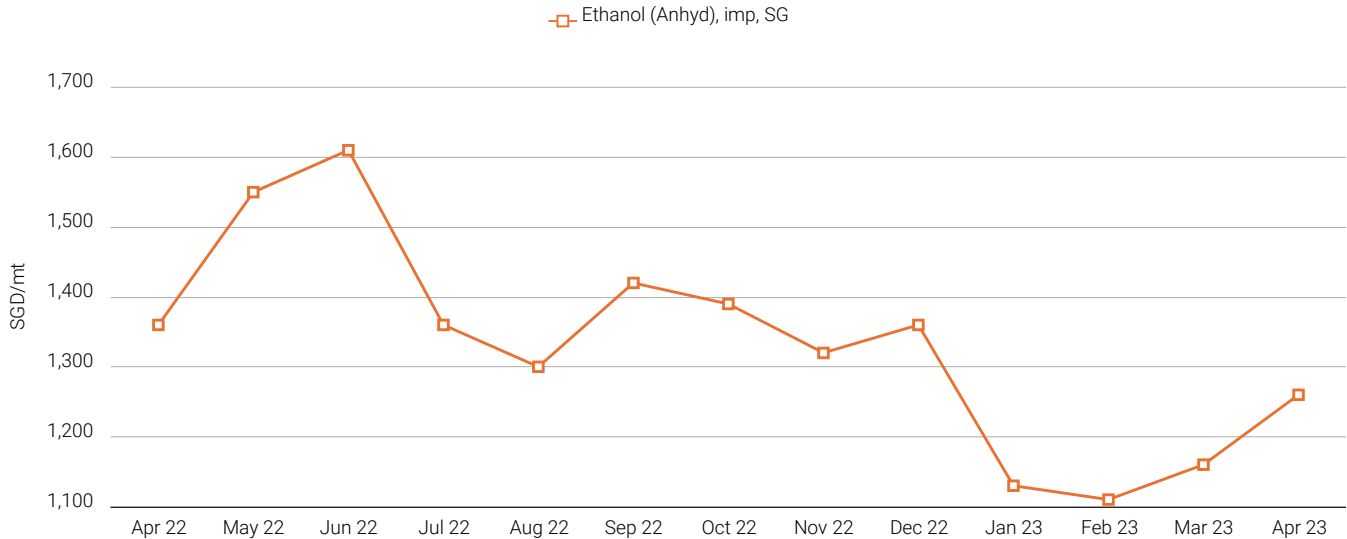


Figure 2.11 Singapore Ethanol Prices (Apr 22 - Apr 23)

Table 2.11 presents the most recent Ethanol prices, along with quarterly and yearly price changes.

Table 2.11 Singapore Ethanol Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Ethanol (anhydrous), import spot, cif (SGD/mt)	1,260	1,160	1,110	+10.3 ↑	-5.3 ↓

Ethanol (Apr 23). The Ethanol (anhydrous), import spot, cif price was around 1,260 SGD per mt, which represents a rise of 8.8% compared to the previous month's value. On a year-over-year basis, Ethanol (anhydrous), import spot, cif prices decreased by 5.3%.

2.12 Biomass-Based Diesel

Figure 2.12 illustrates Biomass-Based Diesel prices over the past 13 months.

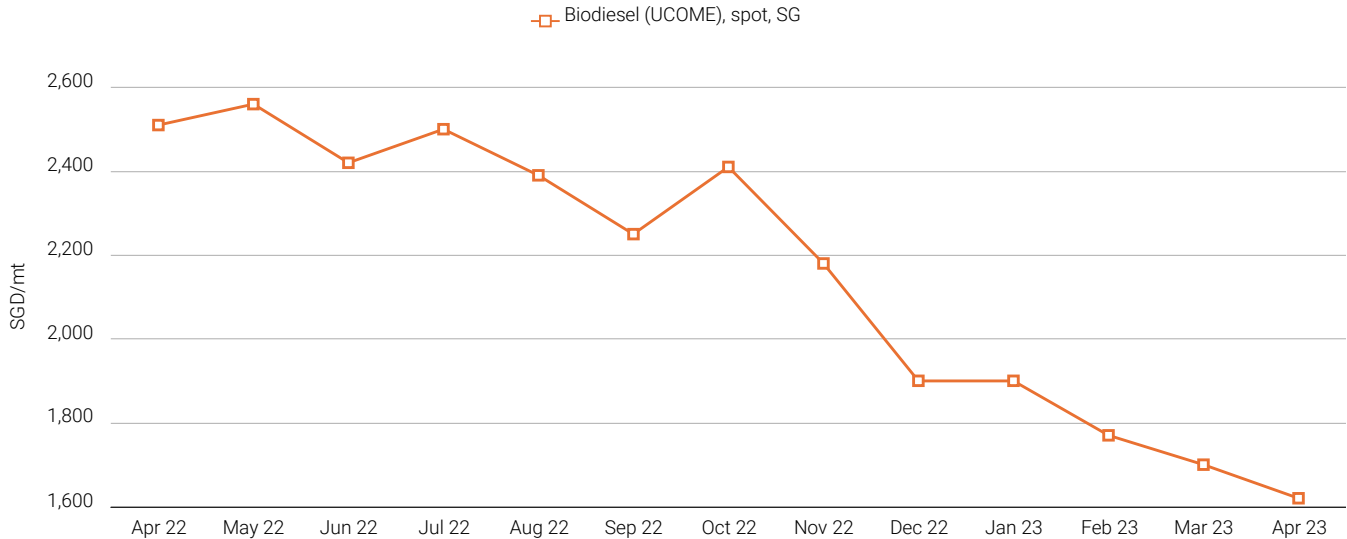


Figure 2.12 Singapore Biomass-Based Diesel Prices (Apr 22 - Apr 23)

Table 2.12 presents the most recent Biomass-Based Diesel prices, along with quarterly and yearly price changes.

Table 2.12 Singapore Biomass-Based Diesel Price Assessments

	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Biodiesel (UCOME biodiesel), spot, fob (SGD/mt)	1,620	1,700	1,770	-14.7 ↓	-33.1 ↓

Biomass-Based Diesel (Apr 23). The Biodiesel (UCOME biodiesel), spot, fob price was around 1,620 SGD per mt, which represents a fall of 4.4% compared to the previous month's value. On a year-over-year basis, Biodiesel (UCOME biodiesel), spot, fob prices decreased by 33.1%.

Chapter 3

Historical Prices

This chapter provides a comprehensive overview of historical energy prices, offering insights into market trends over different time horizons. The data is organized into three sections:

- * **1-Year Monthly History:** Monthly price history for the past year, available to all subscription levels.
- * **3-Year Quarterly History:** A broader view of price trends over the last three years, with quarterly data accessible exclusively to **Pro** and **Advanced** subscribers.
- * **10-Year Annual History:** A long-term analysis of annual price trends over the past decade, available only to **Advanced** subscribers.

3.1 1-Year Monthly History

Figure 3.1 presents the energy prices in Singapore in the last year.

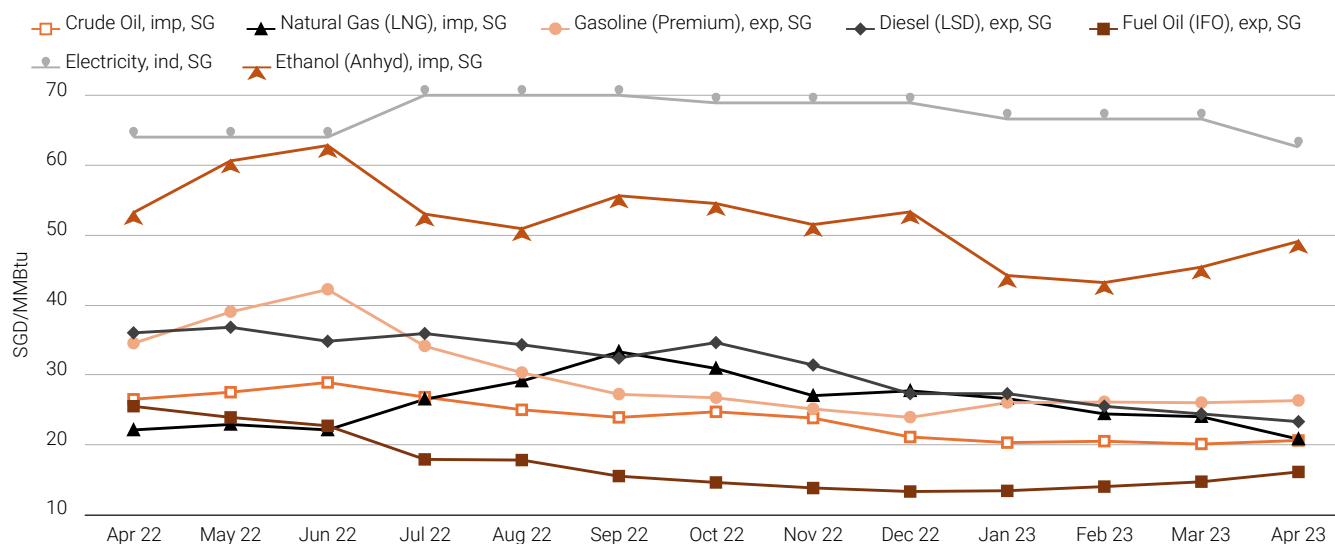


Figure 3.1 Singapore Key Energy Prices (Apr 22 - Apr 23)

Table 3.1 presents the energy prices in Singapore in the last year.

Table 3.1 Monthly Price Assessments

	Apr 23	Mar 23	Feb 23	Jan 23	Dec 22	Nov 22	Oct 22	Sep 22	Aug 22	Jul 22	Jun 22	May 22	Apr 22
Crude Oil, import spot, cif (SGD/Bbl)	121	118	120	119	124	139	144	140	146	157	169	161	155
Natural Gas (liquified), import spot, cif (SGD/MMBtu)	20.8	24.0	24.4	26.6	27.7	27.0	30.9	33.3	29.1	26.5	22.1	22.9	22.1
Natural Gas (town gas), household (SGD/MMBtu)	63.5	64.0	64.0	64.0	66.6	66.6	66.6	67.7	67.7	67.7	63.5	63.5	63.5
Coal (thermal), import spot, cif (SGD/mt)	98.0	103	99.9	111	132	128	136	124	107	119	125	130	147
Propane, import spot, cif (SGD/mt)	927	917	945	929	866	1,020	1,040	1,130	1,190	1,180	1,240	1,240	1,290
Butane (n-butane), export contract, fob (SGD/mt)	867	1,110	1,150	919	1,030	988	950	1,040	1,070	1,140	1,180	1,320	1,330
LPG (propane, butane and isobutane), household (SGD/mt)	2,720	2,720	2,690	2,690	2,690	2,690	2,690	2,770	2,770	2,850	2,890	2,890	2,890
Naphtha (heavy), export spot, fob (SGD/mt)	778	801	828	789	732	956	984	775	890	944	944	1,100	1,140
Gasoline (premium), export spot, fob (SGD/Bbl)	134	132	132	132	121	127	135	138	154	173	214	198	175
Gasoline (regular), retail (SGD/Bbl)	409	404	404	399	397	410	409	417	423	455	494	467	445
Gasoline (mid-grade), retail (SGD/Bbl)	415	410	412	407	404	418	417	423	429	463	502	475	452
Gasoline (premium), retail (SGD/Bbl)	496	493	493	488	485	499	498	504	510	541	583	556	533
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	122	127	135	145	140	163	167	162	173	183	218	187	175
Diesel (ultra-low-sulfur), retail (SGD/Bbl)	356	367	377	382	380	402	401	404	409	429	447	429	402
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	131	138	144	154	154	177	195	182	193	203	196	208	203
Fuel Oil (intermediate), export spot, fob (SGD/mt)	619	566	539	516	513	532	562	597	687	692	876	923	982
Electricity, industrial sector (SGD/kWh)	0.214	0.227	0.227	0.227	0.235	0.235	0.235	0.239	0.239	0.239	0.218	0.218	0.218
Electricity, household (SGD/kWh)	0.274	0.289	0.289	0.290	0.294	0.297	0.297	0.302	0.302	0.302	0.279	0.279	0.279
Ethanol (anhydrous), import spot, cif (SGD/mt)	1,260	1,160	1,110	1,130	1,360	1,320	1,390	1,420	1,300	1,360	1,610	1,550	1,360
Biodiesel (UCOME biodiesel), spot, fob (SGD/mt)	1,620	1,700	1,770	1,900	1,900	2,180	2,410	2,250	2,390	2,500	2,420	2,560	2,510

Easily Accessing Intratec Database

Advanced subscribers can easily access the last year price history via **Excel Add-in**. Monthly price history covering more than 10 years are provided through **Web API** and **Power BI**. More information in *"Appendix C. Data Delivery Methods."*

3.2 3-Year Quarterly History

Table 3.2 presents the energy prices in Singapore in the last three years.

Table 3.2 Quarterly Price Assessments

	Q4 22	Q3 22	Q2 22	Q1 22	Q4 21	Q3 21	Q2 21	Q1 21	Q4 20	Q3 20	Q2 20	Q1 20
Crude Oil, import spot, cif (SGD/Bbl)	136	148	162	138	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Natural Gas (liquified), import spot, cif (SGD/MMBtu)	28.5	29.6	22.4	21.0	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Natural Gas (town gas), household (SGD/MMBtu)	66.6	67.7	63.5	59.2	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Coal (thermal), import spot, cif (SGD/mt)	132	117	134	116	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Propane, import spot, cif (SGD/mt)	975	1,170	1,260	1,190	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Butane (n-butane), export contract, fob (SGD/mt)	989	1,080	1,280	1,150	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
LPG (propane, butane and isobutane), household (SGD/mt)	2,690	2,800	2,890	2,920	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Naphtha (heavy), export spot, fob (SGD/mt)	891	870	1,060	1,070	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (premium), export spot, fob (SGD/Bbl)	128	155	196	149	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (regular), retail (SGD/Bbl)	405	432	469	413	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (mid-grade), retail (SGD/Bbl)	413	438	476	420	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (premium), retail (SGD/Bbl)	494	518	557	501	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	157	173	193	141	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Diesel (ultra-low-sulfur), retail (SGD/Bbl)	394	414	426	347	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	175	193	202	142	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Fuel Oil (intermediate), export spot, fob (SGD/mt)	536	659	927	731	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Electricity, industrial sector (SGD/kWh)	0.235	0.239	0.218	0.196	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Electricity, household (SGD/kWh)	0.296	0.302	0.279	0.254	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Ethanol (anhydrous), import spot, cif (SGD/mt)	1,360	1,360	1,510	1,150	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Q4 22	Q3 22	Q2 22	Q1 22	Q4 21	Q3 21	Q2 21	Q1 21	Q4 20	Q3 20	Q2 20	Q1 20
Biodiesel (UCOME biodiesel), spot, fob (SGD/mt)											
2,160	2,380	2,500	1,750	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Figure 3.2 presents the energy prices in Singapore in the last three years.

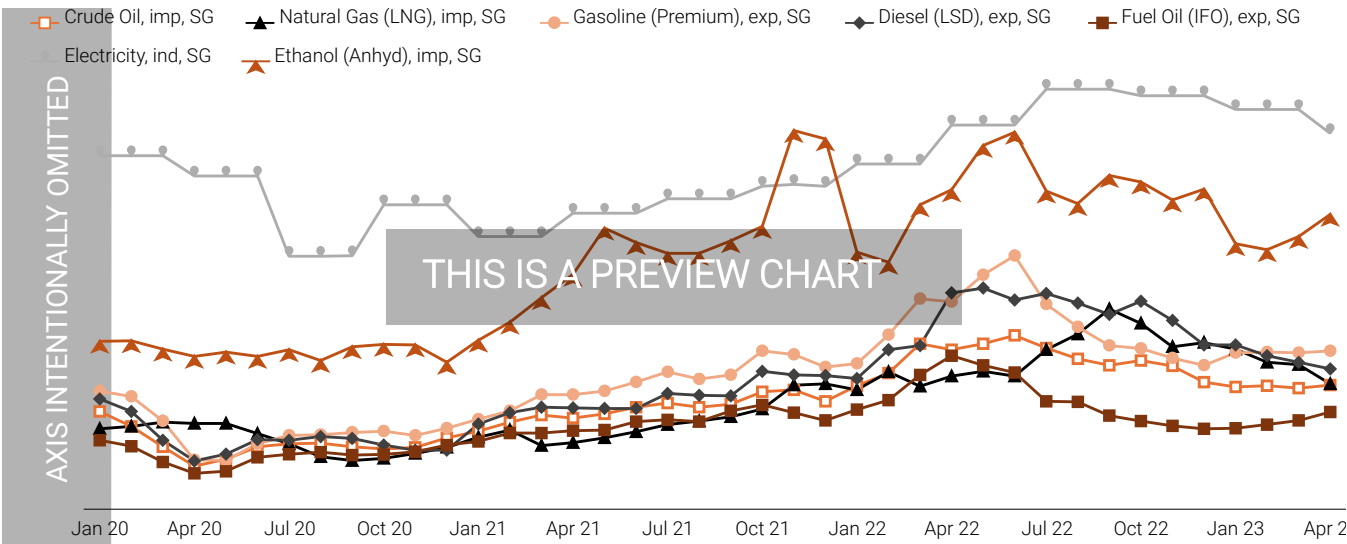


Figure 3.2 Singapore Key Energy Prices (Jan 20 - Apr 23)

3.3 10-Year Annual History

Table 3.3 presents the energy prices in Singapore in the last ten years.

Table 3.3 Yearly Price Assessments

	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Crude Oil, import spot, cif (SGD/Bbl)	146	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Natural Gas (liquified), import spot, cif (SGD/MMBtu)	25.4	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Natural Gas (town gas), household (SGD/MMBtu)	64.3	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Coal (thermal), import spot, cif (SGD/mt)	125	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Propane, import spot, cif (SGD/mt)	1,150	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Butane (n-butane), export contract, fob (SGD/mt)	1,120	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
LPG (propane, butane and isobutane), household (SGD/mt)	2,820	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Naphtha (heavy), export spot, fob (SGD/mt)	972	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (premium), export spot, fob (SGD/Bbl)	157	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (regular), retail (SGD/Bbl)	430	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (mid-grade), retail (SGD/Bbl)	437	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Gasoline (premium), retail (SGD/Bbl)	518	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	166	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Diesel (ultra-low-sulfur), retail (SGD/Bbl)	395	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	178	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Fuel Oil (intermediate), export spot, fob (SGD/mt)	713	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Electricity, industrial sector (SGD/kWh)	0.222	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Electricity, household (SGD/kWh)	0.283	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
Ethanol (anhydrous), import spot, cif (SGD/mt)	1,340	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
Biodiesel (UCOME biodiesel), spot, fob (SGD/mt)									
2,200	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX

Figure 3.3 presents the energy prices in Singapore in the last ten years.

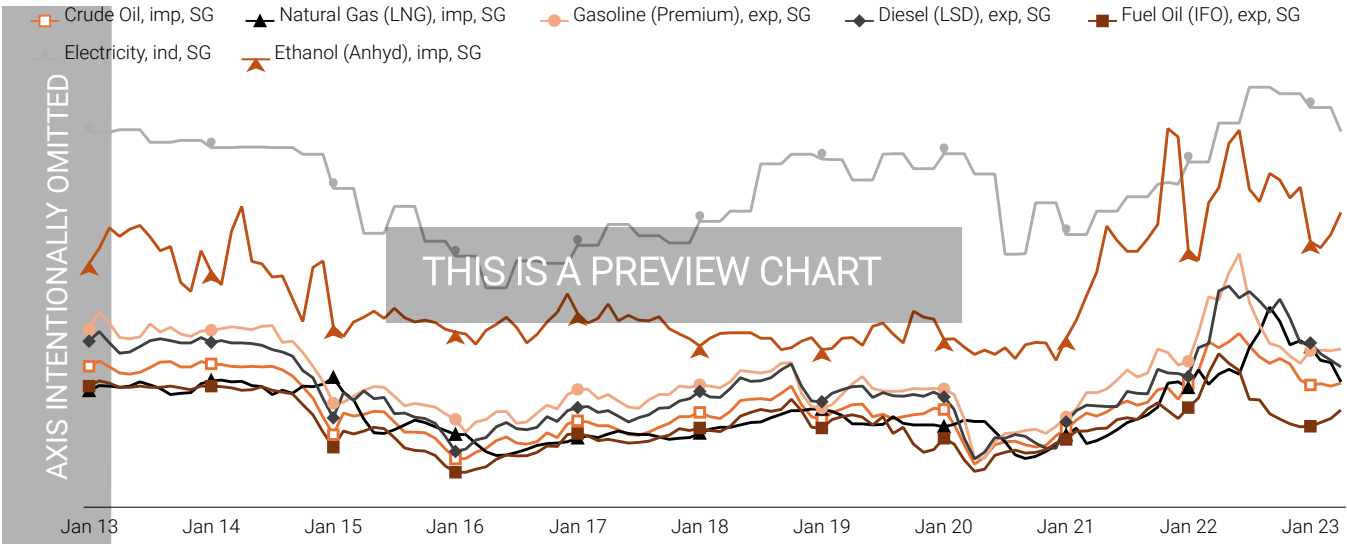


Figure 3.3 Singapore Key Energy Prices (Jan 13 - Apr 23)

Chapter 4

Price Forecasts

This chapter provides short-term price forecasts for key energy commodities, covering the next six months. The forecasts are organized into sections based on commodity categories: Oil, Oil Products, Natural Gas, Coal, Electricity, and Biofuels.

Additionally, each section features a chart comparing the forecasted prices of major commodities using a common energy unit (e.g., SGD/Bbl). This approach allows for a clear understanding of relative price movements across different energy sources and facilitates comparisons between commodities.

4.1 Crude Oil

Table 4.1 presents the six-month price forecast for Crude Oil.

Table 4.1 Crude Oil Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Crude Oil, import spot, cif (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.1 illustrates the six-month price trend forecast for Crude Oil.

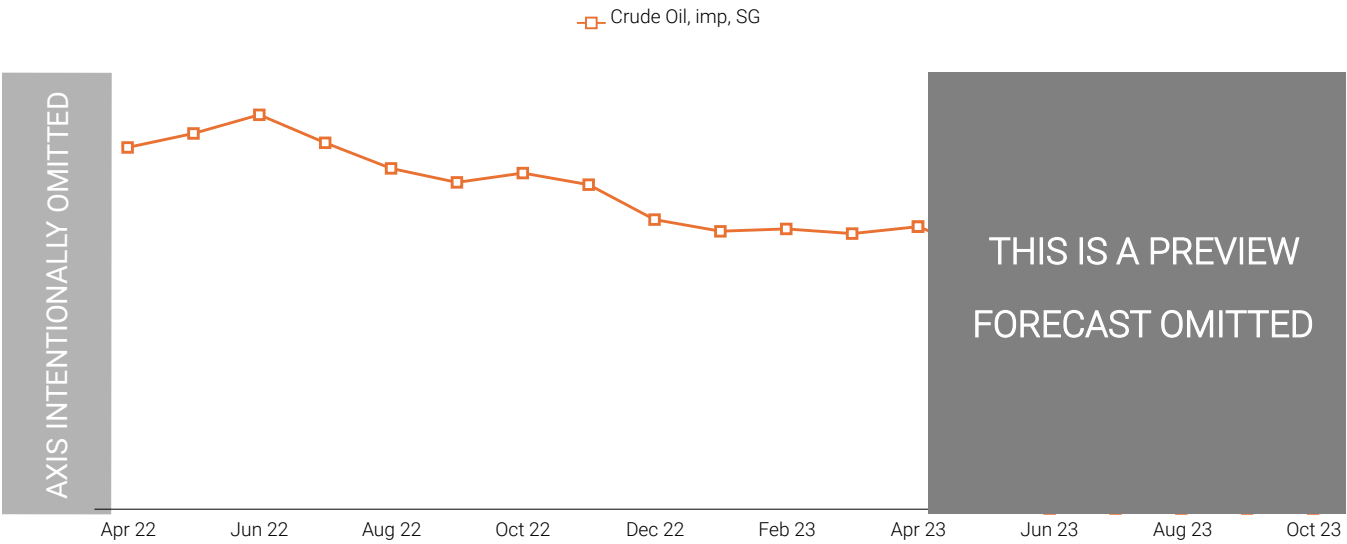


Figure 4.1 Crude Oil Price Forecast (Apr 22 - Oct 23)

4.2 Natural Gas

Table 4.2 presents the six-month price forecast for Natural Gas.

Table 4.2 Natural Gas Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Natural Gas (liquified), import spot, cif (SGD/MMBtu)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.2 illustrates the six-month price trend forecast for Natural Gas.

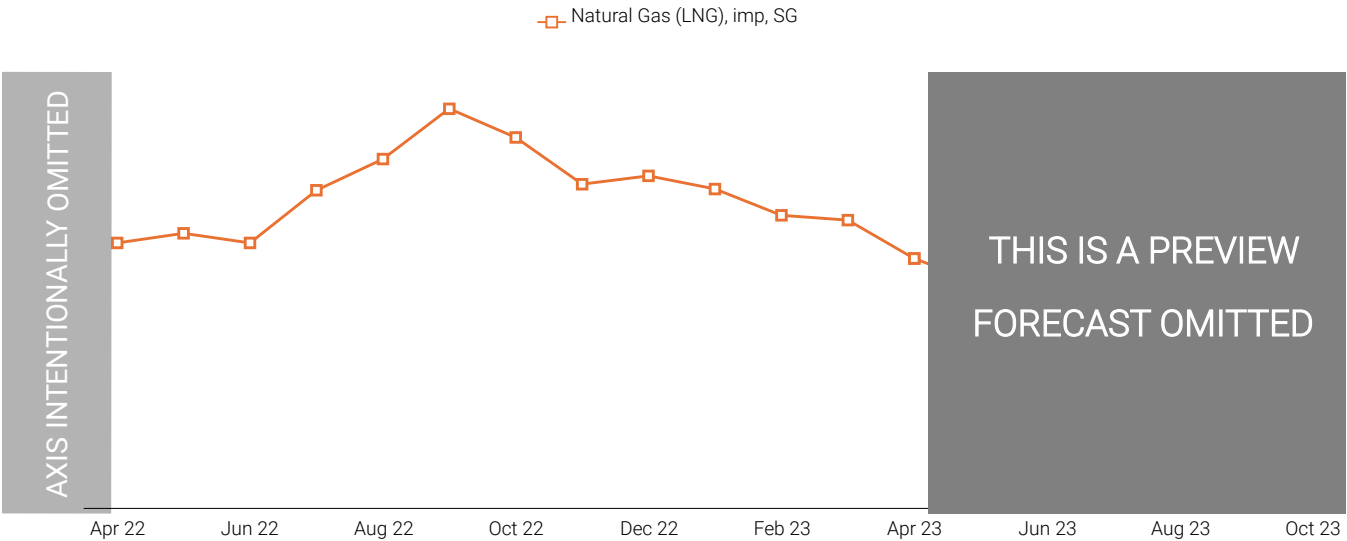


Figure 4.2 Natural Gas Price Forecast (Apr 22 - Oct 23)

4.3 Coal

Table 4.3 presents the six-month price forecast for Coal.

Table 4.3 Coal Monthly Forecast Price Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Coal (thermal), import spot, cif (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.3 illustrates the six-month price trend forecast for Coal.

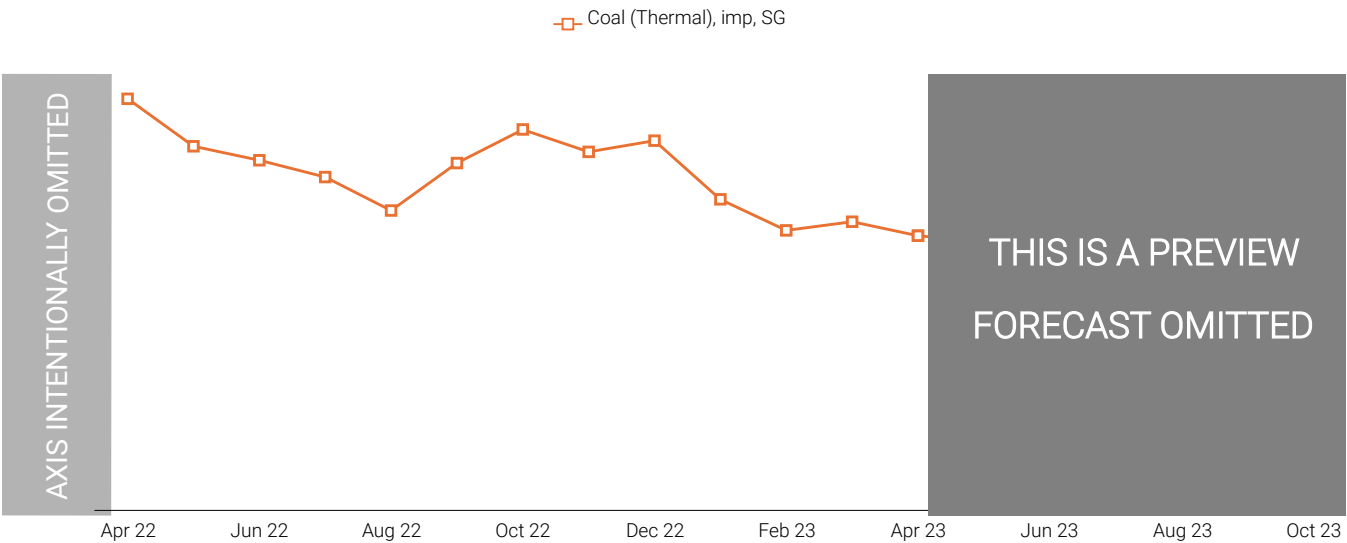


Figure 4.3 Coal Price Forecast (Apr 22 - Oct 23)

4.4 Liquified Petroleum Gases

Table 4.4 presents the six-month price forecast for Liquified Petroleum Gases.

Table 4.4 Liquified Petroleum Gases Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Propane, import spot, cif (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX
Butane (n-butane), export contract, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.4 illustrates the six-month price trend forecast for Liquified Petroleum Gases.

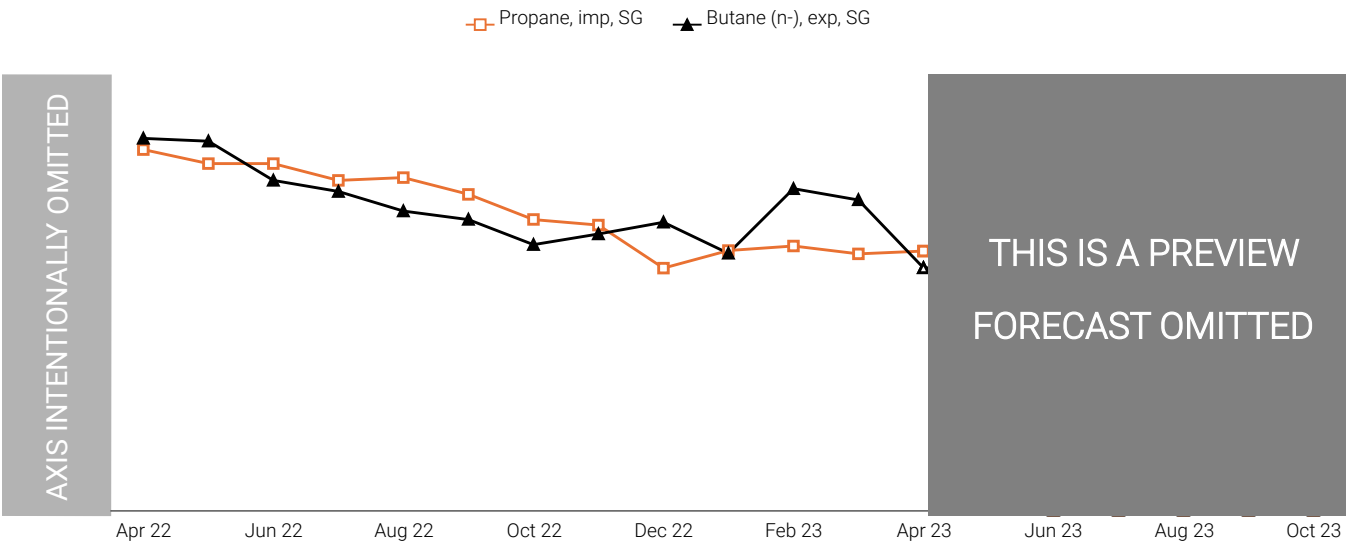


Figure 4.4 Liquified Petroleum Gases Price Forecast (Apr 22 - Oct 23)

4.5 Naphtha

Table 4.5 presents the six-month price forecast for Naphtha.

Table 4.5 Naphtha Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Naphtha (heavy), export spot, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.5 illustrates the six-month price trend forecast for Naphtha.

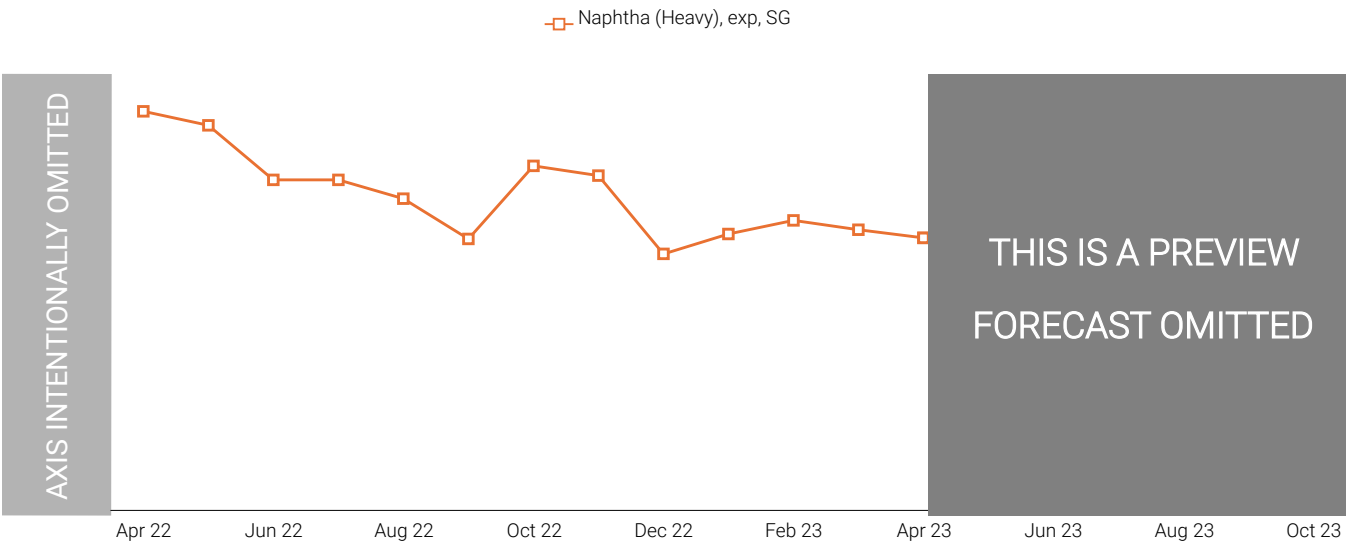


Figure 4.5 Naphtha Price Forecast (Apr 22 - Oct 23)

4.6 Gasoline

Table 4.6 presents the six-month price forecast for Gasoline.

Table 4.6 Gasoline Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Gasoline (premium), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.6 illustrates the six-month price trend forecast for Gasoline.

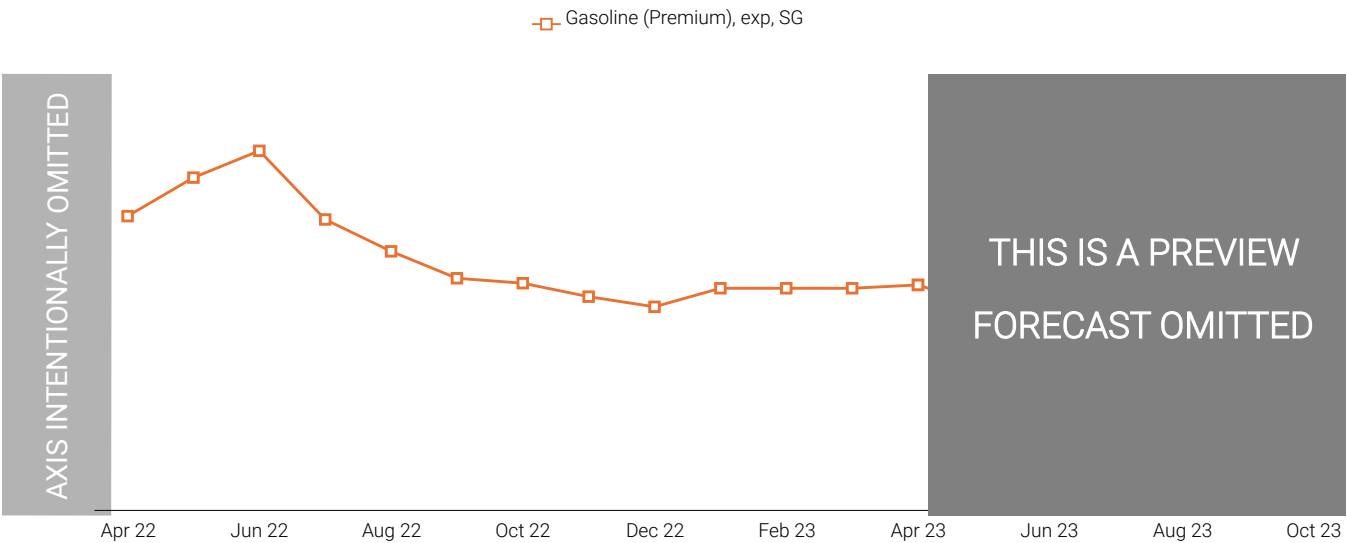


Figure 4.6 Gasoline Price Forecast (Apr 22 - Oct 23)

4.7 Kerosene

Table 4.7 presents the six-month price forecast for Kerosene.

Table 4.7 Kerosene Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Kerosene (jet fuel), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.7 illustrates the six-month price trend forecast for Kerosene.

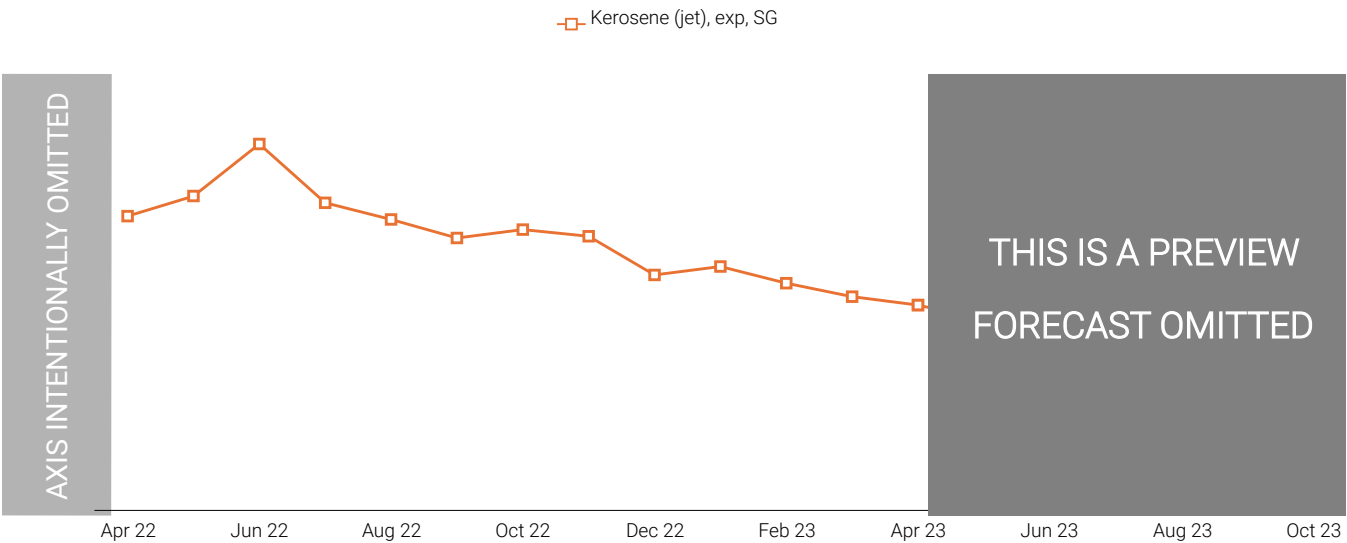


Figure 4.7 Kerosene Price Forecast (Apr 22 - Oct 23)

4.8 Diesel

Table 4.8 presents the six-month price forecast for Diesel.

Table 4.8 Diesel Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Diesel (low-sulfur), export spot, fob (SGD/Bbl)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.8 illustrates the six-month price trend forecast for Diesel.

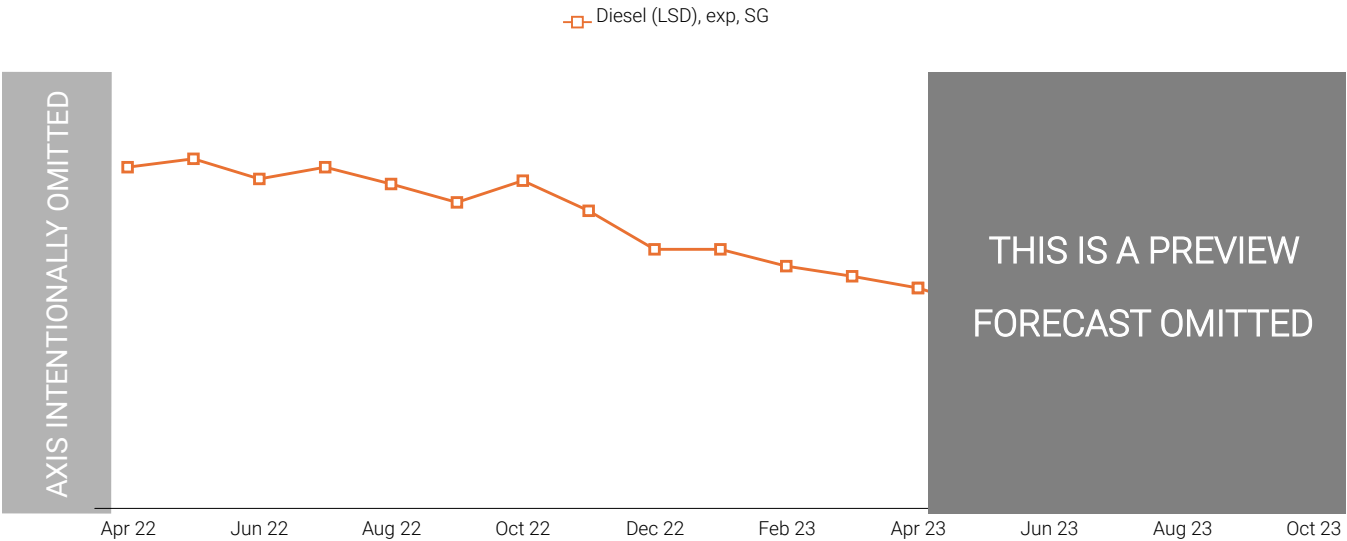


Figure 4.8 Diesel Price Forecast (Apr 22 - Oct 23)

4.9 Fuel Oil

Table 4.9 presents the six-month price forecast for Fuel Oil.

Table 4.9 Fuel Oil Monthly Price Forecast Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Fuel Oil (intermediate), export spot, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.9 illustrates the six-month price trend forecast for Fuel Oil.

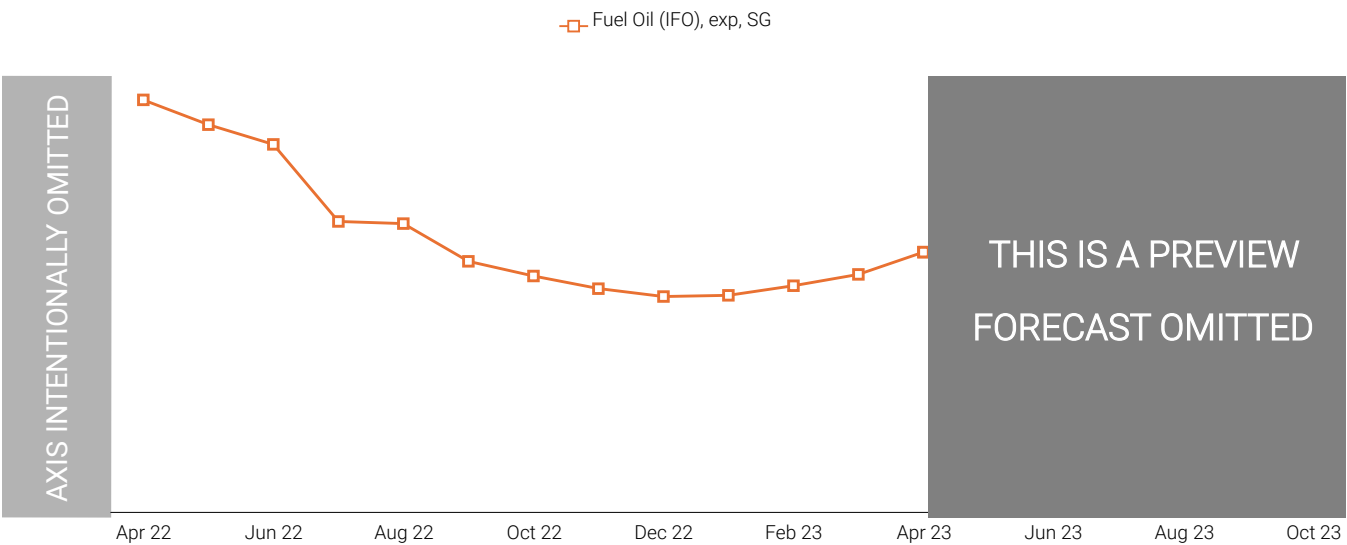


Figure 4.9 Fuel Oil Price Forecast (Apr 22 - Oct 23)

4.10 Electricity

Table 4.10 presents the six-month price forecast for Electricity.

Table 4.10 Electricity Monthly Forecast Price Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Electricity, industrial sector (SGD/kWh)	XXX	XXX	XXX	XXX	XXX	XXX
Electricity, household (SGD/kWh)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.10 illustrates the six-month price trend forecast for Electricity.

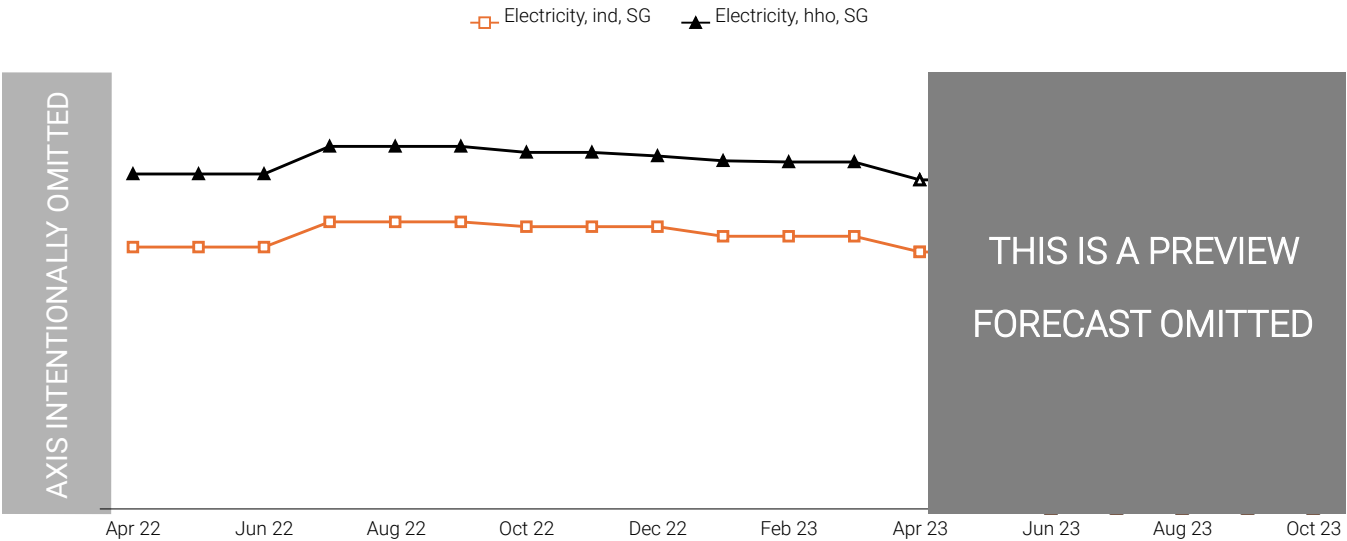


Figure 4.10 Electricity Price Forecast (Apr 22 - Oct 23)

4.11 Ethanol

Table 4.11 presents the six-month price forecast for Ethanol.

Table 4.11 Ethanol Monthly Forecast Price Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Ethanol (anhydrous), import spot, cif (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.11 illustrates the six-month price trend forecast for Ethanol.

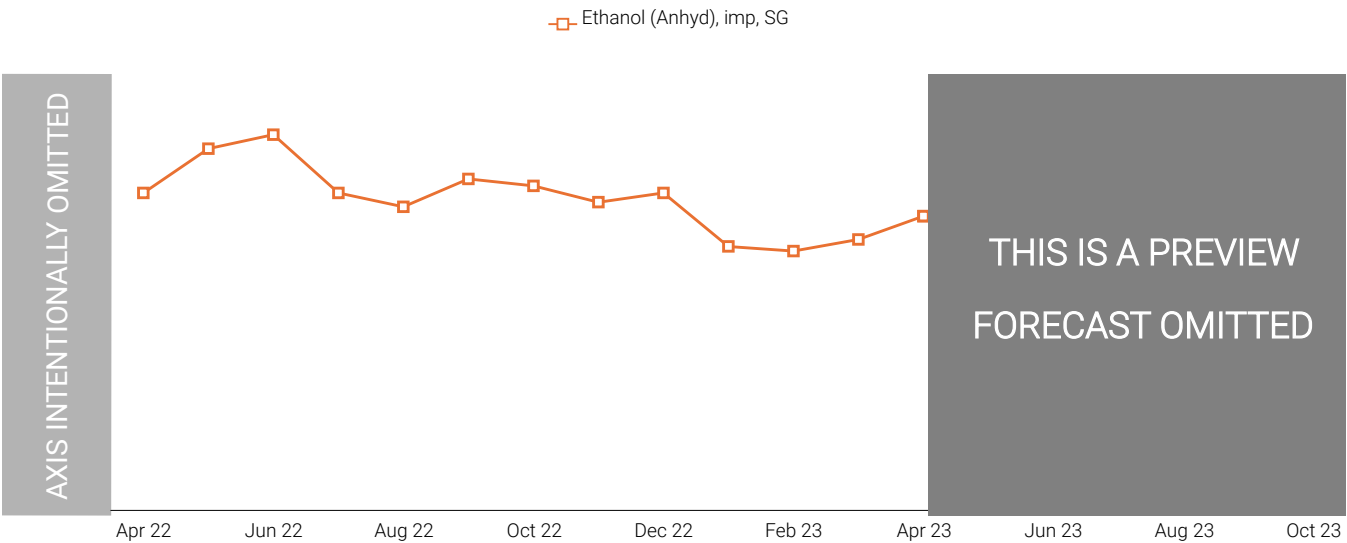


Figure 4.11 Ethanol Price Forecast (Apr 22 - Oct 23)

4.12 Biomass-Based Diesel

Table 4.12 presents the six-month price forecast for Biomass-Based Diesel.

Table 4.12 Biomass-Based Diesel Monthly Forecast Price Assessments

	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Biodiesel (UCOME biodiesel), spot, fob (SGD/mt)	XXX	XXX	XXX	XXX	XXX	XXX

Figure 4.12 illustrates the six-month price trend forecast for Biomass-Based Diesel.

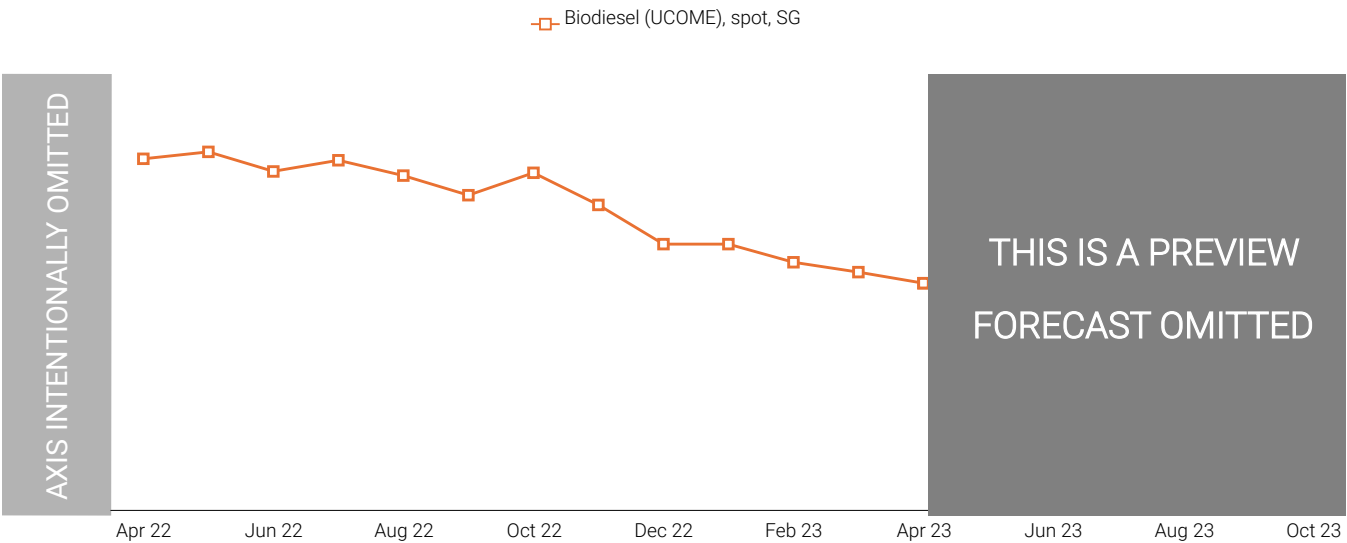


Figure 4.12 Biomass-Based Diesel Price Forecast (Apr 22 - Oct 23)

Chapter 5

Market Outlook

This chapter provides a comprehensive analysis of the energy market in Singapore, focusing on key aspects such as international trade, domestic production, total demand, final consumption, energy self-sufficiency, and trade dependencies.

The analysis is structured as follows:

- * **Imports and Exports:** Examines the energy trade balance, highlighting net imports and trends in energy commodity trade over recent years.
- * **Trade Partners:** Identifies key countries involved in energy imports and exports across different commodity categories.
- * **Production and Demand:** Analyzes trends in domestic energy production and total demand while exploring factors influencing these metrics.
- * **Energy Balance:** Summarizes how energy supply and demand interact to define overall equilibrium.
- * **Electricity Generation by Source:** Breaks down electricity generation by fuel type, highlighting contributions from renewables, nuclear, and fossil fuels.
- * **Energy Self-Sufficiency and Trade Dependencies:** Evaluates reliance on imports, economic implications of energy trade, and the significance of exports to global markets.

Through this analysis, the chapter aims to provide a deeper understanding of the energy landscape in Singapore, offering valuable insights into production trends, consumption patterns, trade relationships, and the country's role in global energy markets.

Readers seeking further details on energy commodity categories and energy flows can refer to *"Appendix A. Glossary and Methodology."*

5.1 Imports and Exports

This section provides a detailed analysis of the energy trade in Singapore, focusing on net imports as well as energy commodity imports and exports over the past years. Figure 5.1 illustrates the energy net imports from Dec 21 to Dec 22, offering insights into the country's overall energy trade balance.

Following this, Tables 5.1 and 5.2 present a breakdown of energy commodity imports and exports by category, including Oil and Oil Products, Natural Gas, Coal, Renewables, and Electricity. The units used for each commodity are tailored to their specific characteristics (e.g., barrels for Oil, metric tons for Coal), while aggregated values are expressed in energy terms where appropriate (e.g., TJ).

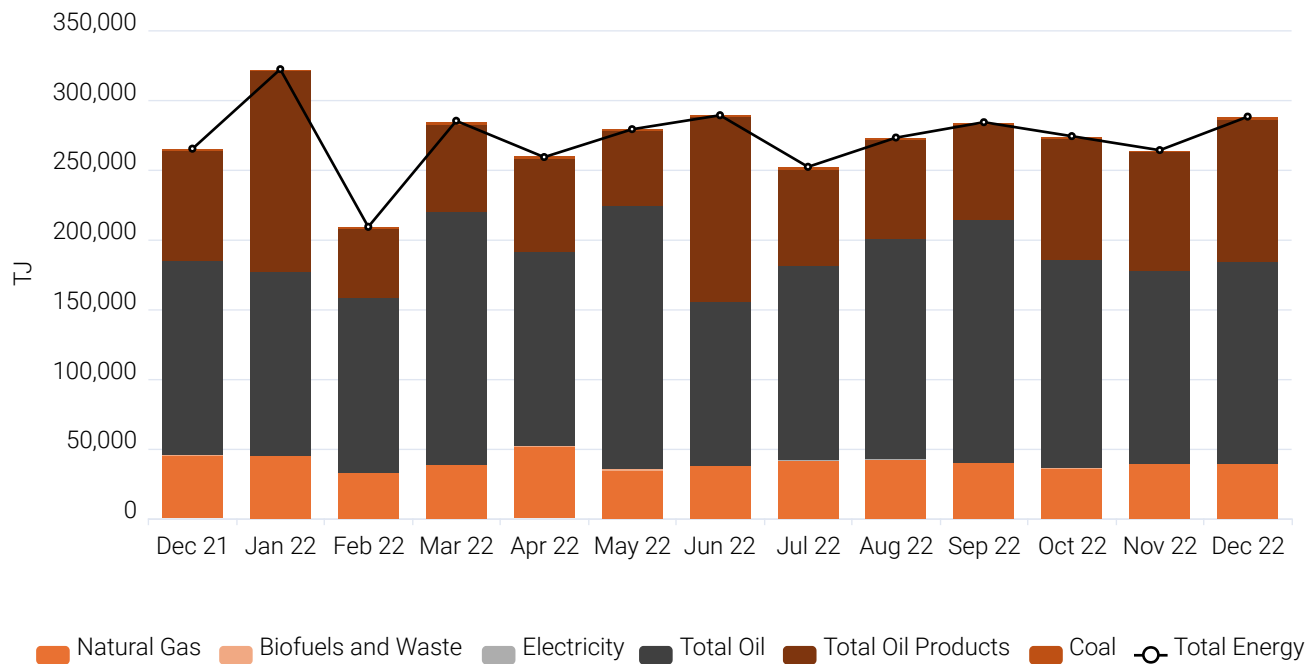


Figure 5.1 Singapore Energy Net Trade, in TJ (Dec 21 - Dec 22)

Table 5.1 Energy Commodities Imports

Imports	Unit	2022	2021	2020	2019
Crude Oil	MMbbl (TJ)	305 (1,790,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
NGL	MMT (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Other Feedstock	MMT (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Oil	TJ	1,790,000	XXX	XXX	XXX
LPG	MMT (TJ)	0.101 (4,420)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Naphtha	MMT (TJ)	9.88 (426,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Gasoline	MMT (TJ)	14.9 (632,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Kerosenes	MMT (TJ)	0.0150 (626)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Diesel	MMT (TJ)	8.67 (358,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Fuel oil	MMT (TJ)	45.7 (1,820,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Other oil products	MMT (TJ)	15.6 (598,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Oil Products	TJ	3,840,000	XXX	XXX	XXX
Total Oil & Oil Products	TJ	5,630,000	XXX	XXX	XXX
Natural Gas	TJ	476,000	XXX	XXX	XXX
Coal	MMT (TJ)	0.676 (15,500)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Biofuels and waste	TJ	4,930	XXX	XXX	XXX
Electricity	GWh (TJ)	180 (648)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Energy Imports	TJ	6,120,000	XXX	XXX	XXX

Table 5.2 Energy Commodities Exports

Exports	Unit	2022	2021	2020	2019
Crude Oil	MMbbl (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
NGL	MMT (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Other Feedstock	MMT (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Oil	TJ	0	XXX	XXX	XXX
LPG	MMT (TJ)	0.0520 (2,280)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Naphtha	MMT (TJ)	1.93 (83,200)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Gasoline	MMT (TJ)	25.1 (1,070,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Kerosenes	MMT (TJ)	0.161 (6,720)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Diesel	MMT (TJ)	16.3 (672,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Fuel oil	MMT (TJ)	14.2 (564,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Other oil products	MMT (TJ)	11.8 (450,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Oil Products	TJ	2,840,000	XXX	XXX	XXX
Total Oil & Oil Products	TJ	2,840,000	XXX	XXX	XXX
Natural Gas	TJ	0.00	XXX	XXX	XXX
Coal	MMT (TJ)	0.00203 (46.4)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Biofuels and waste	TJ	1,190	XXX	XXX	XXX
Electricity	GWh (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Energy Exports	TJ	2,840,000	XXX	XXX	XXX

5.2 Trade Partners

This section examines the key trade partners involved in Singapore energy imports and exports, focusing on major commodity categories such as Oil, Oil Products, Natural Gas, and Coal.

Oil

Figure 5.2 illustrates the primary countries exporting and importing Oil in 2022 (January to December). Additionally, Table 5.3 presents a detailed breakdown of Oil trade partners over recent years, expressed as a percentage of total Singapore imports and exports.

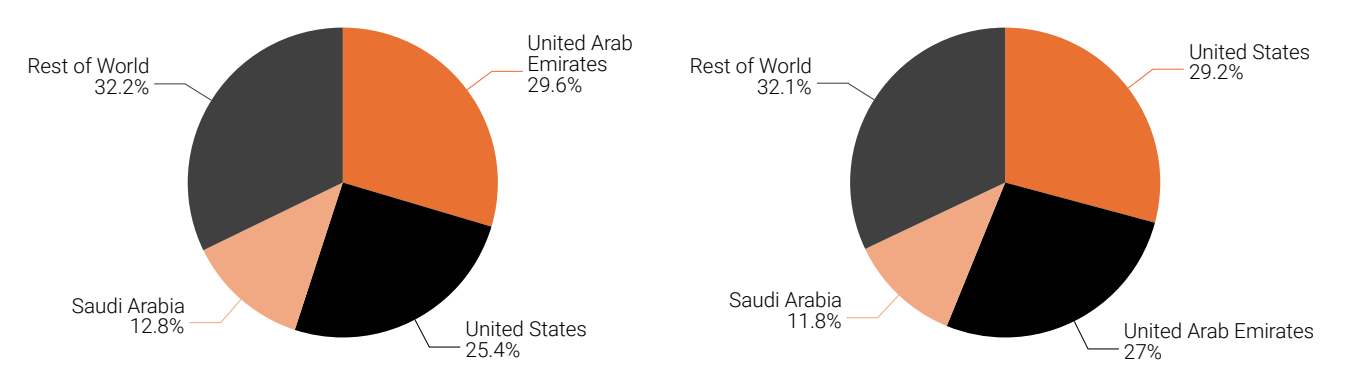


Figure 5.2 Oil Exporters, left, and Importers, right (Jan 22 - Dec 22)

Table 5.3 Singapore Oil Trade Partners (%)

Key Partners	2022	2021	2020	2019
Top Exporters				
1st	29.6 (United Arab Emirates)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	25.4 (United States)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	12.8 (Saudi Arabia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	32.2	XXX	XXX	XXX
Top Importers				
1st	29.2 (United States)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	27 (United Arab Emirates)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	11.8 (Saudi Arabia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	32.1	XXX	XXX	XXX

Oil Products

Figure 5.3 illustrates the key countries exporting and importing Oil Products in 2022 (January to December). Additionally, Table 5.4 provides a detailed breakdown of oil product trade partners over recent years, expressed as a percentage of total Singapore imports and exports.

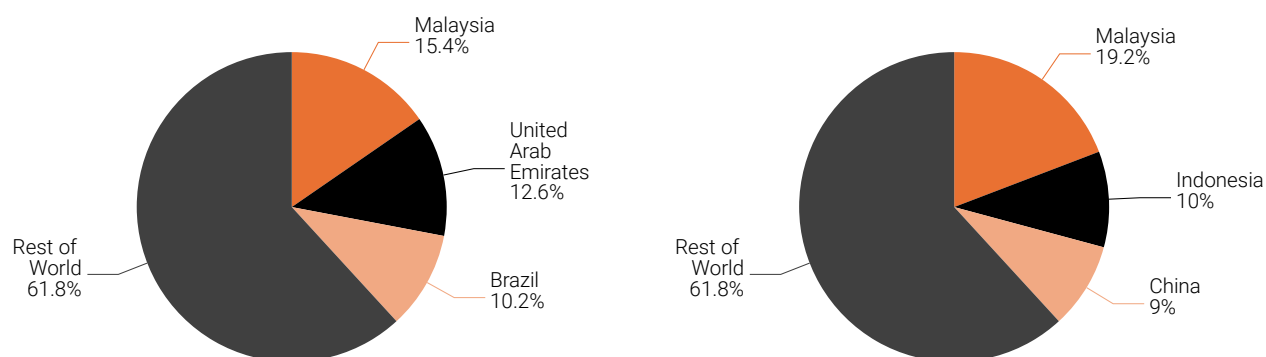


Figure 5.3 Oil Products Exporters, left, and Importers, right (Jan 22 - Dec 22)

Table 5.4 Singapore Oil Products Trade Partners (%)

Key Partners	2022	2021	2020	2019
Top Exporters				
1st	15.4 (Malaysia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	12.6 (United Arab Emirates)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	10.2 (Brazil)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	61.8	XXX	XXX	XXX
Top Importers				
1st	19.2 (Malaysia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	10 (Indonesia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	9 (China)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	61.8	XXX	XXX	XXX

Natural Gas

Figure 5.4 highlights the key countries exporting and importing Natural Gas in 2022 (January to December). Additionally, Table 5.5 presents a detailed breakdown of Natural Gas trade partners over recent years, expressed as a percentage of total Singapore imports and exports.

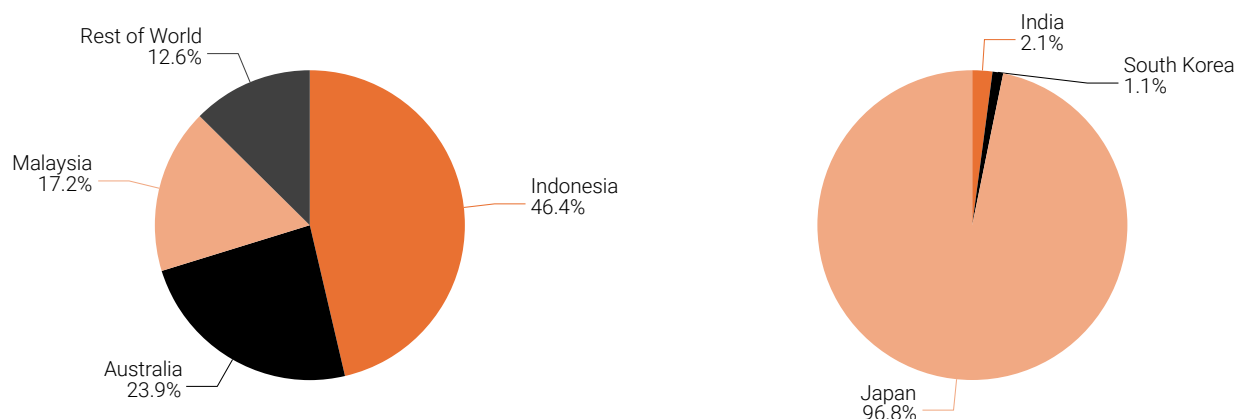


Figure 5.4 Natural Gas Exporters, left, and Importers, right (Jan 22 - Dec 22)

Table 5.5 Singapore Natural Gas Trade Partners (%)

Key Partners	2022	2021	2020	2019
Top Exporters				
1st	46.4 (Indonesia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	23.9 (Australia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	17.2 (Malaysia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	12.6	XXX	XXX	XXX
Top Importers				
1st	96.8 (Japan)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	2.1 (India)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	1.1 (South Korea)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	-	XXX	XXX	XXX

Coal

Figure 5.5 highlights the primary countries exporting and importing Coal in 2022 (January to December). Additionally, Table 5.6 provides a detailed breakdown of Coal trade partners over recent years, expressed as a percentage of total Singapore imports and exports.

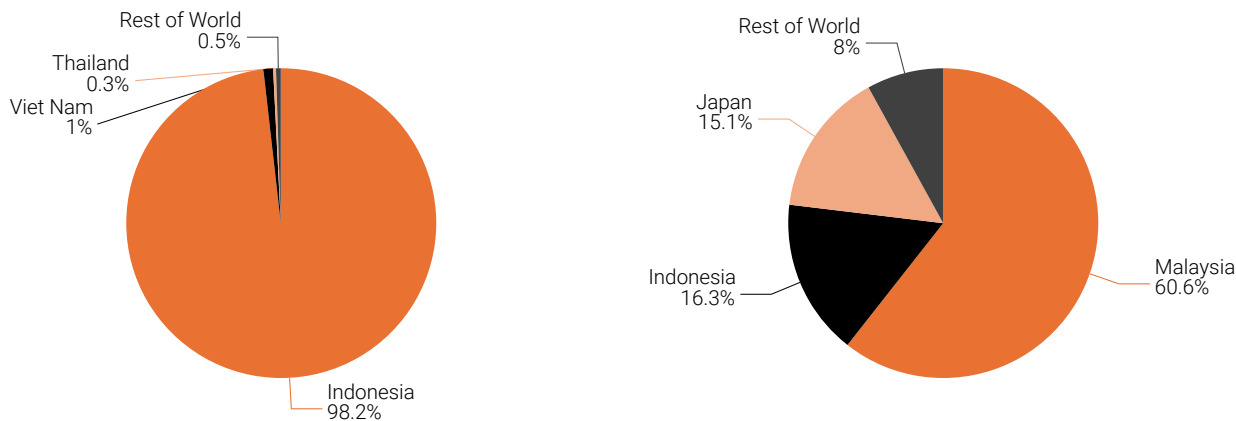


Figure 5.5 Coal Exporters, left, and Importers, right (Jan 22 - Dec 22)

Table 5.6 Singapore Coal Trade Partners (%)

Key Partners	2022	2021	2020	2019
Top Exporters				
1st	98.2 (Indonesia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	1 (Viet Nam)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	0.3 (Thailand)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	0.5	XXX	XXX	XXX
Top Importers				
1st	60.6 (Malaysia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
2nd	16.3 (Indonesia)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
3rd	15.1 (Japan)	XXX (XXXXXX)	XXX (XXXXXX)	XXX (XXXXXX)
Rest of World	8	XXX	XXX	XXX

5.3 Production and Demand

Production

Energy production involves extracting and generating energy from various sources. These include fossil fuels (Coal, Oil, and Natural Gas), which are used as fuels and for electricity generation, as well as Nuclear Power and Renewable energy sources (Hydropower, Wind, and Solar).

The trends in domestic energy production over recent years in Singapore are presented in Figure 5.6, highlighting shifts in the contribution of energy sources to the overall energy mix.

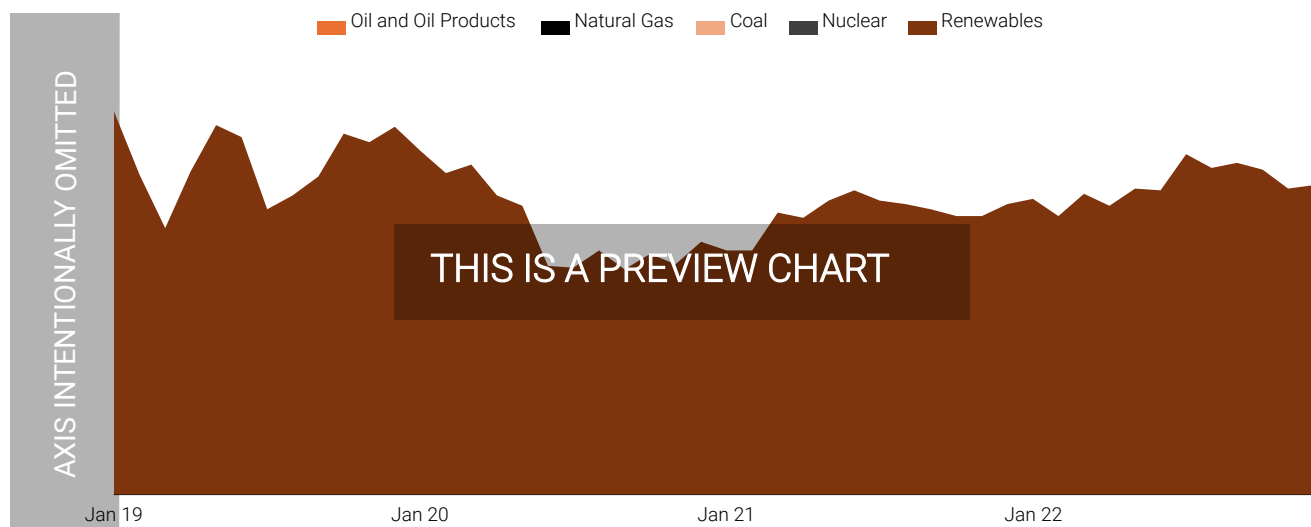


Figure 5.6 Singapore Energy Production (Jan 19 - Dec 22)

Table 5.7 Singapore Energy Production

Production	Unit	2022	2021	2020	2019
Oil & Oil Products	TJ	0.00	XXX	XXX	XXX
Natural Gas	TJ	0.00	XXX	XXX	XXX
Coal	MMT (TJ)	0.00 (0.00)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Nuclear	TJ	0.00	XXX	XXX	XXX
Hydro	TJ	0.00	XXX	XXX	XXX
Geothermal	TJ	0.00	XXX	XXX	XXX
Solar	TJ	2,440	XXX	XXX	XXX
Wind	TJ	0.00	XXX	XXX	XXX
Biofuels and waste	TJ	19,200	XXX	XXX	XXX
Total Energy Production	TJ	21,600	XXX	XXX	XXX

Demand

Energy demand represents the total energy required to meet the needs of end users within a country, calculated as:

$$\text{Demand} = \text{Production} + \text{Imports} - \text{Exports} - \text{Stock Change}$$

This metric reflects the energy needed for various applications, including industrial processes, transportation, residential heating, and electricity generation. While some energy sources are consumed in their original form, most are transformed into fuels or electricity before final use. Recent trends in energy demand in Singapore are illustrated in Figure 5.7, showcasing how total demand has evolved over the years. Additional details are provided in Table 5.8, which presents a breakdown of energy demand by year.

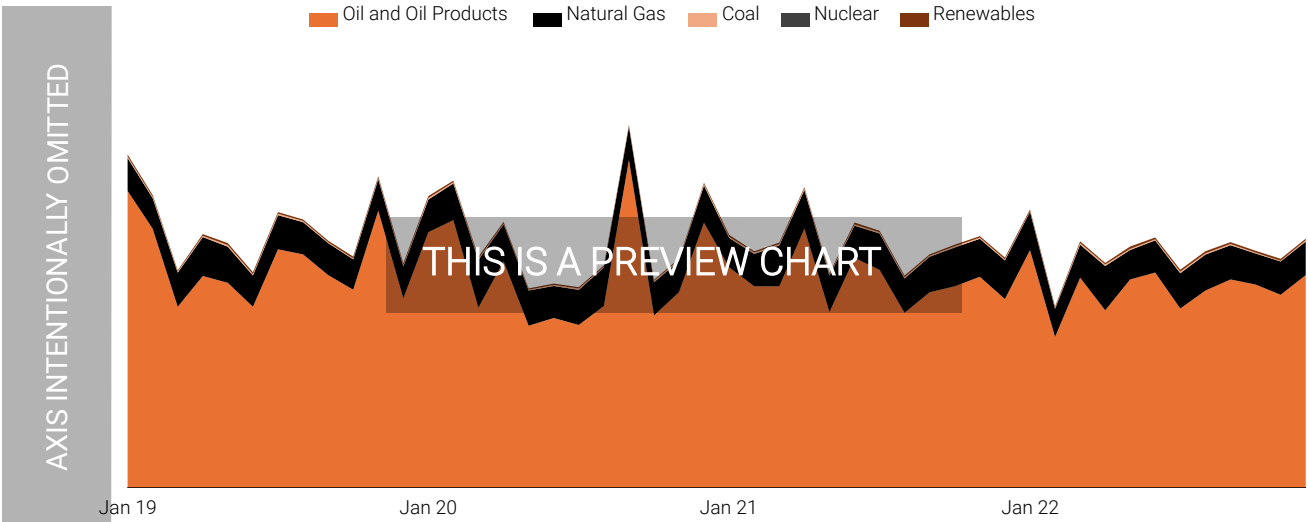


Figure 5.7 Singapore Energy Demand (Jan 19 - Dec 22)

Table 5.8 Singapore Energy Demand

Demand	Unit	2022	2021	2020	2019
Oil	TJ	1,790,000	XXX	XXX	XXX
Oil Products	TJ	992,000	XXX	XXX	XXX
Natural Gas	TJ	476,000	XXX	XXX	XXX
Coal	MMT (TJ)	1.03 (15,400)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Nuclear	TJ	0.00	XXX	XXX	XXX
Hydro	TJ	0.00	XXX	XXX	XXX
Geothermal, solar, wind, etc.	TJ	2,440	XXX	XXX	XXX
Biofuels and waste	TJ	22,900	XXX	XXX	XXX
Total Energy Demand	TJ	3,300,000	XXX	XXX	XXX

Oil Products Domestic Supply

The domestic supply of oil products reflects availability and demand for petroleum products within a country. It accounts for the transformation of Crude Oil, Natural Gas Liquids, and other inputs into refined products at refineries, as well as their direct use to meet energy needs.

Refined petroleum products serve various purposes, including transportation (e.g., Gasoline, Diesel), residential heating, industrial applications, and power generation. They are also key raw materials for petrochemical production, contributing to plastics, synthetic rubber, and other industrial goods.

Figure 5.8 illustrates recent trends in the domestic supply of refined oil products in Singapore. Table 5.9 provides an overview of key oil products and their shares in total supply.

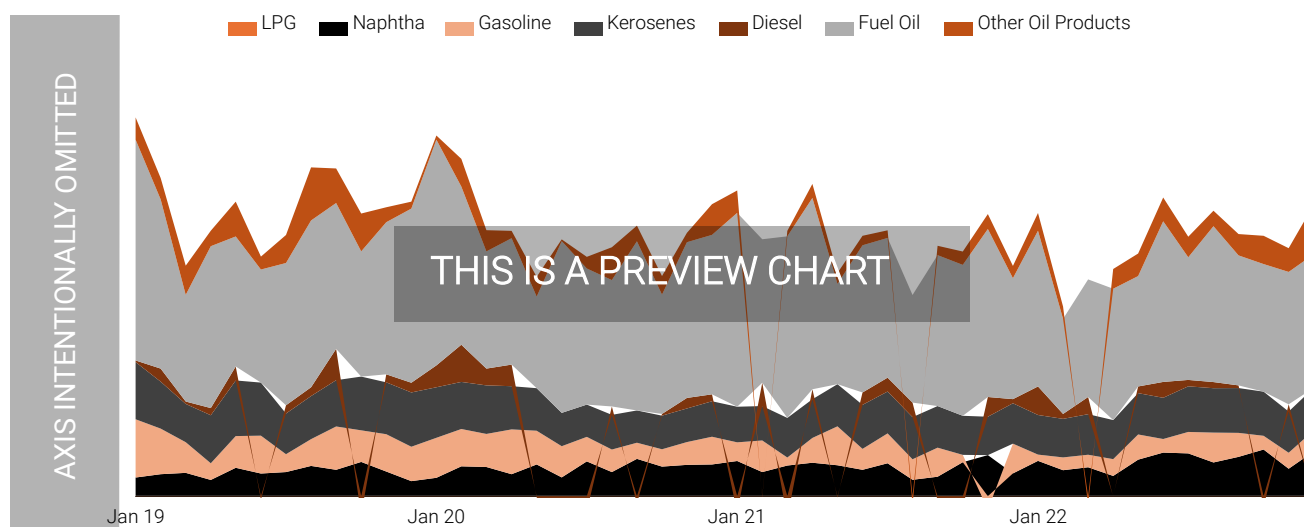


Figure 5.8 Singapore Oil Products Supply (Jan 19 - Dec 22)

Table 5.9 Singapore Oil Products Domestic Supply

	Unit	2022	2021	2020	2019
LPG	MMT (TJ)	0.0935 (4,100)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Naphtha	MMT (TJ)	7.95 (342,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Gasoline	MMT (TJ)	4.09 (174,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Kerosenes	MMT (TJ)	9.83 (410,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Diesel	MMT (TJ)	1.67 (69,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Fuel oil	MMT (TJ)	32.2 (1,280,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Other oil products	MMT (TJ)	5.24 (200,000)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Total Oil Products	TJ	2,480,000	XXX	XXX	XXX

Consumption

Consumption refers to the energy directly used by individuals, businesses, and industries for various activities such as heating and cooling buildings, powering appliances, lighting, transportation, and operating industrial machinery. It also includes non-energy applications, such as the use of fossil fuels as raw materials in chemical production.

During the conversion of primary energy sources into usable forms (e.g., electricity or refined fuels), a portion of energy is inevitably lost. As a result, the composition of final energy consumption often differs from demand. Understanding both metrics is essential for analyzing the efficiency of energy systems and identifying trends in energy use across sectors.

Recent trends in consumption are illustrated in Figure 5.9, which highlights changes over the years. Additional details are provided in Table 5.10, presenting a year-by-year breakdown of energy consumption across key commodity sectors.

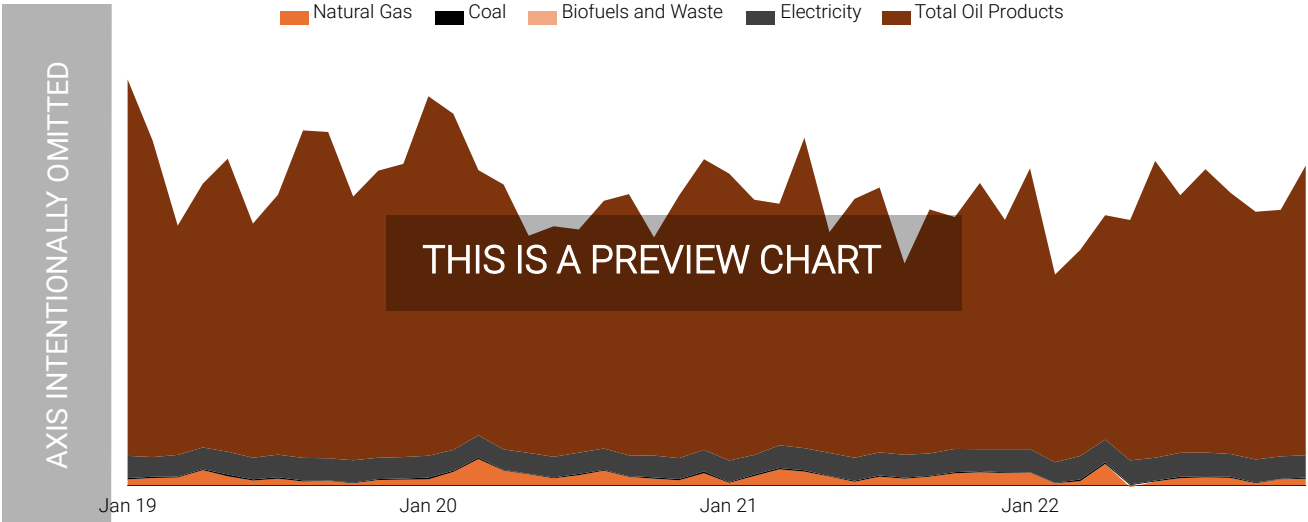


Figure 5.9 Singapore Energy Consumption (Jan 19 - Dec 22)

Table 5.10 Singapore Energy Consumption

Consumption	Unit	2022	2021	2020	2019
Oil Products	TJ	2,460,000	XXX	XXX	XXX
Natural Gas	TJ	63,300	XXX	XXX	XXX
Coal	MMT (TJ)	0.454 (9,590)	XXX (XXX)	XXX (XXX)	XXX (XXX)
Biofuels and waste	TJ	0.00	XXX	XXX	XXX
Electricity	TJ	224,000	XXX	XXX	XXX
Total Consumption	TJ	2,760,000	XXX	XXX	XXX

5.4 Energy Balance

The energy balance provides a comprehensive overview of the relationship between energy production, imports, exports, total demand, and consumption. It serves as a key indicator of how energy flows within the country, highlighting self-sufficiency levels, trade dependencies, and consumption patterns.

Table 5.11 summarizes the energy balance for recent years, presenting data on production, imports, exports, total demand, and final consumption in terajoule (TJ).

Additionally, Figure 5.10 illustrates the energy balance for 2022 (January to December), providing a visual representation of how energy supply and demand interact during this period.

Table 5.11 Singapore Energy Balance (in TJ)

Energy Balance	2022	2021	2020	2019
Production	21,600	XXX	XXX	XXX
Net Trade + Stock Changes	3,280,000	XXX	XXX	XXX
Demand	3,300,000	XXX	XXX	XXX
Transformation Losses	-540,000	XXX	XXX	XXX
Total Consumption	2,760,000	XXX	XXX	XXX

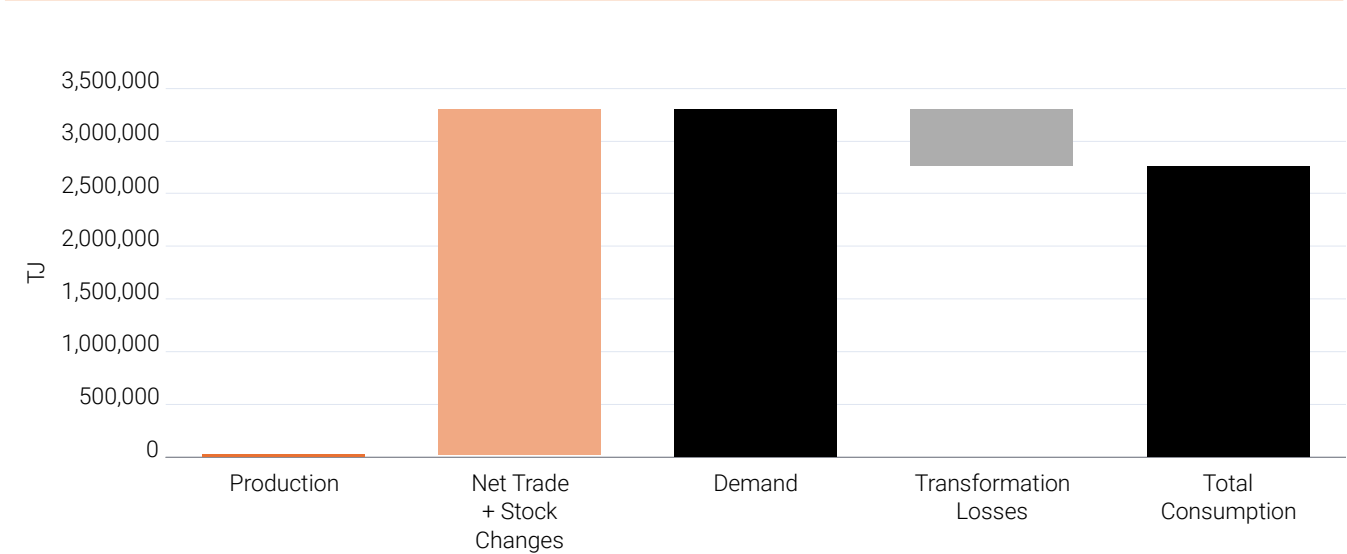


Figure 5.10 Singapore Energy Balance (Jan 22 - Dec 22)

5.5 Electricity Generation by Source

Electricity is classified as a secondary energy source because it is produced through the conversion of primary energy sources such as Coal, Natural Gas, Nuclear Energy, and Renewables (e.g., Wind, Solar, and Hydropower). This transformation process enables Electricity to serve as an energy carrier, powering homes, businesses, industries, and transportation systems.

Figure 5.11 illustrates Electricity generation by source for 2022 (January to December), highlighting contributions of Fossil Fuels, Nuclear Power, and Renewable Energy. Additionally, Table 5.12 presents detailed data on Electricity generation by source (in GWh) over recent years.

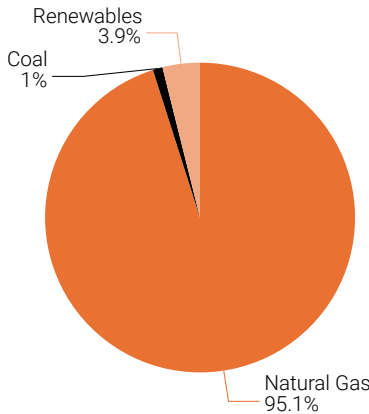


Figure 5.11 Singapore Electricity Generation by Source (Jan 22 - Dec 22)

Table 5.12 Singapore Electricity Generated by Source (in GWh)

Electricity Source	2022	2021	2020	2019
Nuclear	0.00	XXX	XXX	XXX
Hydro	0.00	XXX	XXX	XXX
Coal	601	XXX	XXX	XXX
Natural Gas	57,300	XXX	XXX	XXX
Biofuels & Waste	1,670	XXX	XXX	XXX
Geothermal	0.00	XXX	XXX	XXX
Solar	677	XXX	XXX	XXX
Wind	0.00	XXX	XXX	XXX
Other Sources	0.00	XXX	XXX	XXX
Total Electricity	62,000	XXX	XXX	XXX

5.6 Energy Self-Sufficiency and Trade Dependencies

This chapter examines the energy self-sufficiency and trade dependencies of Singapore, providing insights into its ability to meet domestic energy demand through local production and its reliance on international trade. Energy self-sufficiency is a critical metric for understanding a country's energy security, while trade dependencies highlight the economic relationships with key energy import and export partners.

The analysis begins with an overview of the energy self-sufficiency ratio over the last years, illustrating the balance between domestic production and demand. This is followed by an exploration of the country's dependency on energy imports, including the share of GDP attributed to imports and the contribution of top trading partners to this dependency.

In addition, the chapter evaluates the role of energy exports in the economy of Singapore, presenting exports as a percentage of GDP and analyzing their contribution to the economies of top partner countries. Together, these insights offer a comprehensive view of the position of Singapore in global energy markets and its economic ties to key trading partners.

Energy Self-Sufficiency

Figure 5.12 illustrates the energy self-sufficiency ratio of Singapore over the years, calculated as domestic production divided by total demand. A ratio above 100% indicates self-sufficiency, while below 100% signals import reliance.

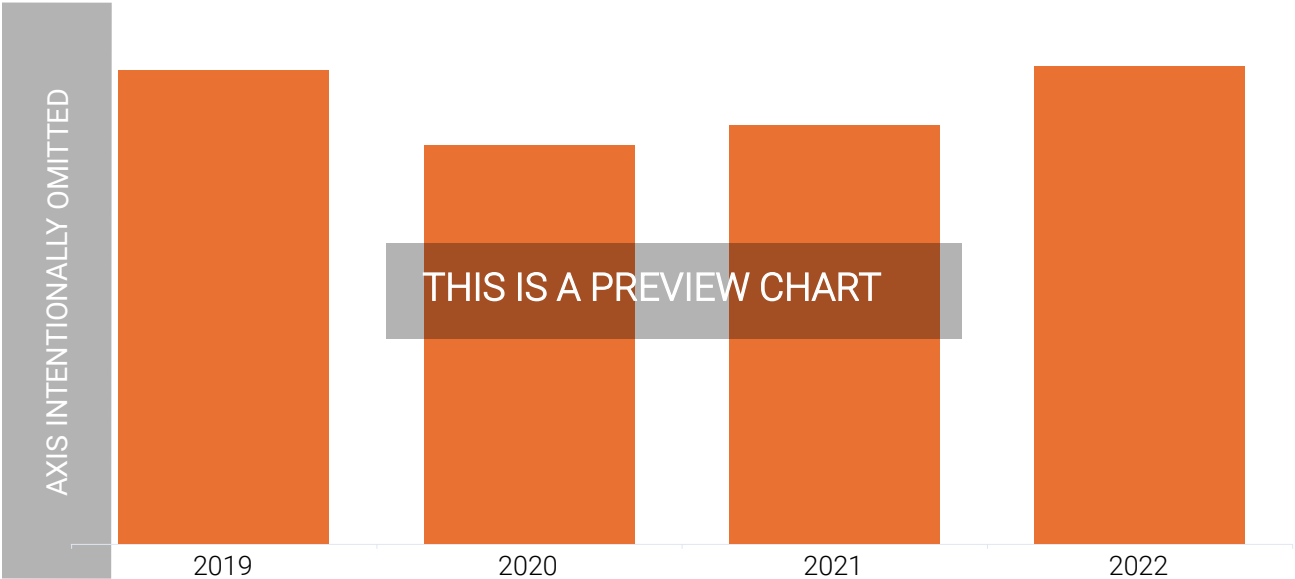


Figure 5.12 Singapore Energy Self-Sufficiency (2022 = Jan - Dec)

Economic Impact of Energy Imports

Figure 5.13 presents energy imports as a percentage of Singapore GDP over recent years, highlighting the contribution of key exporting countries. Figure 5.14 shows the share of GDP that Singapore energy imports represent for these exporters, emphasizing the economic importance of Singapore trade to their economies.

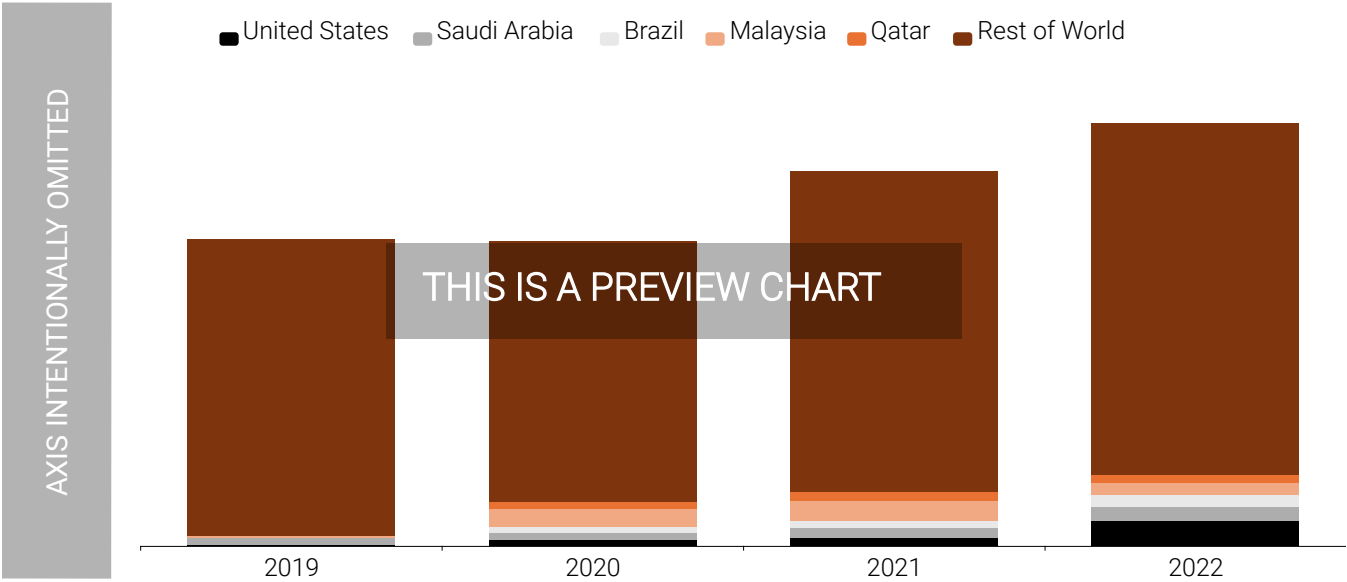


Figure 5.13 Singapore Energy Imports Over the Last Years (2022 = Jan - Dec)

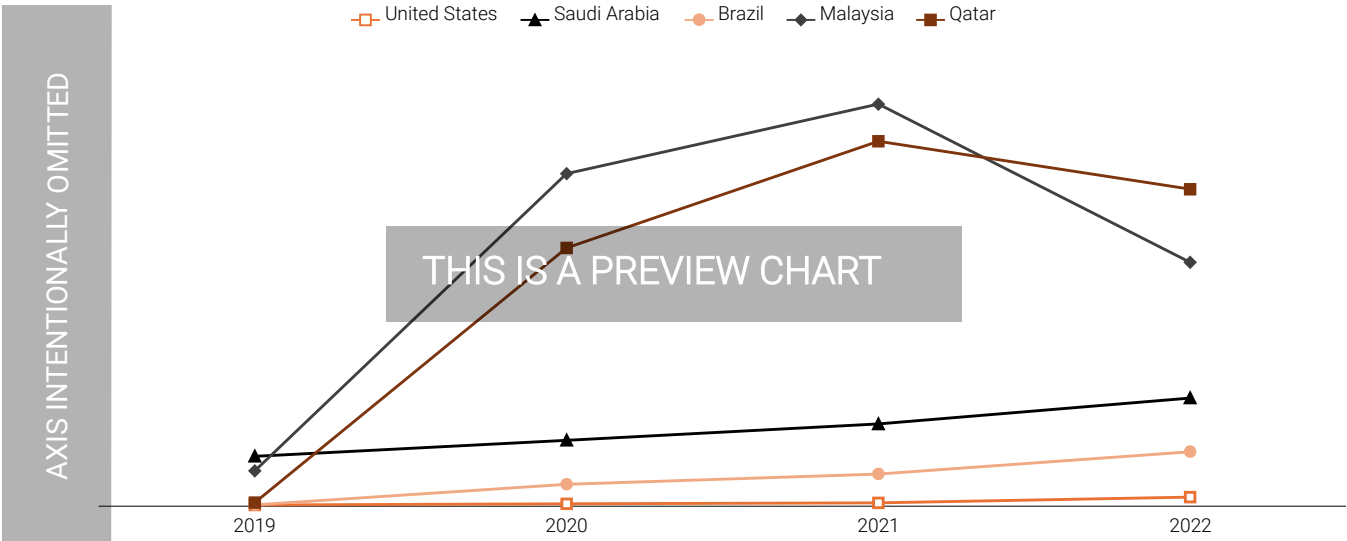


Figure 5.14 Singapore Imports as % of Exporters' GDP (2022 = Jan - Dec)

Economic Impact of Energy Exports

Figure 5.15 presents energy exports as a percentage of Singapore GDP over recent years, highlighting the role of key importing countries. Figure 5.16 shows the share of GDP that Singapore energy exports represent for these importers, underscoring the importance of Singapore trade to their economies.

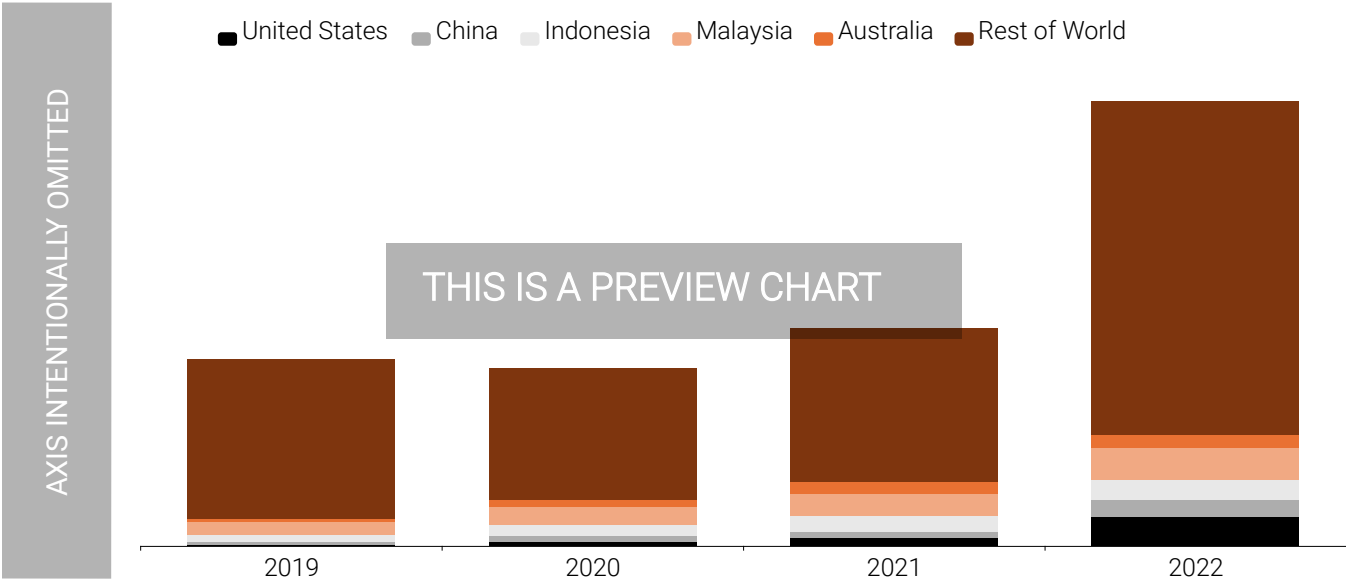


Figure 5.15 Singapore Energy Exports Over the Last Years (2022 = Jan - Dec)

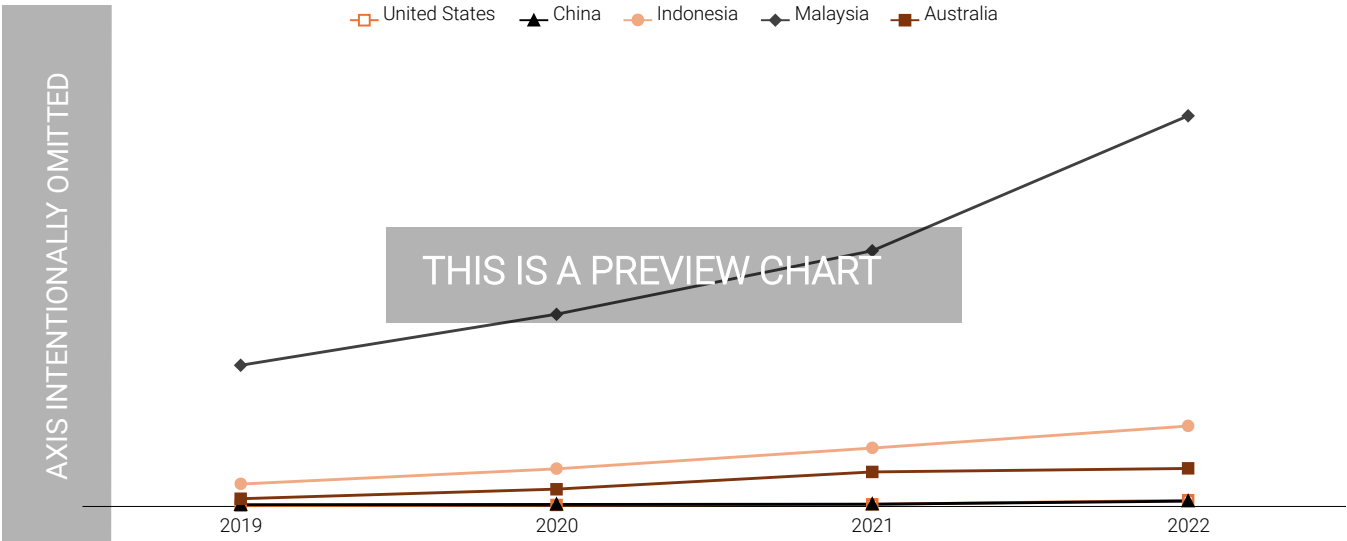


Figure 5.16 Singapore Exports as % of Importers' GDP (2022 = Jan - Dec)

Chapter 6

Freight and Insurance

Transportation costs play a crucial role in energy markets, shaping the final price of commodities and influencing the competitiveness of suppliers across regions. This chapter examines the key cost components of moving energy commodities via maritime shipping, including sea freight rates, marine insurance costs, and their impact on market pricing.

Maritime freight rates represent the cost of shipping energy commodities along various international trade routes by sea. In addition to historical data, this chapter provides short-term sea freight rate forecasts, offering insights into expected marine transportation costs in the near future.

Marine insurance costs are another vital component of energy trade, covering risks associated with cargo transportation by sea and safeguarding shipments against potential losses. By incorporating both maritime freight and insurance costs, this chapter also presents netback and netforward prices – key metrics for evaluating commodity value along the supply chain. Netback prices reflect a commodity's value at its origin after deducting sea transportation and insurance costs, while netforward prices represent its delivered value at the destination, including these costs.

Together, these analyses provide a clearer understanding of how logistics impact energy pricing, trade flows, and market dynamics.

As presented in the report Preamble, this section organizes fuels into categories commonly used in maritime shipping, reflecting industry practices and the distinct characteristics of each fuel type transported by sea. The categories include Heavy Oils, Light Fuels, Hydrocarbon Gas Liquids (HGL), Liquefied Natural Gas (LNG), and Coal Products.

6.1 Maritime Freight Rates

Figure 6.1 presents key maritime energy freight rates related to Singapore over the past year and for the foreseeable future. These sea freight rates are expressed in SGD/mt to standardize the comparison across energy commodities with different units.

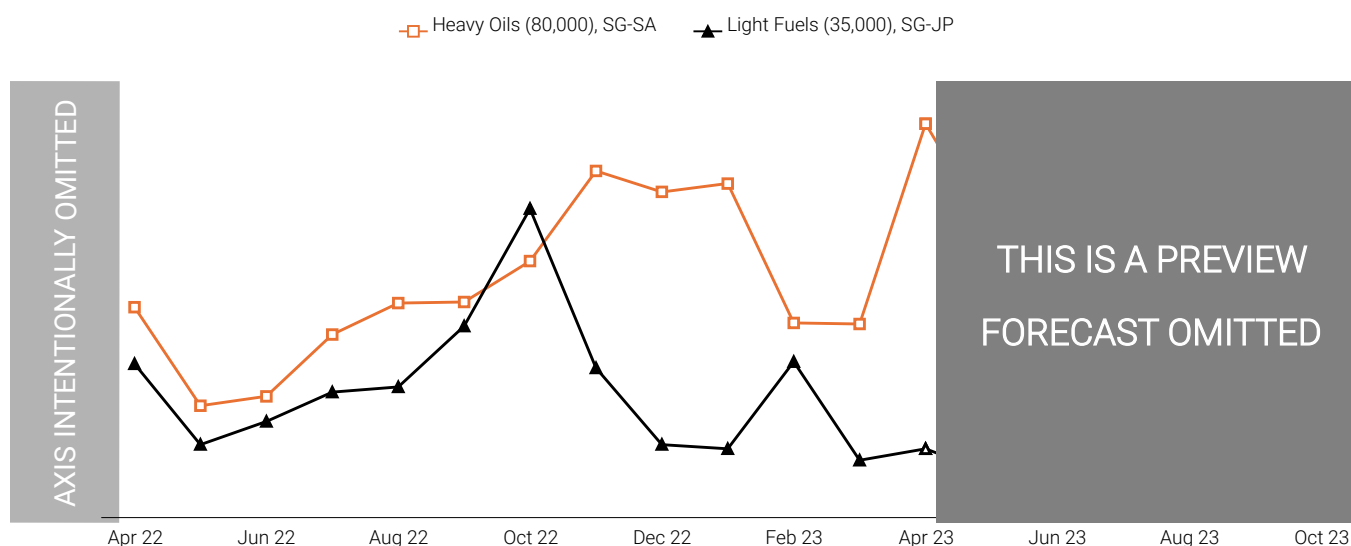


Figure 6.1 Singapore Key Maritime Freight Rates (Apr 22 - Oct 23)

Heavy Oils

Table 6.1 presents maritime freight rates for Heavy Oils, including Crude Oil and Fuel Oil. It provides data on sea freight rates over recent months for key shipping routes related to Singapore, specifying the country of origin, country of destination, and vessel size.

Table 6.1 Heavy Oil Maritime Freight Rates (SGD/mt)

Origin	Destination	Vessel Size	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Kuwait	Singapore	80,000 mt	48.9	32.7	32.8	+10.3 ↑	-10.4 ↓
Saudi Arabia	Singapore	270,000 mt	10.3	15.2	16.3	-34.4 ↓	-46.1 ↓
United States	Singapore	270,000 mt	42.2	44.2	61.0	-20.3 ↓	-25.3 ↓
Taiwan	Singapore	270,000 mt	3.66	5.44	5.81	-34.4 ↓	-46.0 ↓
Singapore	Saudi Arabia	80,000 mt	57.5	38.4	38.5	+10.3 ↑	+45.9 ↑
Singapore	South Korea	270,000 mt	5.69	8.46	9.04	-34.5 ↓	-46.1 ↓
Singapore	Australia	270,000 mt	9.87	14.7	15.7	-34.6 ↓	-45.9 ↓
Singapore	Philippines	270,000 mt	3.05	4.53	4.84	-34.4 ↓	-46.1 ↓

Light Fuels

Table 6.2 presents maritime freight rates for Light Fuel commodities, including Naphtha, Gasoline, Kerosene, and Diesel.

Table 6.2 Light Fuels Maritime Freight Rates (SGD/mt)

Origin	Destination	Vessel Size	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
United States	Singapore	38,000 mt	92.7	96.0	130	-25.4 ↓	-44.1 ↓
India	Singapore	35,000 mt	15.1	14.4	19.8	-0.9 ↓	-21.0 ↓
Taiwan	Singapore	40,000 mt	13.5	15.3	20.0	-42.5 ↓	-6.3 ↓
South Korea	Singapore	40,000 mt	35.1	37.5	32.0	+14.9 ↑	-6.2 ↓
Russia	Singapore	40,000 mt	53.0	60.3	78.5	-42.2 ↓	-6.4 ↓
Singapore	Japan	35,000 mt	26.5	25.4	34.8	-0.5 ↓	-20.8 ↓
Singapore	Australia	35,000 mt	79.1	84.5	72.1	+15.0 ↑	-6.2 ↓
Singapore	Philippines	35,000 mt	20.5	20.6	18.5	-0.6 ↓	-13.2 ↓
Singapore	Indonesia	35,000 mt	8.07	8.10	7.26	-0.5 ↓	-13.1 ↓

Hydrocarbon Gas Liquids

Table 6.3 presents maritime freight rates for Hydrocarbon Gas Liquids (HGL) commodities, including LPG and NGL.

Table 6.3 HGL Maritime Freight Rates (SGD/mt)

Origin	Destination	Vessel Size	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Saudi Arabia	Singapore	44,000 mt	73.8	52.5	45.7	-5.7 ↓	-2.7 ↓
United States	Singapore	44,000 mt	254	206	190	+9.2 ↑	+10.8 ↑

LNG

Table 6.4 presents maritime freight rates for LNG.

Table 6.4 LNG Maritime Freight Rates (SGD/mt)

Origin	Destination	Vessel Size	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Australia	Singapore	91,500 mt	12.1	15.3	15.8	-21.3 ↓	-22.6 ↓

Coal Products

Table 6.5 presents maritime freight rates for solid coal products and derivatives.

Table 6.5 Coal Products Maritime Freight Rates (SGD/mt)

Origin	Destination	Vessel Size	Apr 23	Mar 23	Feb 23	QoQ (%)	YoY (%)
Indonesia	Singapore	49,300 mt	11.3	12.3	10.7	+12.8 ↑	-28.4 ↓

6.2 Freight Rates Forecast

This section provides short-term freight rate forecasts, offering insights into expected transportation costs in the near future.

Heavy Oils

Table 6.6 presents six-month forecasted freight rates for Heavy Oils.

Table 6.6 Heavy Oil Maritime Freight Rates Forecasts (SGD/mt)

Origin	Destination	Vessel Size	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Kuwait	Singapore	80,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Saudi Arabia	Singapore	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
United States	Singapore	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Taiwan	Singapore	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Saudi Arabia	80,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	South Korea	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Australia	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Philippines	270,000 mt	XXX	XXX	XXX	XXX	XXX	XXX

Light Fuels

Table 6.7 presents six-month forecasted freight rates for Light Fuels.

Table 6.7 Liquid Fuels Maritime Freight Rates Forecasts (SGD/mt)

Origin	Destination	Vessel Size	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
United States	Singapore	38,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
India	Singapore	35,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Taiwan	Singapore	40,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
South Korea	Singapore	40,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Russia	Singapore	40,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Japan	35,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Philippines	35,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
Singapore	Indonesia	35,000 mt	XXX	XXX	XXX	XXX	XXX	XXX

Hydrocarbon Gas Liquids

Table 6.8 presents six-month forecasted freight rates for HGL.

Table 6.8 HGL Maritime Freight Rates Forecasts (SGD/mt)

Origin	Destination	Vessel Size	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Saudi Arabia	Singapore	44,000 mt	XXX	XXX	XXX	XXX	XXX	XXX
United States	Singapore	44,000 mt	XXX	XXX	XXX	XXX	XXX	XXX

LNG

Table 6.9 presents six-month forecasted freight rates for LNG.

Table 6.9 LNG Maritime Freight Rates Forecasts (SGD/mt)

Origin	Destination	Vessel Size	May 23	Jun 23	Jul 23	Aug 23	Sep 23	Oct 23
Australia	Singapore	91,500 mt	XXX	XXX	XXX	XXX	XXX	XXX

6.3 Insurance Costs

Table 6.10 presents the most recent insurance costs for energy commodities.

Table 6.10 Energy Commodity Insurance Costs (% of CFR Price)

Commodity	Shipping Category	Apr 23	Mar 23	2023 (i)	2022	2021	2020
Naphtha	Light Fuels	0.1	0.1	0.1	XXX	XXX	XXX
Propane	Hydrocarbon Gas Liquids	0.1	0.2	0.1	XXX	XXX	XXX
Butane	Hydrocarbon Gas Liquids	0.1	0.1	0.1	XXX	XXX	XXX
Ethanol	Light Fuels	0.3	0.3	0.3	XXX	XXX	XXX
Coal	Coal Products	0.1	0.3	0.2	XXX	XXX	XXX
Natural Gas	LNG	0.1	0.1	0.1	XXX	XXX	XXX
Crude Oil	Heavy Oils	0.1	0.1	0.1	XXX	XXX	XXX
LPG	Hydrocarbon Gas Liquids	1.3	0.8	1.1	XXX	XXX	XXX
Kerosene	Light Fuels	0.1	0.1	0.1	XXX	XXX	XXX
Diesel	Light Fuels	0.1	0.1	0.1	XXX	XXX	XXX
Fuel Oil	Heavy Oils	0.1	0.2	0.1	XXX	XXX	XXX
Gasoline	Light Fuels	0.1	0.1	0.1	XXX	XXX	XXX
Biodiesel	Light Fuels	0.4	0.4	0.3	XXX	XXX	XXX

(i) Data for 2023 are incomplete and represent January to April values only.

6.4 Netback and Netforward Prices

Netback and netforward prices are calculated by adjusting price assessments to account for maritime freight rates and insurance costs. Netback prices are derived by subtracting freight and insurance costs from the delivered price (CIF), while netforward prices are calculated by adding these costs to the free-on-board (FOB) price. The formulas for these calculations are:

$$\text{Netback Price (FOB)} = \text{CIF Price} - (\text{Maritime Freight} + \text{Insurance})$$

$$\text{Netforward Price (CIF)} = \text{FOB Price} + (\text{Maritime Freight} + \text{Insurance})$$

The values presented in this report can be used in these formulas to estimate other price assessments. CIF and FOB prices are presented in “Chapter 2. Current Prices,” while maritime freight rates and insurance costs are detailed in sections “6.1. Maritime Freight Rates” and “6.3. Insurance Costs” of this chapter, respectively.

This process is illustrated in Figure 6.2.

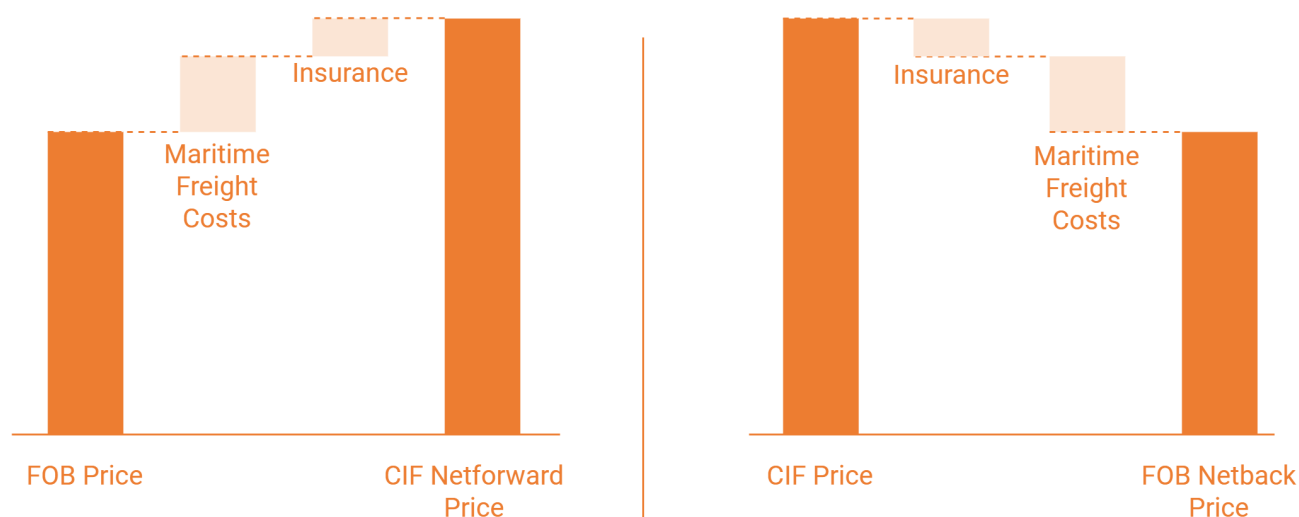


Figure 6.2 Netforward / Netback Price Calculation

Table 6.11 presents examples of key price assessments estimated using the freight rates and insurance costs detailed in this section.

Table 6.11 Singapore Netback and Netforward Price Assessments (Apr 23)

Origin	Destination	Distance (nm)	Shipping Time	FOB Price	Freight	Insurance	CIF Price
Naphtha, export transaction price (SGD/mt)							
United States	Singapore	11,800	24 d	0.967	0.0927	0.000967	1.06 (N)
Propane, export contract price (SGD/mt)							
Saudi Arabia	Singapore	4,540	9 d	741	73.8	0.741	815 (N)
Natural Gas (liquified), import spot price (SGD/MMBtu)							
Australia	Singapore	4,370	11 d	20.8 (N)	0.244	0.0208	21.1
Crude Oil (sour), export spot price (SGD/Bbl)							
Saudi Arabia	Singapore	4,540	9 d	111	1.39	0.111	112 (N)
Crude Oil (WTI), export spot price (SGD/Bbl)							
United States	Singapore	11,800	24 d	106	5.59	0.106	111 (N)
Crude Oil, import spot price (SGD/Bbl)							
Taiwan	Singapore	1,620	4 d	121 (N)	0.502	0.121	121
Kerosene (jet fuel), export spot price (SGD/Bbl)							
India	Singapore	1,550	3 d	980	15.1	0.980	996 (N)
Diesel (ultra-low-sulfur), export spot price (SGD/Bbl)							
Russia	Singapore	6,360	13 d	839	53.0	0.839	893 (N)
Diesel, export transaction price (SGD/Bbl)							
Taiwan	Singapore	1,620	4 d	136	1.78	0.136	138 (N)
Diesel, export transaction price (SGD/Bbl)							
South Korea	Singapore	2,500	5 d	127	4.65	0.127	132 (N)

Origin	Destination	Distance (nm)	Shipping Time	FOB Price	Freight	Insurance	CIF Price
Naphtha (heavy), export spot price (SGD/mt)							
Singapore	Indonesia	531	1 d	778	8.07	0.778	787 (N)
Naphtha (heavy), export spot price (SGD/mt)							
Singapore	Australia	4,160	9 d	778	79.1	0.778	858 (N)
Naphtha (heavy), import spot price (SGD/mt)							
Singapore	Japan	2,730	6 d	896 (N)	26.5	0.896	924
Naphtha (heavy), export spot price (SGD/mt)							
Singapore	Philippines	1,350	3 d	778	20.5	0.778	799 (N)
Fuel Oil (intermediate), export spot price (SGD/mt)							
Singapore	Saudi Arabia	4,560	9 d	619	57.5	0.619	677 (N)
Fuel Oil (intermediate), export spot price (SGD/mt)							
Singapore	South Korea	2,520	5 d	619	5.69	0.619	625 (N)
Fuel Oil (intermediate), export spot price (SGD/mt)							
Singapore	Philippines	1,350	3 d	619	3.05	0.619	623 (N)
Fuel Oil (intermediate), export spot price (SGD/mt)							
Singapore	Australia	4,370	9 d	619	9.87	0.619	630 (N)

(N) Indicates prices calculated using netback or netforward methodologies.

Appendix A

Glossary and Methodology

This appendix offers a detailed overview of the key terms, concepts, and methodologies that underpin the Intratec Energy Prices & Markets report. It is designed to enhance transparency and provide readers with a clear understanding of the foundational elements used throughout the analyses. The appendix is structured into two main sections:

- * **Glossary:** This section provides concise explanations of essential terms, including price types, product categories, and energy flows. These definitions ensure consistency and clarity in interpreting the data and insights presented in the report.
- * **Methodology:** This section outlines the rigorous methodology employed by Intratec to collect, validate, and analyze data for price assessments, forecasts, and market insights.

Complementary Documents

For further details on terms and definitions used in this report, readers can refer to the Glossary & Abbreviations document:

► <https://intrat.ec/glossary>

For an in-depth understanding of the methodology developed by Intratec for the Intratec Energy Prices & Markets report, readers are encouraged to explore the General Methodology Guide, available here:

► <https://intrat.ec/m?f=/iep-methodology-general>

A.1 Glossary

Pricing Basis

- * **Compiled Prices** are modeled using price data from public sources, and their raw data consist of some price series (value per quantity) over a month.
- * **Formula-Based Prices** are prices calculated using related commodity prices, economic indicators, and regression models.
- * **Freight-Based Prices** adjust product values to include maritime freight costs, resulting in **Netback** and **Netforward** prices. Netback deducts freight costs to reflect the product value at the loading terminal, while Netforward adds freight costs to estimate the product value at the destination terminal.
- * **Manufacturing Cost-Based Prices** are based on operating costs, including raw materials and utilities. One example is the **cash cost**, that represents the out-of-pocket expenses manufacturers pay to produce a commodity, including raw materials, utilities, labor, maintenance, taxes, and fees.
- * **Preliminary Prices.** are best-estimate price values for the current period when official trade data are unavailable or delayed, typically by 1 to 3 months. They are derived using mathematical models that adjust related, timely price assessments to provide a reliable estimate until official figures are released.
- * **Transaction Prices** are prices derived from trade data and calculated by filtering out data that fall outside a minimum traded quantity and then applying a univariate outlier detection algorithm with the goal of removing inaccurate data.
- * **Unit Values** are prices calculated by dividing the total amount of money by the total quantity of a given commodity in each month traded by a specific country as reported by countries' custom authorities. It is calculated with no statistical treatment.

Energy Commodities Definitions

- * **Biofuels** are renewable fuels derived from organic materials (biomass), such as plants, agricultural residues, animal fats, and waste. They serve as alternatives to fossil fuels in transportation, heating, and electricity generation, including liquid, gaseous, and solid biofuels.
- * **Biomass and Waste** refers to organic materials from plants, animals, or waste that can be converted into biofuels (e.g., ethanol, biodiesel), biogas, or burned for energy. Key sources include agricultural residues, forestry waste, municipal solid waste, animal manure, and dedicated energy crops.
- * **Coal Products** include processed coal used in power generation (thermal coal) and steel production (metallurgical coal). These bulk commodities are typically transported by rail, barge, or ship, requiring specialized handling.
- * **Crude Oil** is a liquid fossil fuel extracted from underground reservoirs and refined into essential products such as gasoline, diesel, and jet fuel.
- * **Diesel** is a middle distillate fuel primarily used in diesel engines.
- * **Electricity** is an energy carrier generated from fossil fuels, renewables, or nuclear power. It is essential for residential, industrial, and infrastructure applications.
- * **Fuel Oil** is a heavy petroleum product used in power generation, marine engines, and industrial heating. It has high energy content and is a by-product of refining.
- * **Gaseous Biofuels** include biogas, produced via anaerobic digestion of organic waste.
- * **Gasoline** is a refined petroleum product used in internal combustion engines, valued for its high energy content and efficiency.
- * **Geothermal Energy** harnesses heat from beneath the Earth's surface for electricity generation and direct heating.
- * **Heat** is produced directly (e.g., geothermal) or as a by-product of fuel combustion. It is crucial for heating, industrial processes, and energy systems.
- * **Heavy Oils** are high-density petroleum products such as fuel oil that require specialized handling. In freight, they are transported under “dirty freight” conditions, referring to tankers carrying unrefined or residual oil products.

- * **Hydro Energy** converts the kinetic energy of flowing water into electricity using turbines, making it one of the most reliable renewable sources.
- * **Kerosenes** are refined petroleum products used in aviation (jet fuel), heating, and lighting. They are middle distillates valued for stability and clean combustion.
- * **Light Oils** are low-density refined petroleum products, such as gasoline, naphtha, and kerosene, that are easier to handle and transport. In freight, they fall under “clean freight” conditions, requiring tanks free from heavy oil residues.
- * **Liquefied Petroleum Gas (LPG)** refers to flammable hydrocarbon gases such as propane and butane, used in heating, cooking, transport, and industry.
- * **Liquid Biofuels** include ethanol, produced from crops like corn, and biodiesel, derived from vegetable oils or animal fats. Renewable diesel, another liquid biofuel, is a sustainable alternative that closely resembles petroleum diesel in its chemical composition.
- * **Naphtha** is a flammable liquid hydrocarbon used primarily as a petrochemical feedstock and industrial solvent. Intratec considers it a key oil product.
- * **Natural Gas** is a methane-rich fossil fuel used in heating, electricity generation, and petrochemicals manufacturing. It is processed to remove impurities and can be liquefied (LNG) for transport.
- * **Natural Gas Liquids (NGL)** are a mixture of hydrocarbons such as ethane, propane, butane, and pentanes recovered during crude oil or natural gas production.
- * **Nuclear** energy is generated through nuclear fission, where uranium atoms split to release heat, producing steam to drive electricity-generating turbines. Nuclear fuels include uranium, thorium, and plutonium.
- * **Primary Energy Sources** are raw energy materials extracted from nature, such as crude oil, coal, and natural gas, or harnessed from renewable flows like solar and wind.
- * **Oil** corresponds to petroleum and all derivatives, such as refined fuels obtained through the processing of crude oil in refineries. Intratec considers crude oil and all oil products as oil.
- * **Oil Products** are refined fuels and derivatives from crude oil, primarily used for energy, transportation, and industry. Intratec categorizes diesel, gasoline, fuel oil, naphtha, and kerosenes as oil products.

- * **Other Oil Products** include lubricants, bitumen (asphalt), paraffin waxes, petroleum coke, and petrochemical feedstocks.
- * **Other Feedstocks** encompass refinery feedstocks (unfinished oils), synthetic crude oils (e.g., from tar sands or coal liquefaction), and blending components for fuel enhancement.
- * **Renewables** are energy sources that naturally replenish, including solar, wind, hydro, geothermal, and biomass. They generate electricity with lower environmental impact than fossil fuels and contribute to sustainability.
- * **Secondary Energy Sources** result from processing primary energy sources into more usable forms, such as refined fuels and electricity.
- * **Solar** energy is the Sun's radiant energy, harnessed through photovoltaic (PV) cells to generate electricity or solar thermal systems for heating and industrial applications.
- * **Solid Biofuels** include wood pellets and briquettes used as substitutes for coal in heating and power generation.
- * **Wind** energy converts wind's kinetic energy into electricity using turbines, with blades capturing wind currents to drive generators.

Energy Commodities Flows

- * **Production** refers to the generation of energy from various sources, including fossil fuels extracted through drilling or mining, nuclear power, and renewable sources such as hydropower, wind, and solar energy. Bioenergy, derived from waste materials and biomass, also plays a significant role in domestic energy production across many countries.
- * **Demand** is the total energy required in a country, calculated as domestic production plus imports, minus exports. It reflects the energy needed to meet industrial, commercial, and residential consumption, including both primary energy sources and those converted into fuels or electricity.
- * **Consumption** refers to the direct use of energy by individuals, businesses, and industries for heating, cooling, lighting, transportation, and manufacturing. It also includes non-energy uses (e.g., fossil fuels in chemical production). Energy losses occur during conversion, making final consumption different from total demand.
- * **Imports, Exports, and Net Trade.** Track energy flows across borders. Imports bring energy in, exports send energy out, and net trade shows whether a country is a net importer or exporter.
- * **Trade Partners** are the countries involved in energy imports and exports, shaping market dependencies and geopolitical considerations.
- * **Stock Change** refers to variations in energy inventories over a specific period, reflecting increases (stock builds) or decreases (stock draws), which impact supply stability and pricing.
- * **Domestic Supply of Oil Products** represents the total availability of refined petroleum products within a country. It indicates how much oil products are available for domestic consumption.
- * **Energy Balance** is a comprehensive accounting framework that tracks energy flows within a country, from production and imports to transformation, consumption, and exports.
- * **Electricity Generation** is the production of electricity from various sources, including fossil fuels (coal, natural gas, oil), renewables (hydro, wind, solar, geothermal, biomass), and nuclear power.
- * **Energy Self-Sufficiency** measures the extent to which a country can meet its energy needs with domestic production, reducing reliance on imports.

A.2 Methodology

Intratec provides reliable, data-driven insights by leveraging official trade statistics and advanced computational models. As a leading provider of commodity strategic data, Intratec empowers customers with accurate information for decision-making.

Reports are released monthly, offering timely updates on energy prices, forecasts, and market trends. This approach ensures assessments are available early each month while maintaining accuracy and reliability.

* Data Sources and Processing

Intratec relies exclusively on public sources such as government statistics, market exchanges, and multilateral organizations, ensuring high data reliability. Data processing occurs through structured pipelines developed by a team of market experts, computer scientists, and data analysts. Automated systems gather data from open sources, complemented by manual checks to minimize errors and biases.

* Data Analysis and Quality Assurance

Collected data undergo formatting, standardization, and normalization to account for variations in location and quality. Exchange rates and adjustments enhance comparability. Short-term forecasts use mathematical models and economic indicators. Rigorous reviews identify inconsistencies, refining calculation models and enhancing reliability.

* Quality Assurance and Continuous Improvement

All data undergo rigorous reviews to identify inconsistencies or anomalies. Cross-market comparisons and statistical analyses are used to refine calculation models and enhance reliability. Assessments are regularly reviewed to ensure alignment with market practices, which may result in new assessment opportunities, assessment retirements, or changes in specifications based on trading conventions and global market conditions.

Complementary Documents

For an in-depth understanding of the methodology developed by Intratec for the Intratec Energy Prices & Markets report, readers are encouraged to explore the General Methodology Guide, available at: <https://intrat.ec/m?f=/iep-methodology-general>

Appendix B

Currency and Conversion Factors

Table B.1 Currency Conversion from United States Dollar (USD)

Currency	Apr 25	Mar 25	Feb 25	Apr 24	2024	2023	2022	2021
Euro (EUR)	0.957	0.959	0.960	0.933	0.924	0.924	0.951	0.846
Chinese Yuan (CNY)	7.21	7.21	7.21	7.24	7.19	7.08	6.71	6.45
Japanese Yen (JPY)	155	156	156	154	151	140	131	110
Pound Sterling (GBP)	0.798	0.798	0.798	0.799	0.783	0.804	0.809	0.727
Singapore Dollar (SGD)	1.35	1.35	1.35	1.36	1.34	1.34	1.38	1.34

* For more currency rates, visit: <https://www.intrat.ec/currency-exchange>

Table B.2 Unit Conversion

Name	Symbol	Relation to SI	Name	Symbol	Relation to SI
Volume			Energy		
Cubic meter (SI unit)	m ³		Joule (SI unit)	J	= 1 N.m
Gallon	gal	= 3.785 x 10 ⁻³ m ³	British thermal unit	Btu	= 1,055 J
Barrel	bbl (oil)	= 0.1589 m ³	Kilowatt-hour	kWh	= 3.6 x 10 ⁶ J
Mass			Tonne of oil equivalent	toe	= 11,630 kWh
Kilogram (SI unit)	kg				
Metric ton	mt	= 10 ³ kg			

* For more unit conversions, visit: <https://www.intrat.ec/unit-conversion>

Table B.3 Typical Densities and Net Calorific Value (NCV)

Commodity	Density (kg/m ³)	NCV (GJ/mt)	Commodity	Density (kg/m ³)	NCV (GJ/mt)
Crude Oil	853	45	Diesel	844	45
Natural Gas Liquids	522	50	Fuel Oil	930	40.7
LPG	522	46.2	Coal, anthracite	1,500	30
Naphtha	691	45.3	Ethanol	789	37.1
Gasoline, regular	741	44.8	Biodiesel, B99	880	37.1
Kerosenes	803	44.6	Renewable Diesel	800	43

* Values may vary according to the assessment. Typical values are shown; specific values can be found, in "General Assessments Guide" at: <https://cdn.intratec.us/docs/methodologies/iep-assessments-sg.pdf>

Appendix C

Alternative Data Delivery Methods

Intratec Energy Prices & Markets data can be delivered in various formats to seamlessly integrate with subscribers' systems. In addition to PDF reports, the data presented in this report can also be accessed through Microsoft Excel, Microsoft Power BI, or via integration with users' workflows through a Web API. These alternative delivery methods are available as add-ons exclusively for Advanced Plan subscribers.

* Microsoft Excel

Intratec offers an Excel Add-In that allows subscribers to download updated datasets directly into Excel with a single click. This tool provides up to 1-year monthly history, enabling offline access and streamlined integration into existing workflows. It ensures flexibility for analysis and reporting, making it ideal for professionals in industries such as energy, chemicals, and manufacturing.

For more details, visit: <https://www.intratec.us/delivery-methods/excel>.

* Microsoft Power BI

Subscribers can integrate Intratec data directly into their Power BI dashboards, accessing up-to-date industrial economics data without additional setup. This delivery method supports real-time visualization of up to 10-year monthly price history alongside other business data, streamlining decision-making processes with visually rich and actionable insights.

For more details, visit: <https://www.intratec.us/delivery-methods/power-bi>.

* Web API

The Web API enables programmatic access to Intratec's proprietary datasets in standardized formats (JSON, CSV). Subscribers can retrieve historical, current, and forecast data (up to 10-year monthly history) while customizing parameters such as time span, frequency, and currency. This method is ideal for organizations seeking automated updates or integrating data into business intelligence tools, dashboards, or enterprise systems.

For more details, visit: <https://www.intratec.us/delivery-methods/api>.

Appendix D

Price Models Accuracy

Throughout this report, some prices are marked with (P) to indicate they are preliminary. These preliminary prices are derived from Intratec's proprietary price models, which were developed to address delays in the publication of official statistics. Such statistics are typically released with lags of 1 to 3 months. In cases where insufficient or no data is available, these models provide the best price estimates for periods up to the current month, ensuring timely and reliable information for decision-making.

This appendix evaluates the performance and accuracy of Intratec's price models, emphasizing their transparency and reliability. To assess model quality, Intratec has developed a proprietary metric called the Model Performance Score (MPS), which consolidates key evaluation metrics into a single indicator of reliability. Before delving into how the MPS is calculated, it is important to understand the foundational metrics used in model evaluation:

- * **Mean Absolute Percentage Error (MAPE):** Expressed as a percentage, this metric measures the deviation between preliminary and consolidated prices. It contextualizes deviations in relative terms, enabling meaningful comparisons across time periods and datasets.
- * **Mean Absolute Percentage Accuracy (MAPA):** Expressed as a percentage and calculated as $100\% - \text{MAPE}$, this metric measures the accuracy of preliminary prices compared to the consolidated ones.
- * **Directional Accuracy (DA):** This metric evaluates the model's ability to correctly predict price trends – whether prices will rise or fall – providing a practical assessment of its reliability for decision-making.

In some cases, there may be insufficient historical assessment data to estimate all parameters. When this occurs, Intratec indicates the data gap with a “not available” (NA) label.

D.1 Evaluation Metrics Across Timeframes

To ensure a robust evaluation of model performance, Intratec calculates average MAPA and DA values over three distinct timeframes: the last 3 months, the last 6 months, and the last 12 months where consolidated prices are available. This approach allows for a direct comparison between preliminary price estimates and actual consolidated prices over different periods.

Table D.1 presents the average values for MAPA and DA across all assessments for each timeframe. These metrics provide insights into how well Intratec's models perform in predicting energy prices.

Table D.1 Model Accuracy - MAPA and DA (Last 3, 6, and 12 Months)

Assessment	Last 3 Months		Last 6 Months		Last 12 Months	
	MAPA	DA	MAPA	DA	MAPA	DA
Natural Gas (liquified), import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Gasoline (premium), retail	XX%	XX%	XX%	XX%	XX%	XX%
Gasoline (mid-grade), retail	XX%	XX%	XX%	XX%	XX%	XX%
Gasoline (regular), retail	XX%	XX%	XX%	XX%	XX%	XX%
LPG (propane, butane and isobutane), household	XX%	XX%	XX%	XX%	XX%	XX%

D.2 Model Performance Score (MPS)

Building on these metrics, Intratec developed the Accuracy Index (AI) to provide a single, user-friendly indicator of a model's reliability for each timeframe analyzed. The AI is calculated as a weighted combination of MAPA and DA using the following formula:

$$Accuracy\ Index\ (AI) = \frac{(MAPA \times (24 - num_{obs}) + (DA \times num_{obs}))}{24}$$

In this formula:

- * 24 represents the maximum total number of months used for evaluation.
- * num_obs refers to the actual number of data points available (e.g., last 3 months or last 12 months).

The AI ranges between 0 and 100%, with higher values indicating better model accuracy for the analyzed timeframe.

To provide an overall evaluation of model performance across all timeframes, Intratec combines the Accuracy Indexes from the three timeframes into a proprietary metric called the Model Performance Score (MPS). The MPS assigns greater weight to more recent preliminary prices using a ratio of 5:3:2 for the last 3 months, last 6 months, and last 12 months respectively. The formula for MPS is:

$$MPS = \frac{(0.5 \times \text{Last 3 Months AI} + 0.3 \times \text{Last 6 Months AI} + 0.2 \times \text{Last 12 Months AI})}{20}$$

The MPS ranges from zero to five circles, where:

- * Five full circles (●●●●●) indicate an excellent model.
- * Three or fewer circles (e.g., ●●●○○) suggest areas for improvement in model performance.

Table D.2 presents the AI values for each timeframe (last 3 months, last 6 months, and last 12 months) along with the Global MPS for each assessment.

Table D.2 Model Accuracy AI and MPS

Assessment	12 Months AI	6 Months AI	3 Months AI	Global MPS
Natural Gas (liquified), import, cif	XX%	XX%	XX%	XXX
Gasoline (premium), retail	XX%	XX%	XX%	XXX
Gasoline (mid-grade), retail	XX%	XX%	XX%	XXX
Gasoline (regular), retail	XX%	XX%	XX%	XXX
LPG (propane, butane and isobutane), household	XX%	XX%	XX%	XXX

Appendix E

Price Forecasts Accuracy

Price forecasts are indispensable tools for stakeholders in the energy sector, enabling informed decision-making in trading, risk management, and policy development. Accurate forecasts provide critical insights into future market trends, supporting long-term strategies and mitigating risks associated with price volatility.

In this chapter, the accuracy of the price forecasts presented in “*Chapter 4. Price Forecasts*” is evaluated. This evaluation aims to provide transparency and convey the reliability of Intratec's data.

This chapter emphasizes the importance of M1 (forward-month) forecasts, as they are the most relevant for short-term planning and decision-making. The forward-month forecast is the most critical horizon, providing immediate insights for navigating near-term market dynamics. To evaluate M1 accuracy, Intratec employs robust statistical metrics, including Mean Absolute Percentage Accuracy (MAPA) and Directional Accuracy (DA). These metrics assess both the magnitude of forecast errors and the consistency of directional predictions. For M1 forecasts, these metrics are consolidated into a single indicator – the Model Performance Score (MPS) – to provide an intuitive and reliable measure of forecast accuracy.

Additionally, a high-level evaluation of M6 (six-month ahead) forecast performance is presented through a comparison of Intratec's model MAPA values against those of a baseline Constant Price Model (Naïve MAPA). This comparison highlights the added value of Intratec's forecasting methodology.

In some cases, there may be insufficient historical assessment data to estimate all parameters. When this occurs, Intratec indicates the data gap with a “not available” (NA) label.

E.1 Forward-Month Forecast Accuracy

As mentioned earlier, the forward-month (M1) forecast is the most critical forecast horizon, offering actionable insights for short-term decision-making. To evaluate M1 accuracy, Intratec calculates average MAPA and DA values over three distinct timeframes: the last 3 months, last 6

months, and last 12 months where consolidated prices are available. This approach ensures a robust evaluation by comparing forecasted prices to actual consolidated prices across different periods.

Table E.1 presents MAPA and DA values for M1 forecasts across all assessments, offering insights into how well Intratec's models perform in predicting forward-month prices.

Table E.1 Forward-Month Model Accuracy - MAPA and DA (Last 3, 6, and 12 Months)

Assessment	Last 3 Months		Last 6 Months		Last 12 Months	
	MAPA	DA	MAPA	DA	MAPA	DA
Naphtha (heavy), export, fob	XX%	XX%	XX%	XX%	XX%	XX%
Natural Gas (liquified), import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Fuel Oil (intermediate), export, fob	XX%	XX%	XX%	XX%	XX%	XX%
Gasoline (premium), export, fob	XX%	XX%	XX%	XX%	XX%	XX%
Coal (thermal), import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Crude Oil, import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Diesel (low-sulfur), export, fob	XX%	XX%	XX%	XX%	XX%	XX%
Ethanol (anhydrous), import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Kerosene (jet fuel), export, fob	XX%	XX%	XX%	XX%	XX%	XX%
Propane, import, cif	XX%	XX%	XX%	XX%	XX%	XX%
Electricity, household	XX%	XX%	XX%	XX%	XX%	XX%
Biodiesel (UCOME biodiesel), spot, fob	XX%	XX%	XX%	XX%	XX%	XX%

NA = not available

These metrics are consolidated into a single score for easier interpretation using the Accuracy Index (AI) formula:

$$Accuracy\ Index\ (AI) = \frac{(MAPA \times (24 - num_{obs}) + (DA \times num_{obs}))}{24}$$

The AI values for each timeframe are then combined into a weighted score called the Model Performance Score (MPS), which assigns greater weight to more recent forecasts using a ratio of 5:3:2 for the last 3 months, last 6 months, and last 12 months respectively:

$$MPS = \frac{(0.5 \times Last\ 3\ Months\ AI + 0.3 \times Last\ 6\ Months\ AI + 0.2 \times Last\ 12\ Months\ AI)}{20}$$

Table E.2 summarizes AI values for each timeframe along with the Global MPS.

Table E.2 Forward-Month Model Accuracy AI and MPS

Assessment	12 Months AI	6 Months AI	3 Months AI	Global MPS
Naphtha (heavy), export, fob	XX%	XX%	XX%	XXX
Natural Gas (liquified), import, cif	XX%	XX%	XX%	XXX
Fuel Oil (intermediate), export, fob	XX%	XX%	XX%	XXX
Gasoline (premium), export, fob	XX%	XX%	XX%	XXX
Coal (thermal), import, cif	XX%	XX%	XX%	XXX
Crude Oil, import, cif	XX%	XX%	XX%	XXX
Diesel (low-sulfur), export, fob	XX%	XX%	XX%	XXX
Ethanol (anhydrous), import, cif	XX%	XX%	XX%	XXX
Kerosene (jet fuel), export, fob	XX%	XX%	XX%	XXX
Propane, import, cif	XX%	XX%	XX%	XXX
Electricity, household	XX%	XX%	XX%	XXX
Biodiesel (UCOME biodiesel), spot, fob	XX%	XX%	XX%	XXX

NA = not available

E.2 Six-Month Ahead Forecast Evaluation

Although less critical than M1 forecasts for short-term decision-making purposes, six-month ahead (M6) forecasts provide valuable insights into medium-term trends. To assess their added value over simple assumptions, Intratec compares MAPA values for its forecasting models against a baseline Constant Price Model (Naïve MAPA). The ratio between these MAPAs is the relative performance:

$$\text{Relative Performance Ratio} = \frac{\text{Intratec Model MAPA}}{\text{Naïve Model MAPA}}$$

Values above 100% indicate superior performance by Intratec’s models compared to the Naïve model.

Table E.3 summarizes relative performance ratios for M6 forecasts across all assessments.

Table E.3 Relative Performance of Six-Month Ahead Forecast vs. Constant Price Model

Assessment	Last 3 Months	Last 6 Months	Last 12 Months
Fuel Oil (IFO), export, fob	XX%	XX%	XX%
Gasoline (Premium), export, fob	XX%	XX%	XX%
Electricity, industrial sector,	XX%	XX%	XX%
Crude Oil, import, cif	XX%	XX%	XX%
Diesel (LSD), export, fob	XX%	XX%	XX%
Propane, import, cif	XX%	XX%	XX%
Butane (n-), export, fob	XX%	XX%	XX%
Electricity, household,	XX%	XX%	XX%

NA = not available

Appendix F

Global Prices Comparison

This appendix provides a comparative analysis of energy prices across the 33 countries covered in Intratec Energy Prices & Markets. By examining both individual energy commodity price rankings and an average energy price comparison, this chapter positions Singapore within the global energy landscape. The analysis highlights how energy costs in Singapore compare to those in other countries, offering insights into its relative affordability and competitiveness.

The appendix is divided into two sections:

- * **Ranking of Energy Commodity Prices by Country:** This section ranks Singapore against other countries for key energy commodities, including Natural Gas, Electricity, Gasoline, Diesel, Naphtha, and Fuel Oil.
- * **Energy Average Price Comparison:** This section presents an average energy price comparison across all countries. It highlights the relative position of Singapore in terms of overall energy costs.

F.1 Ranking of Energy Commodity Prices by Country

This section ranks Singapore in relation to the other 32 countries covered by the program for six key energy commodities: Natural Gas, Electricity, Gasoline, Diesel, Naphtha, and Fuel Oil. These rankings help identify whether Singapore is among the most affordable or expensive markets for each commodity.

The following figures present the rankings of energy commodity prices across the 33 countries covered by the program. Each chart positions Singapore relative to other countries for a specific commodity, highlighting its rank within the global context.

Natural Gas

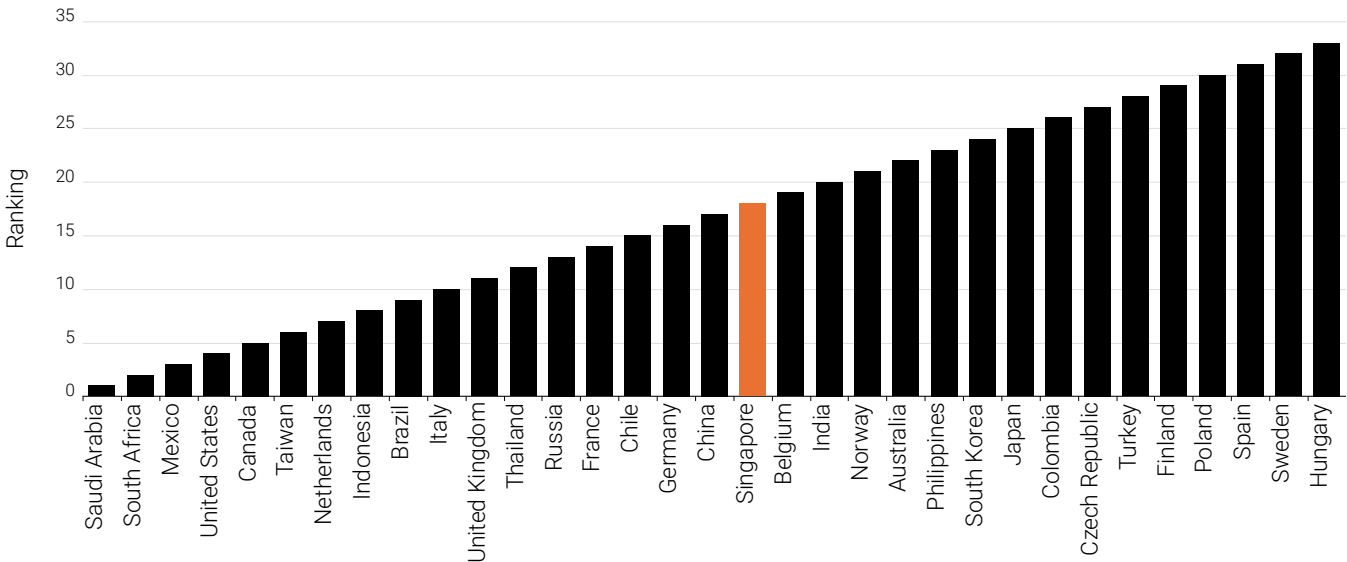


Figure F.1 Natural Gas Price Rankings by Country (May 23)

Electricity

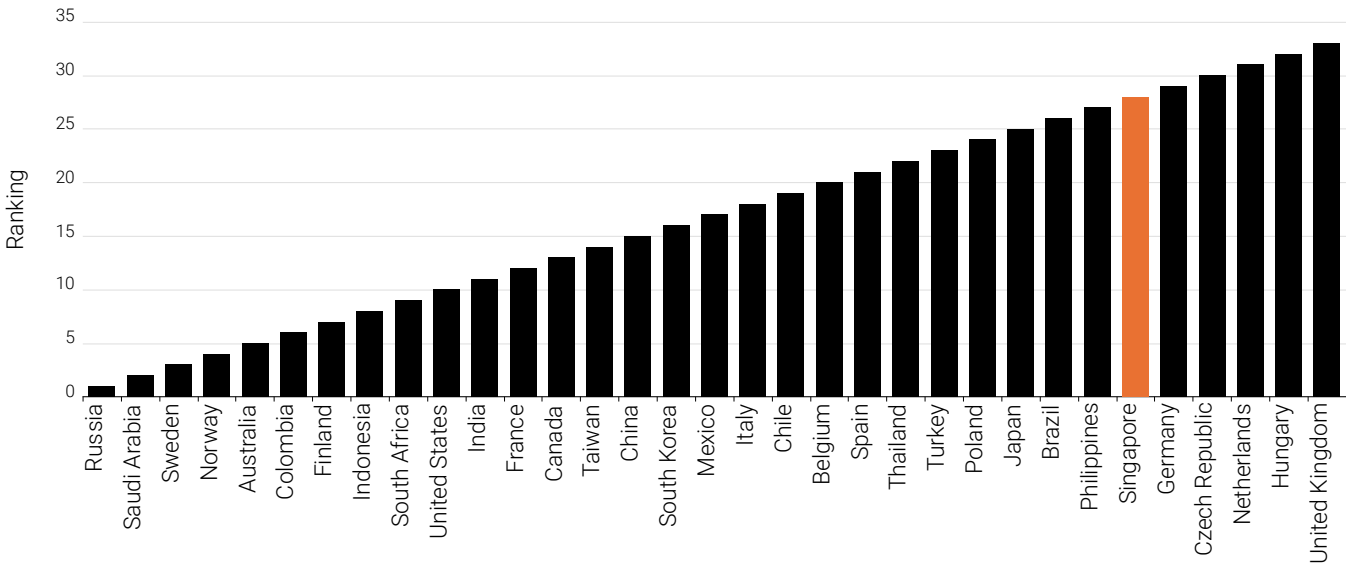


Figure F.2 Electricity Price Rankings by Country (May 23)

Gasoline

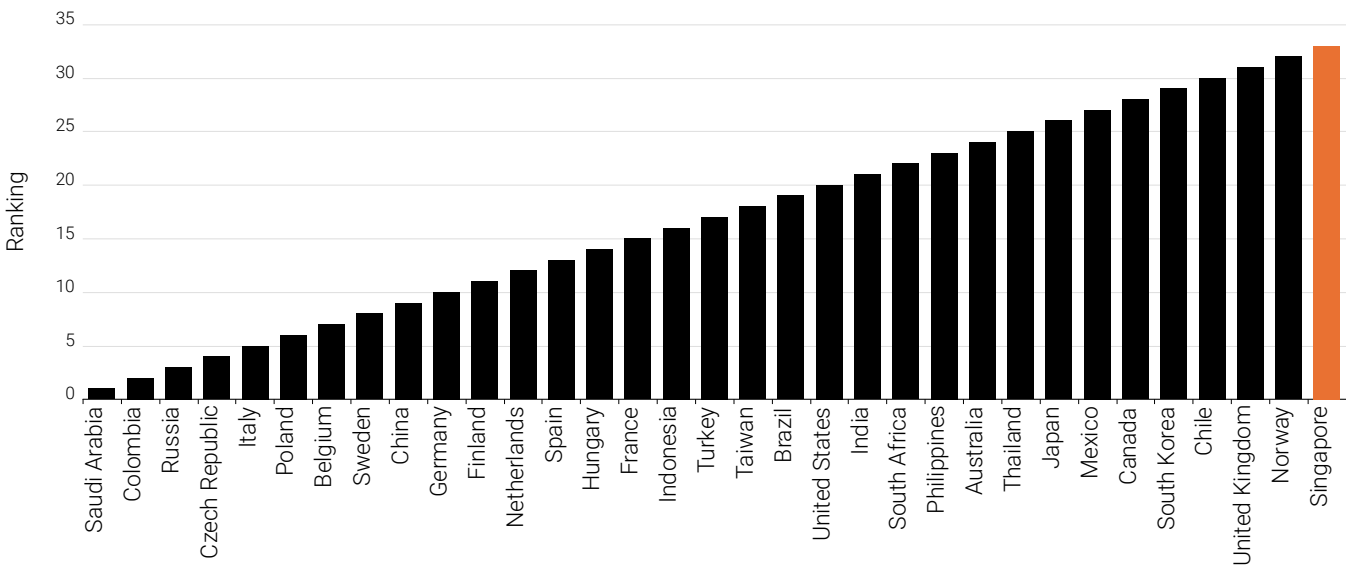


Figure F.3 Gasoline Price Rankings by Country (May 23)

Diesel

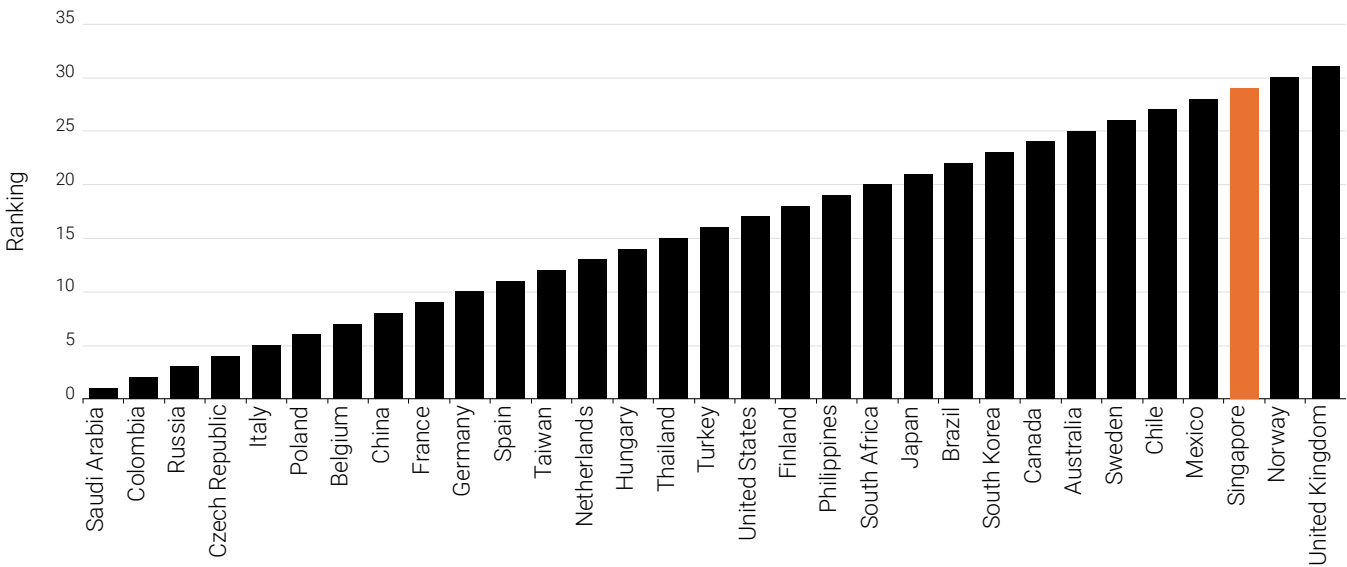


Figure F.4 Diesel Price Rankings by Country (May 23)

Fuel Oil

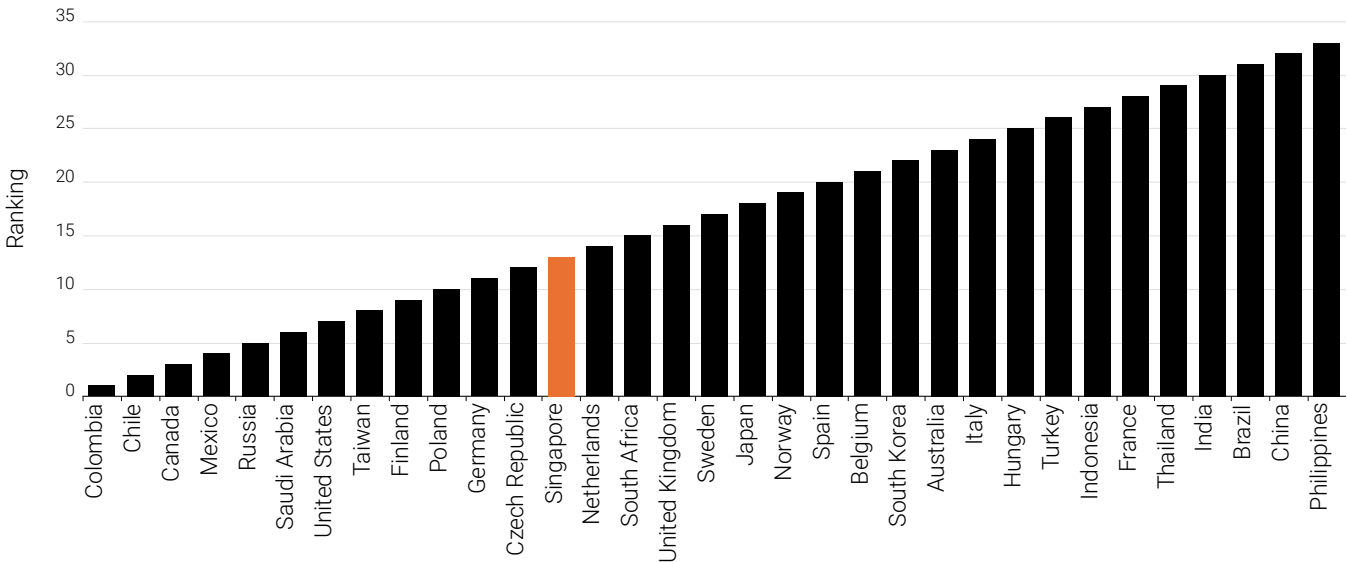


Figure F.5 Fuel Oil Price Rankings by Country (May 23)

Naphtha

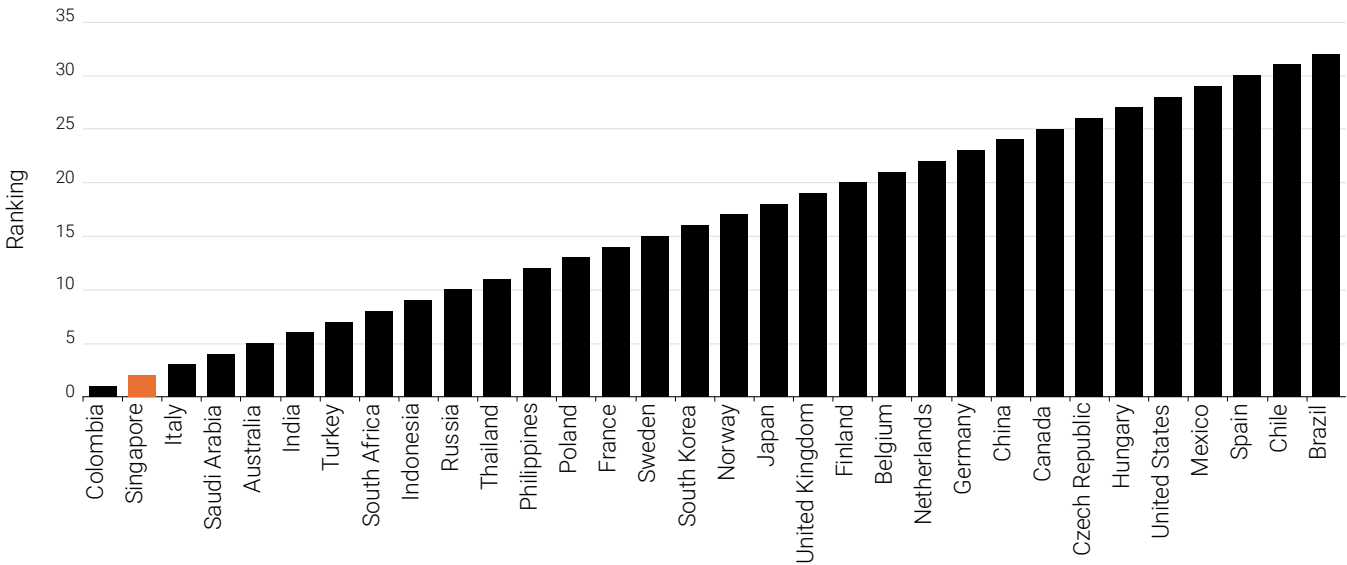


Figure F.6 Naphtha Price Rankings by Country (May 23)

F.2 Energy Average Price Comparison



Figure F.7 Average Energy Price Comparison Worldwide

Figure F.7 compares overall average energy prices across 33 countries covered in the Intratec Energy Prices & Markets reports. The average price for each country is calculated by weighting individual energy source prices (e.g., Natural Gas, Electricity, Gasoline) based on their consumption levels within that country. The chart highlights the position of Singapore relative to other nations, indicating whether its overall energy costs are comparatively high or low.

Appendix G

Frequently Asked Questions

This appendix addresses common questions related to the methodologies, data, and features presented in the Intratec Energy Prices & Markets report. It is designed to provide clarity on key concepts, enhance transparency, and support users in understanding the report's structure and the reliability of the information provided.

The topics covered include explanations of pricing methodologies and other relevant aspects of energy price analysis. By addressing these frequently asked questions, this appendix aims to reinforce confidence in the data and methodologies used while offering practical insights for users navigating the report.

Q: What are the limitations of using unit values for price analysis?

Unit values are calculated by dividing the total amount of money by the total quantity of a given commodity traded by a specific country each month, as reported by customs authorities. This calculation is performed without any statistical treatment. Compared to the prices presented in the Intratec Energy Prices & Market report, unit values have several core limitations in energy market price analyses:

Inherent Weaknesses Compared to Intratec's Trade-Based Prices

Trade-based prices in the Intratec Energy Prices & Market report are derived from international trade information reported by countries. These prices are selected based on a criterion of data homogeneity, ensuring that all data refer to the same assessment (i.e., the same commodity with similar specifications and trade conditions). Once data homogeneity is confirmed, trade-based prices are calculated. For instance, transaction prices are treated to remove inconsistent values by filtering out data that fall outside a minimum traded quantity and applying a univariate outlier detection algorithm to remove inaccurate data.

In contrast, unit values lack the robustness of trade-based methodologies that filter inconsistent data and adjust for quality variations. Specifically, unit values present critical flaws:

- * **Aggregation Bias:** Unit values group heterogeneous products under broad classifications, blending distinct commodities into distorted averages.
- * **Failure to Detect Outliers:** Unlike Intratec's trade-based indices, unit values do not systematically exclude implausible transactions. Intratec's methodology employs outlier detection algorithms to remove abnormal prices.

Lack of Market Specificity

On the other hand, Intratec's compiled prices provide granular market segmentation that unit values cannot replicate. Compiled prices are derived from price data from public sources, offering detailed insights into specific market conditions. These prices typically provide:

- * **Market Destination:** Unit values do not specify market destinations, whereas Intratec's Compiled Prices differentiate between, for instance, wholesale, retail, and industrial prices.
- * **Price Type Differentiation:** Unit values aggregate long-term contracts and spot prices, whereas Intratec's Compiled Prices distinguish between these price types.
- * **Commodity Specifications:** Unit values average across quality grades, whereas Intratec's Compiled Prices isolate specific commodity specifications.

Q: Why Are There Missing Chapters in My Report?

To meet a diverse range of customer needs, the Intratec Energy Prices & Markets report is available through three subscription plans: Starter, Pro, and Advanced. Each plan offers a different level of depth and coverage, with the Advanced plan being the most comprehensive. Depending on the subscription plan selected, certain chapters may not be included in the report.

The content and features available in each plan can be viewed at the following link:

► <https://www.intratec.us/products/energy-price-references/compare-plans>

Subscriptions can be upgraded at any time while active, allowing access to additional features and chapters not available in the current plan. For more information on how to upgrade a subscription, please visit:

► <https://help.intratec.us/en-us/article/can-i-upgrade-my-plan-1me6ut8/>

Q: Are Intratec Prices Sufficient for Structuring Contracts?

While some customers use Intratec pricing data as an index for structuring contracts between suppliers, processors, and end-customers, Intratec discourages using its prices as the sole reference unless combined with other price indexes (e.g., those compiled by third-party sources).

This recommendation is not due to concerns about the accuracy of Intratec's data, but rather to ensure contracts benefit from a broader industry perspective. Combining multiple indexes leverages diverse datasets and polling bases, enhancing robustness through a broader range of market insights. Intratec believes its data should be used alongside other benchmarks, fostering balanced and informed decision-making in contractual agreements.

Q: What Do Preliminary Prices Mean?

Throughout this report, some prices are marked with (P) to indicate they are preliminary. These preliminary prices are best-estimate values derived from Intratec's proprietary price models. Intratec's price assessments primarily rely on official data gathered from public sources, including national governments' statistics bureaus, foreign trade agencies, and international organizations.

However, these sources often delay data release by 1 to 3 months. To address these delays and ensure timely and reliable information for decision-making, Intratec developed these models to fill the gaps until official figures become available.

To maintain a high level of transparency and reliability, Intratec also presents the accuracy of its models for calculating preliminary prices in the *"Appendix D. Price Models Accuracy"* section of the Intratec Energy Prices & Markets report.

Q: What Are the "Right" Prices Considered to Measure Accuracy of Preliminary Price Models?

Initially, it is important to recognize that there is no single "right" price, as the actual price paid by an individual customer depends on factors such as order size, trade terms, geographical location, contract types, and more. In this context, all prices presented by Intratec are constructed using a robust methodology designed to deliver reliable estimates.

Consequently, our preliminary price model accuracies are evaluated by comparing them against consolidated historical data generated using this rigorous methodology for the specific price

assessment under evaluation. This approach ensures that our preliminary prices, while not definitive, offer a dependable basis for decision-making until official data becomes available.

For more detailed information on the methodology used by Intratec to derive its published prices, the reader may visit:

► <https://cdn.intratec.us/docs/methodologies/iep-methodology-general.pdf>

Appendix H

General Terms and Conditions

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Appendix I

Report Use Restrictions

Internal Use

Readers may, in the course of their business, generate insights or analyses using data from this report for internal use only, provided that:

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