APEC Oil and Gas Security Exercise in Indonesia

6th APEC Oil and Gas Security Exercise
Bali, Indonesia | 4-6 February 2025

APEC Energy Working Group

October 2025

Asia-Pacific
Economic Cooperation

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Disclaimer

The Balikpapan refinery and Jambaran Tiung Biru (JTB) gas processing facility and the surrounding gas pipeline and facilities incidents described in the scenarios are purely hypothetical and used solely for the Exercise.

An actual fire incident last occurred in Balikpapan in May 2024, but it was successfully extinguished and posed no direct threat to the surrounding community (ANTARA,2024).

The last earthquake (Tuban earthquake) that affected gas production in JTB occurred in March 2024. Immediate remedial steps were taken to restore operating conditions in the surrounding gas processing facility (Beritajatim, 2024).

Preface

Energy security in APEC (Asia-Pacific Economic Cooperation) remains a critical concern due to the region's diverse energy needs, supply vulnerabilities, and geopolitical complexities. Many APEC economies—particularly in Northeast Asia such as China; Japan; and Korea and Southeast Asia (the Philippines and Singapore) —are heavily dependent on imported oil and natural gas. At the same time, the region includes energy resources-rich economies like Australia; Russia and the United States, creating a wide disparity in energy security levels.

Meanwhile, the global energy transition is underway in response to ambitious climate goals, growing renewable energy targets, and the push for higher energy efficiency. In this context, APEC continues to promote regional cooperation on energy security through several Energy Working Group (EWG) platforms, such as the Energy Security Initiatives. These efforts aim to help member economies diversify energy sources, harness domestic resources and build strategic reserves—ultimately ensuring access to stable, affordable, and sustainable energy.

At the APEC Energy Ministerial Meeting held in St. Petersburg, Russia in June 2012—and reaffirmed during the 11th APEC Energy Ministerial Meeting in Beijing, China in September 2014—APEC Energy Ministers encouraged the EWG and the Asia Pacific Energy Research Centre (APERC) to collaborate with the International Energy Agency (IEA), the Association of Southeast Asian Nations (ASEAN) and other international and regional organizations. The goal of this collaboration is to enhance regional response measures to oil and gas supply emergencies through workshops, information sharing, and simulation exercises.

In line with this directive, the Oil and Gas Security Exercise (OGSE) has been conducted across APEC economies with the following key objectives*:*

- to provide vital information on global developments and issues on oil and gas security;
- to share experiences and insights on the challenges confronting the APEC economies relating to oil and gas security and supply emergency threats; and
- to establish the possible application of the Oil and Gas Security Exercise Model Procedure as a guiding framework to address different emergency supply scenarios.

Indonesia hosted the APEC OGSE 2025, which took place in Kuta, Bali, from 4 to 6 February 2025. This report presents the Indonesia Oil and Gas Security Exercises, outlining Indonesia’s responses to two hypothetical emergency scenarios in each exercise, and summarizing the key recommendations offered by participating experts.

The Expert Team and the APERC Secretariat extend their sincere gratitude to all Indonesian oil and gas stakeholders who contributed to the event. In particular, we would like to thank the Directorate of Oil and Gas Program Development, under the Directorate General of Oil and Gas, Ministry of Energy and Mineral Resources, for their exceptional efforts in organizing and supporting this important exercise.

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EXECUTIVE SUMMARY

The 6th APEC OGSE held in Kuta, Bali, on 4-6 February 2025, was a 3-day event, consisting of the Oil Exercise (4 February 2025), the Gas Exercise (5 February 2025), and a half-day site visit to an LNG Terminal on 6 February 2025. The exercise was attended by the oil and gas stakeholders of Indonesia, who are from the regulators, oil and gas utility companies, supporting business companies (oil and gas transportation and port operators), oil and gas off-takers (power plant operators), and fuel retailers, as well as the Indonesian Police Corps (as the coordinator of vital object safeguarding). The list of participants is attached to the report as **ANNEX I**.

A team of experts from international institutions was invited to participate in the exercise for discussion, and evaluation. The experts have sufficient capacity and competency in the area of oil and gas economics and supply chain management. The list of experts together with the researchers from the APERC is attached to this report as **ANNEX II**.

The *Oil Emergency Exercise* aims to identify potential gaps in oil supply disruption management in Indonesia while also raising awareness among oil sector professionals about the importance of proactive measures in addressing unforeseen events.

Indonesia's oil consumption in 2022 is approximately 3,000 thousand barrels per day (MBOPD) and is projected to exceed 4,000 MBOPD in the coming years. However, refinery capacity remained relatively constant, standing at 1,176 MBOPD from 2000 to 2022, with a modest increase to 1,276 MBOPD in 2024. Due to limited refining capacity and significant dependence on imported refined products, Pertamina is implementing the Refinery Development Master Plan to expand refinery capacity from 1,104 MBOPD to 1,898 MBOPD by 2028.

In addition to its reliance on imports, Indonesia faces frequent natural disasters that threaten the operational stability of its oil production, processing, transportation, and distribution systems. Earthquakes, floods, lightning strikes, and fires have repeatedly disrupted oil production and distribution, posing considerable challenges in maintaining a stable fuel supply for the population.

Given these vulnerabilities, it is essential to regularly simulate oil supply disruption scenarios to enhance awareness and preparedness among oil sector stakeholders. A key focus is the Balikpapan area, home to one of Indonesia’s most critical refinery facilities. Balikpapan is poised to become a hub for governmental activities, population growth, and economic development. The refinery's capacity was recently expanded from 260 MBOPD to 360 MBOPD in 2024, necessitating improved transportation and distribution systems, whose readiness remains uncertain.

The *Gas Emergency Exercise* aims to identify potential gaps in Indonesia’s gas supply disruption management and to raise awareness among industry stakeholders about the importance of proactive measures to address unforeseen events using existing infrastructure and resources.

An exemplary model of efficient gas production and utilization is the interconnection of the Jambaran Tiung Biru gas source, the Gresik–Semarang gas pipeline, the Tambak Lorok Gas Power Plant, the Kepodang Gas Field, and Semarang City Gas. This network showcases successful collaboration between the power utility and oil and gas sectors, enabling effective energy transfer from eastern to western Java. It is supported by offshore gas resource facilities and represents a framework that could be replicated across other regions in Indonesia to maximize the fair and efficient use of abundant gas resources in industry, power, and households.

The OGSE Gas Scenario focuses on this Jambaran Tiung Biru network and related facilities in central and eastern Java. This scenario examines the integration of multiple sectors along the gas supply

chain, from upstream to downstream activities. It aims to identify potential gaps in Indonesia’s gas supply disruption management and to raise awareness among industry stakeholders about the importance of proactive measures to address unforeseen events using existing infrastructure and resources.

Additionally, the scenario emphasizes the need to accelerate the development of LNG terminals, gas pipelines, and other infrastructure planned by the government to enhance the reliability and availability of gas supply for consumers. By fostering collaboration among stakeholders and pinpointing risks within the gas supply network, this scenario seeks to strengthen Indonesia's overall energy security.

1. Background and energy situation in Indonesia

1.1 Demographic and economic background

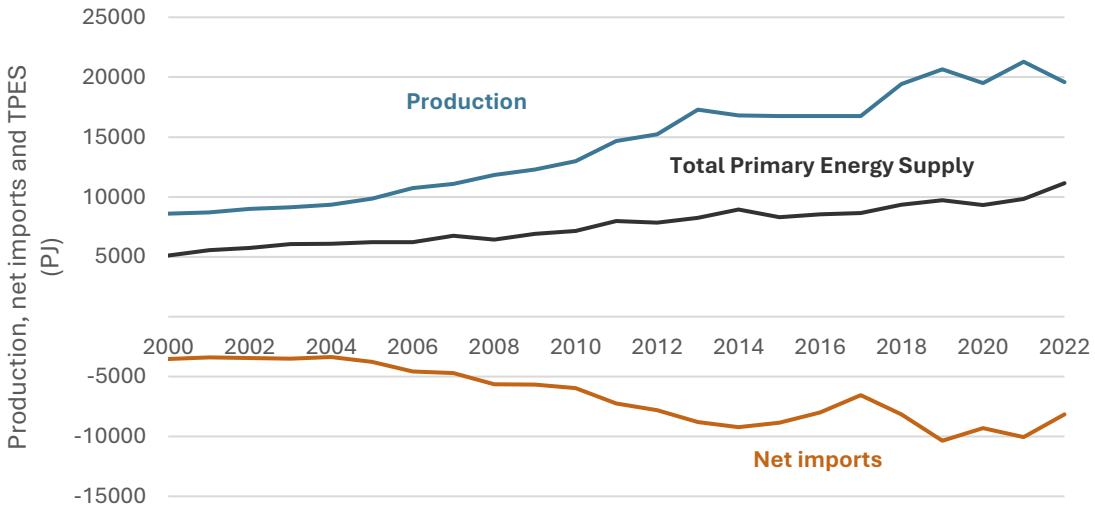
Indonesia is the largest archipelagic economy in the world, comprising a vast group of islands located in Southeast Asia, straddling the equator and stretching between the Indian and Pacific Oceans (*Figure 1*). It is the largest economy in Southeast Asia in terms of land area, population, energy consumption, and gross domestic product (GDP). As of 2023, Indonesia has a total land area of approximately 1,892,410 square kilometers, a population of around 281.6 million people, and a GDP of USD 3.91 trillion based on purchasing power parity (PPP 2021) (World Bank, 2024).

Figure 1• Indonesia in the world map

Source: (Google Maps, 2025)

Indonesia is a net energy exporter with a diverse mix of energy resources, including both fossil fuels and renewable energy. In 2022, the economy's total primary energy supply (TPES) stood at approximately 11,148 petajoules (PJ) *(Figure 2*). The combined oil and gas supply contributed the largest at around 43% (or 4,779 PJ) to the TPES (*Figure 3*).

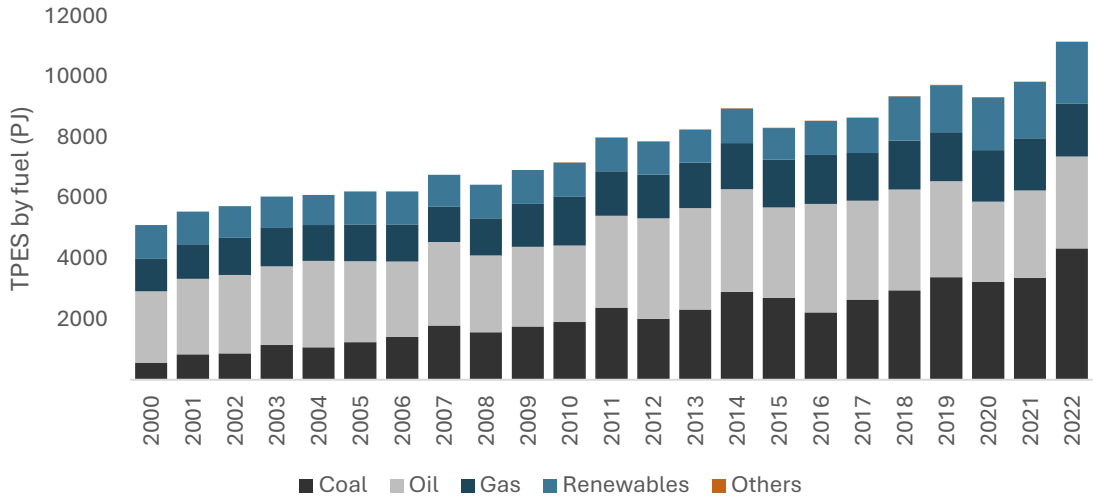
Figure 2 • Energy supply, production and net imports (PJ), 2000-2022



Source: (EGEDA, 2024)

Since 2000, Indonesia's economic growth has consistently ranged between 5% and 6%, except for the downturn during the 2020–2021 COVID-19 pandemic. Correspondingly, the economy's energy consumption has steadily increased. The final energy demand of the combined oil and gas, excluding fuel usage in the power generation sector, reached 3,329 PJ (47%) in 2022. Oil has remained the dominant fuel type, averaging about 47% of the final energy demand between 2000 and 2022.

Figure 3 • TPES by fuel type (PJ), 2000-2022

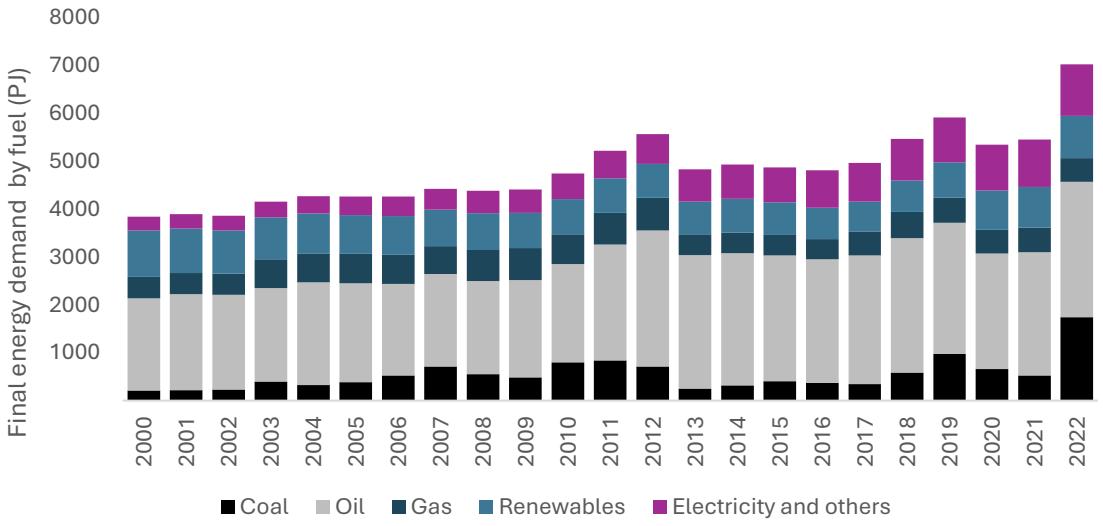


Source: (EGEDA, 2024)

In terms of refined oil products alone, Indonesia is likewise the most significant consumer among the APEC Southeast Asia subregion. In 2022, petroleum products consumption was 2,833 PJ (232.6 MLD), representing 40% of total final energy demand (*Figure 4*).

This imbalance explains why Indonesia, although a major coal, oil, and gas-producing economy in the APEC- Southeast Asia subregion and an overall net exporter, remains a net importer of crude oil and petroleum products. This underscores the critical role of oil and gas supply security in the economy.

Figure 4 • Indonesia final energy demand by fuel (PJ), 2000-2022



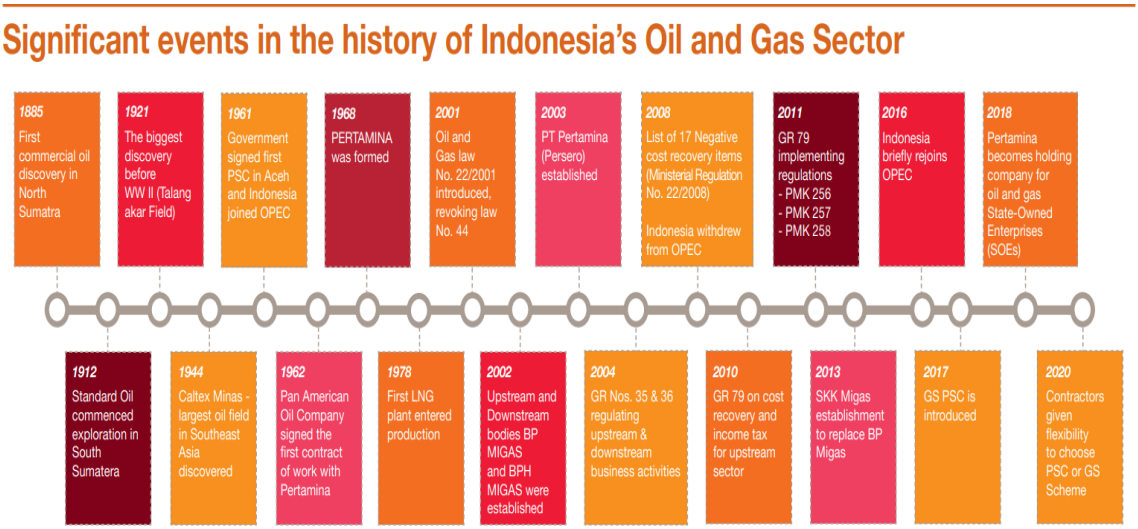
Source: (EGEDA, 2024)

Brief history

Indonesia's oil and gas industry dates back to 1890 during the Dutch colonial era, where there were some discoveries and development of enormous oil reserves, such as the Talang Akar field in 1921 and the Caltex Minas in 1944. Following independence in 1945, the government began acquiring oil reserves, and in 1957, Perusahaan Minyak Negara or PERMINA, the very first oil exploration and production company of Indonesia, was established. Indonesia then joined OPEC in 1961. And in 1968. PERMINA was restructured to become an oil and gas company called Pertamina (*Figure 5*).

Pertamina operated under Law Number 8 of 1971 concerning the National Oil and Gas Company, where Pertamina was allowed to enter into a leveraging contract with foreign oil and gas companies for exploration and production activities. These foreign oil and gas companies or subcontractors would pay back with profit sharing to Pertamina, as well as royalties and taxes to the government.

Figure 5 • Significant events in the oil and gas sector



Source: (PricewaterhouseCoopers, 2024)

Under this legal regime, Indonesia was a net exporter of crude oil and the oil and gas sector contributed the highest to Indonesia's revenue. Indonesia became a prime destination for international oil and gas investment, with an average oil production capacity of above 1 million barrels per day (MMBOPD). Indonesia reached its peak of oil and gas production in 1977 and 1994, with average daily production reaching 1.6 MMBOPD.

However, after the year 2000, Indonesia's crude oil production started to decline due to the natural maturation of producing oil fields, slower reserve replacement, and decreased exploration and technology investment. A new oil and gas regulation, Law 22 of 2001, was introduced, where the previous statement on *Profit Sharing* was changed to *Production Sharing*. This law also changed the contract parties, where private entities and foreign investors were no longer making contracts with Pertamina but instead directly with the Government of Indonesia, represented by the Special Task Force for Upstream Oil and Gas Business Activities (SKK Migas).

Even with the new legal regime, the declining production is inevitable. Although a number of novel proven reserve blocks have been opened up for production sharing tenders, only a few have gained investors due to economic reasons. With significant oil development only in western Indonesia over the last ten years, Indonesia still relies upon the mature oil fields in those areas, where oil production continues to decline. Indonesia's crude oil production has been in gradual decline and has remained below 1 million barrels of oil per day (MMBOPD) since 2007. Meanwhile, domestic demand for crude

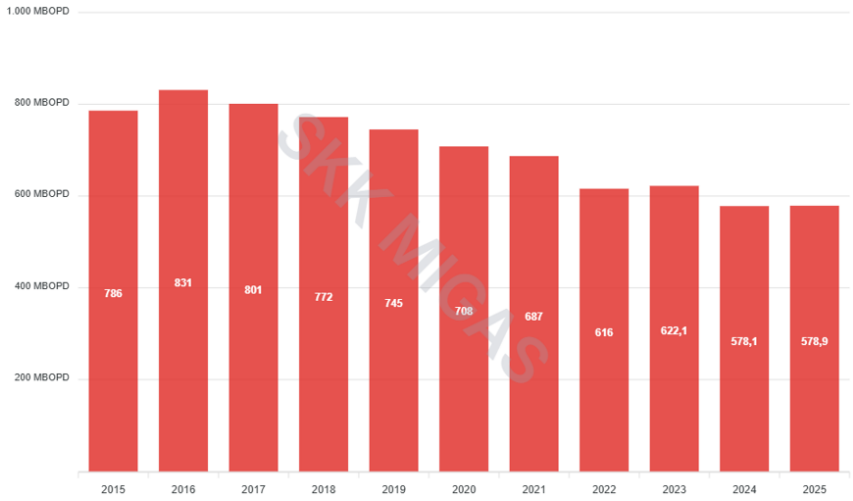
oil has continued to rise, leading Indonesia to become a net crude oil importer in 2004. This shift contributed to its decision to withdraw from OPEC in 2008.

Nevertheless, the government is still very optimistic about the future of oil and gas production in Indonesia. The government has launched an initiative targeting an oil production capacity of 1 MMBOPD and gas production of 12 billion standard cubic feet per day (bscfd) by 2030 (Special Task Force for Oil and Gas, 2023).

1.2 Indonesia Oil Industry

Upstream Oil Industry

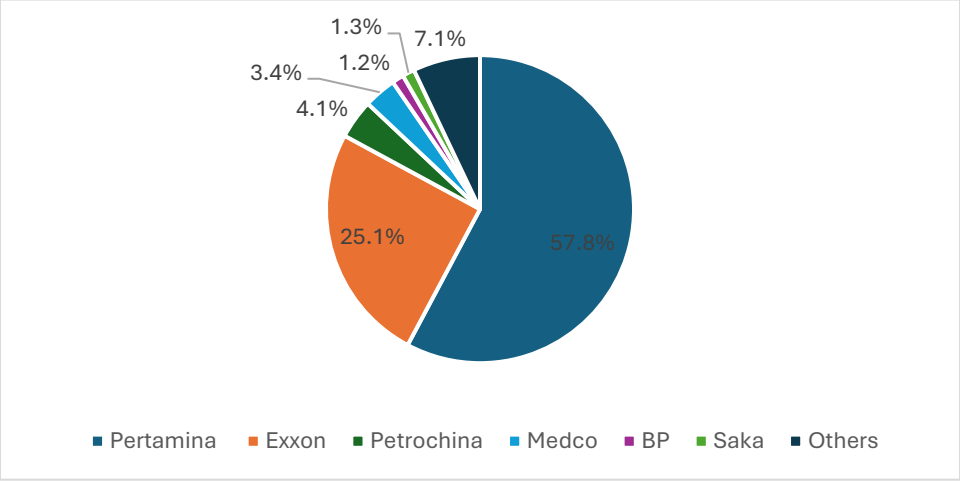
Figure 6 • Average daily crude oil production (MBOPD), 2015-2025



Source: (Special Task Force for Oil and Gas, 2025)

Currently, crude oil production in Indonesia is about 580 MBOPD *(Figure 6*). Pertamina and its subsidiaries, which have just acquired Chevron's assets in Rokan, Riau and assets of Total S.A. in Balikpapan, make the highest contribution to the economy's oil production, followed by Exxon Mobil and PetroChina (*Figure 7*).

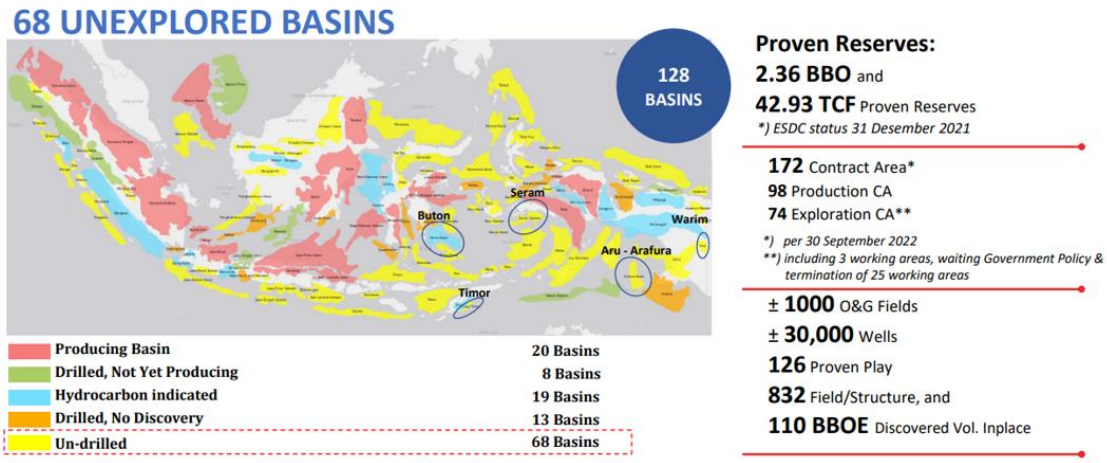
Figure 7 • Crude oil production by companies, 2024, %



Source: (Directorate General of Oil and Gas, Republic of Indonesia , 2024)

However, Indonesia is still targeting to reach 1 MMBOPD in 2030, by offering potential reserves in both explored and unexplored basins in the economy (*Figure 8*).

Figure 8 • Indonesia's oil and gas potential reserves



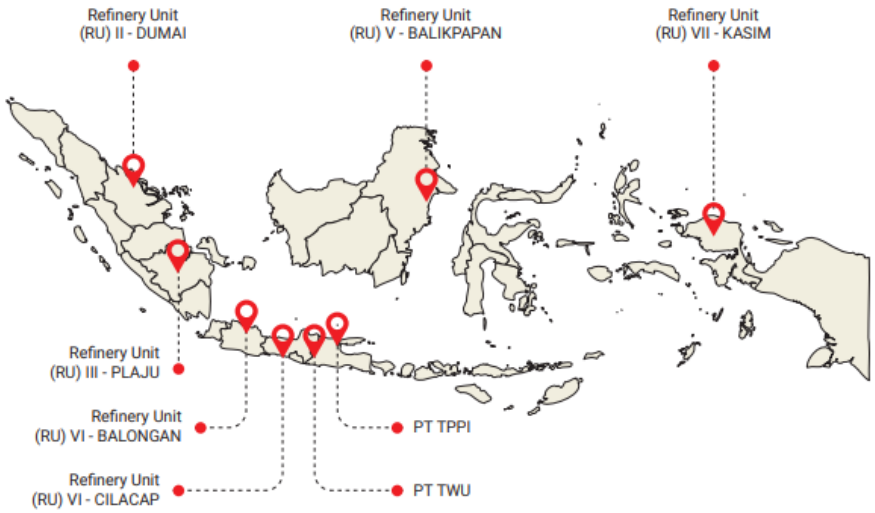
Source: (Ministry of Energy and Mineral Resources, 2023)

A. Refinery Industry

The refining sector in Indonesia comprises six medium- to large-sized and three small refineries, all under the ownership of Pertamina. Total refining capacity in 2022 stood at 1,104 MBOPD. (*Figure 9 and Table 1*).

In 1984, an additional capacity of 400 MBOPD was added to become 825 MBOPD, and another 250 MBOPD was added during 1995-2000 to 1,104 MBOPD.

Figure 9 • Location of oil refineries



Source: (Directorate General of Oil and Gas, Republic of Indonesia , 2024)

Table 1 • List of Refineries

No	Kilang *Refinery*	Lokasi *Location*	Kapasitas *Capacity* (MBSD)	Produk Utama *) *Main Product *)*	Status *Status*
1	Refinery Unit (RU) II - Dumai dan Sungai Pakning	Riau	170	Premium, Kerosene, Solar, Avtur, Non BBM (seperti LPG), Naphta, Green Cokes	Beroperasi
2	RU III - Plaju/Sungai Gerong	Sumatera Selatan	126	Premium, Solar, Minyak Diesel, Pertamax, Non BBM (seperti LPG), Naphta,LAWS	Beroperasi
3	RU IV – Cilacap	Jawa Tengah	348	Premium, Kerosene, Solar, Pertamax, Dexlite, Minyak Diesel, Avtur, Non BBM (seperti LPG, Asphalt), Naphtha, LSWR	Beroperasi
4	RU V – Balikpapan	Kalimantan Timur	260	Premium, Kerosene, Solar, Avtur, Pertamax, Minyak Diese, LPG, Naphtha, LSWR	Beroperasi
5	RU VI – Balongan	Jawa Barat	150	Premium, Kerosene, HOMC 92, Solar, Pertamax, Pertamax Turbo, Avtur, LPG, Propylene, Decant Oil	Beroperasi
6	RU VII Kasim	Papua	10	Premium,, Solar, SR LSWR	Beroperasi
7	Kilang TWU **)	Jawa Timur	18	Straight Run Gasoline,MDO (Marine Diesel Oil), Solar	Beroperasi
8	Kilang Tuban/TPPI	Jawa Timur	100	Premium, Kerosine, Solar, Pertamax, Non BBM (spt LPG)	Beroperasi
9.	Klang Pusdiklat Cepu	Jawa Timur	4	Pertasol CA, Pertasol CB, Pertasol CC, Kerosene, Solar, Residu, RF	Beroperasi
Total Kapasitas			**1,186**	**mbsd**	
Total Kapasitas Beroperasi			**1,186**	**mbsd**	

Source: (Directorate General of Oil and Gas, Republic of Indonesia , 2024)

Assuming an 80% utilization rate, the refineries would require approximately 880 MBOPD. Indonesia's domestic production is around 600 MBOPD and given that some of this crude is not suitable for local refineries, importing crude oil becomes inevitable.

The Refinery Development Master Plan (RDMP) includes the construction of two new grassroots refineries in Tuban and Bontang, as well as the expansion of existing refinery capacities, with a target to reach 1,900 MBOPD by 2030. However, in 2025, the RDMP only managed to increase the capacity of the Balikpapan and Balongan-Indramayu refinery units by a combined total of 100 MBOPD. The RDMP has encountered setbacks due to postponed investments from Pertamina's partners, Rosneft (Russia) and Mubadala Petroleum (Oman). The future of the RDMP remains uncertain, particularly as the new government administration has raised the refinery capacity target without providing a detailed plan for how it will be achieved.

Downstream Oil Industry

Indonesia's retail petroleum market was officially liberalized in 2001, paving the way for private fuel retailers such as Vivo, BP, ExxonMobil, and Shell to operate alongside the government-owned company, Pertamina. Despite the entry of these private players, Pertamina remains the dominant distributor of fuel products due to its extensive economy-wide infrastructure. Private retailers typically operate in major urban areas, where market conditions are more favorable.

Pertamina also plays a central role in delivering subsidized fuel products. The government, through Pertamina, provides subsidized fuels such as Gasoline RON 90 and Biodiesel CN 48, although the daily sales of these products are limited. Pertamina, in return, has the obligation to distribute this subsidized fuel evenly across all areas in Indonesia.

This requires Pertamina to operate a comprehensive supply chain and manage the vast distribution and retail network. This includes fuel depots, distribution tankers, and even air transport carriers to ensure fuel reaches remote and inaccessible areas (*Figure 10*).

To expand its reach, Pertamina also offers public partnership schemes, allowing private investors to operate fuel stations under the Pertamina brand. These partner-operated stations sell Pertamina products, including subsidized fuels, and must adhere to regulated pricing policies. Pertamina is

obligated to maintain a steady supply to its network of retailers, who, in return, are required to sell fuel products at prices set by Pertamina, including government-regulated prices for subsidized fuels.

Figure 10 • Distribution of fuel oil

Source: (Pertamina Patra Niaga, 2025)

All fuel retailers operating under Pertamina, including public partners, are part of a dedicated association called Hiswana Migas, which represents the interests of fuel station operators.

The government oversees the distribution and retail fuel sector through the Downstream Oil and Gas Regulatory Agency (Badan Pengatur Hilir Migas, or BPH Migas), which ensures compliance with regulations and policies.

1.3 Indonesia Gas Industry

Gas Upstream

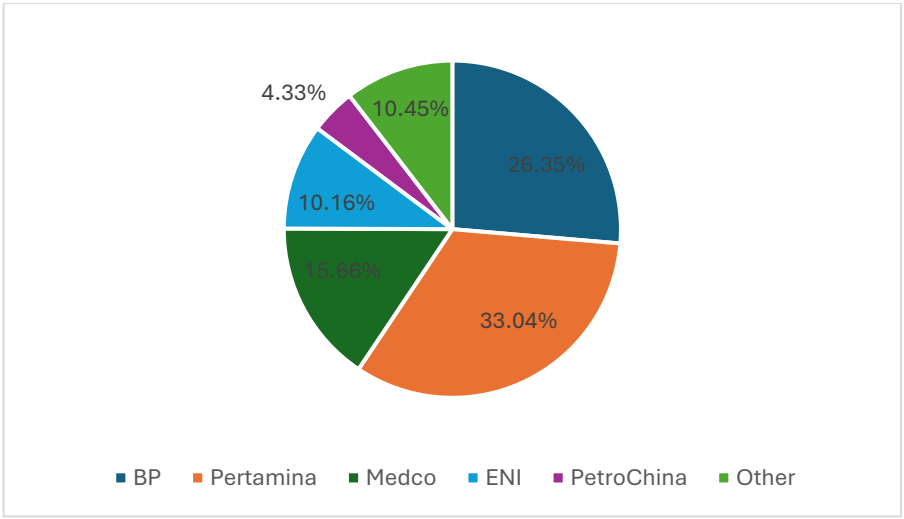
Unlike its declining oil reserves, Indonesia still holds substantial natural gas resources, with a production-to-reserve ratio of about 15 years (Energy Institute, 2024). Before the 2020s, most of Indonesia's gas output was exported, primarily to Japan and Korea. In recent years, however, rising domestic demand—driven mainly by the power generation and fertilizer sectors—has shifted priorities toward the local market. Consequently, exports have steadily declined, although Indonesia still accounts for around 3.4% of global natural gas supply.

At present, Indonesia produces roughly 6,900 million standard cubic feet per day (MMSCFD) of natural gas (*Figure 11*), with Pertamina and its subsidiaries contributing the largest share at about 33% (*Figure 12*). Looking ahead, the government targets an increase in output to 12,000 MMSCFD by 2030, supported by new projects under development in the Andaman Sea, Makassar Strait, and the Masela Block (*Figure 13*).

Figure 11 • Average Gas Daily Production

Source: (Special Task Force for Oil and Gas, 2025)

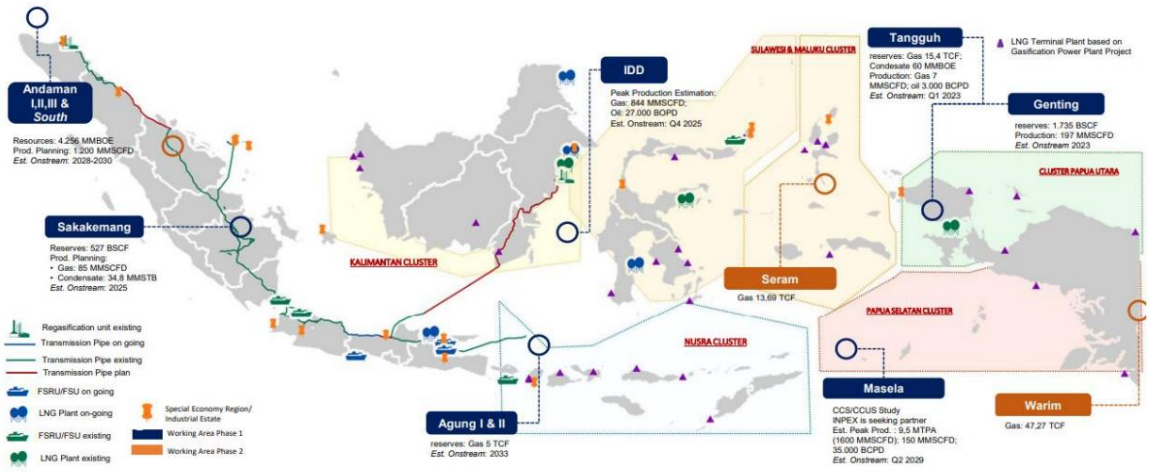
Figure 12 • Gas Production by Entities



Source: (Special Task Force for Oil and Gas, 2025)

However, many of these projects face significant financing challenges due to their substantial capital requirements. A broader shift in global finance further compounds this, as banks and investors reduce their exposure to fossil fuel projects in line with climate action commitments and green financing principles. As a result, securing funding has become an additional hurdle to advancing Indonesia's planned gas developments.

Figure 13 • Gas Potential Reserve



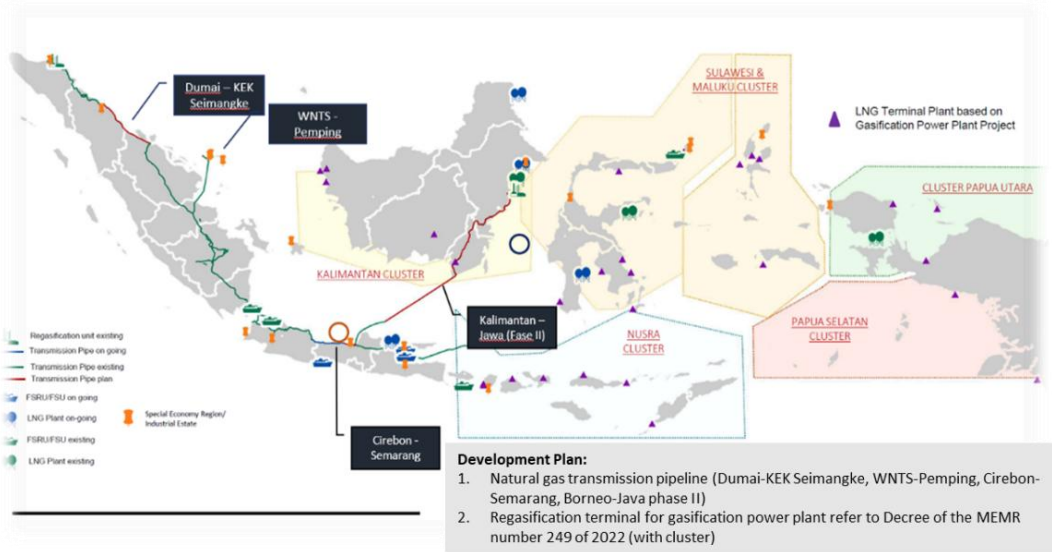
Source: (Ministry of Energy and Mineral Resources, 2023)

Gas Downstream

Natural gas demand in Indonesia continues to grow, prompting the government not only to reduce the share allocated for exports but also to implement price regulations for domestic industries. To support this, infrastructure development for gas transportation and distribution is being accelerated, including LNG terminal construction, city gas networks, and LPG processing facilities.

For the power sector in particular, the government has capped the plant gate price of natural gas at USD 6 per MMBTU (equivalent to approximately USD 6,222 per MMSCFD).

Figure 14 • Gas Reserves Development Planning



Source: (Ministry of Energy and Mineral Resources, 2023)

Indonesia currently has very limited domestic infrastructure for natural gas utilization, which includes regasification, transmission, and distribution. As shown in *Figure 14*, the economy operates only six

LNG regasification terminals, four of which are Floating Storage and Regasification Units (FSRUs). Due to the limited number of regasification facilities, gas utilization often relies on direct connections to nearby production sources. For instance, the Muara Karang Combined Cycle Gas Turbine (CCGT) plant receives natural gas from the Offshore North West Java (ONWJ) field, while the Tambak Lorok CCGT plant is supplied by the Kepodang Field in Northeast Java.

Gas transmission pipelines in Indonesia are currently limited to the islands of Sumatra and Java. However, even on these islands, the networks are not yet fully integrated. In Sumatra, for instance, there remains a disconnect between the pipeline systems in North Sumatra and Riau provinces. Java, the infrastructure gap is evident with the ongoing development of the Cirebon–Semarang Section 1 pipeline, underscoring the incomplete nature of the transmission network. These limitations contribute to a fragile domestic gas supply chain and hinder the expansion of industrial facilities and power plants, particularly in areas where access to gas remains difficult.

The city gas network in Indonesia is currently available only in a limited number of cities, primarily those located near natural gas resources, such as Jakarta, Semarang, Prabumulih, Cirebon, and Bontang. Even within these cities, the distribution network typically does not cover the entire area and is often prioritizing large-scale or industrial consumers. In other regions, most households still rely on liquefied petroleum gas (LPG) in cylinders, which can be inconvenient and pose safety risks.

The limited development of gas utilization infrastructure in Indonesia can be attributed to past policies that prioritized LNG exports as a key source of revenue. However, since the 2010s, domestic demand for natural gas has increased significantly, particularly from the power generation sector and various industries such as fertilizer, petrochemicals, oleochemicals, glass, and steel. Additionally, the growing financial burden of government subsidies for LPG has prompted a policy shift. As a result, the government has gradually reduced natural gas exports and now prioritizes meeting domestic demand.

Future Gas Infrastructure plans

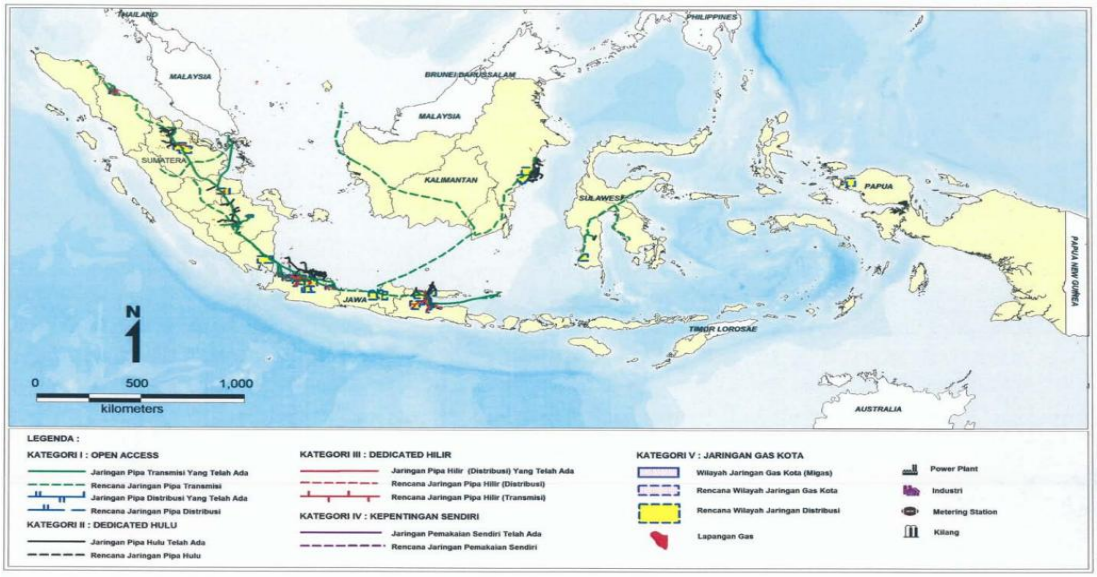
As part of its long-term development plan, Indonesia aims to establish full connectivity between the major islands of Sumatra, Java, and Kalimantan. In line with this vision, the economy is also expanding its LNG infrastructure by developing new regasification terminals, such as the Semarang LNG Terminal and the Lamong LNG Terminal. Additionally, Indonesia plans to construct 27 mini-LNG regasification terminals across remote islands to supply fuel for 20–30 MW gas-fired power plants. These facilities are intended to enhance electricity access for isolated communities.

Mini-LNG regasification terminals are small-scale facilities equipped with simple vaporization technologies and short-distance pipelines connecting to a nearby power plant. Indonesia completed its first mini-LNG terminal in Benoa, Bali, in 2015, which now serves as a reference model for future Mini LNG projects planned by the Government.

Indonesia also plans to expand city gas networks in large cities throughout the economy, such as Greater Jakarta, Cirebon, Batam, Surabaya, and Palembang, to reduce household consumption of inefficient LPG and provide gas fuel through a pipeline network.

All of these infrastructure plans are listed in the Master Plan of the National Gas Infrastructure Network (*Figure 15*), which was initially set up in 2012 and revised in 2023 by ministerial decrees (Ministry of Energy and Mineral Resources, Republic of Indonesia, 2012) (Ministry of Energy and Mineral Resources, Republic of Indonesia, 2023). These development plans currently face significant challenges, particularly in securing financing and addressing delays in the development of new gas resources. These delays contribute to uncertainty regarding the future availability of natural gas, which in turn hampers long-term infrastructure planning and investment.

Figure 15 • Gas Infrastructure Development Planning Stated in Ministerial Decree



Source: (Directorate General of Oil and Gas, 2012)

2. Oil supply emergency exercise

2.1 Oil emergency scenario stages 1 and 2

Background

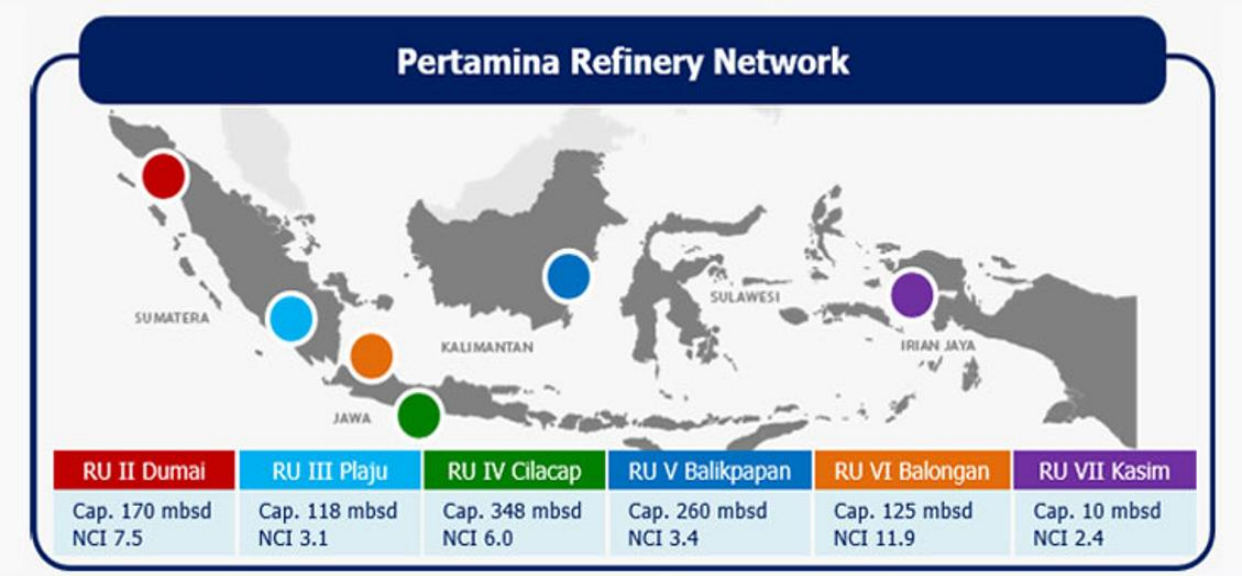
Despite being an oil and gas producing and exporting economy, Indonesia has started to be more reliant on imports of refined petroleum products due to limited capacity in the oil refining sector.

Specifically, Indonesia relied on imports of almost 60% and 79% of consumption for gasoline and LPG, respectively, in 2022 (Asia Pacific Energy Research Centre, 2025). Therefore, an unexpected disruption in refined oil product supply from domestic refineries could result in higher dependence on imports. Moreover, Indonesia is prone to risks of earthquakes, which could result in a disruption in oil product distribution. Hence, emergency preparedness on disruptions of product supply and distribution could essentially provide robustness and security of oil products to Indonesia. Bearing this in mind, the oil emergency scenario stage-1 emphasized a disruption of the supply of refined petroleum products from domestic refineries, while stage-2 highlighted an additional disruption in the distribution system of the products.

Refinery Operation

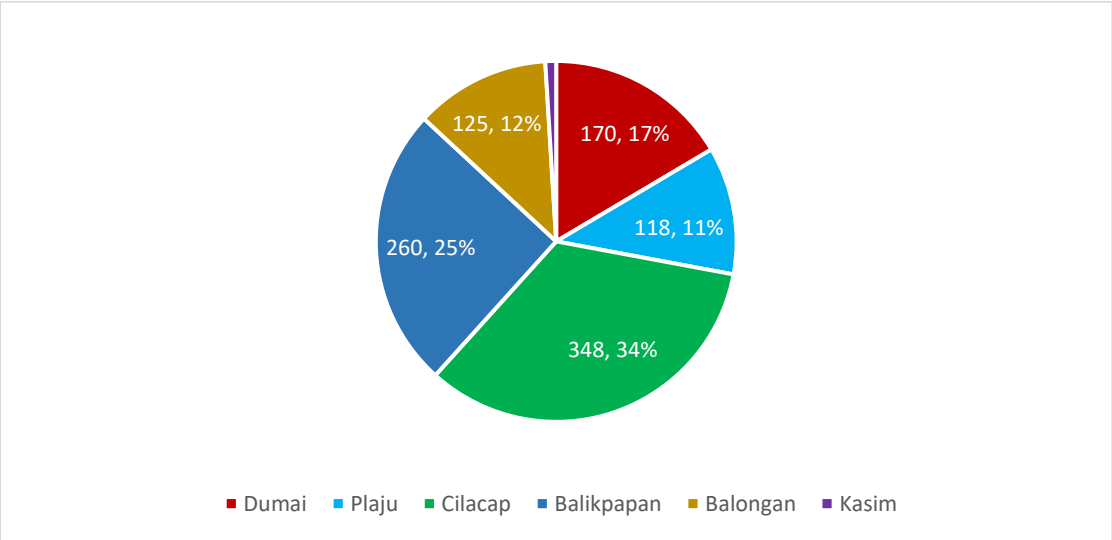
The refining sector of Indonesia comprises six major refineries with a total of 1,031 MBOPD of crude oil distillation capacity (*Figure 16*). Refining capacity is led by the Cilacap refinery in Java (348 MBOPD) and Balikpapan refinery in Kalimantan (260 MBOPD), altogether accounting for almost 60% of total refining capacity (Pertamina, 2024). Total refinery output in 2022 was 893 MBPOD, representing an 87% utilization rate of total capacity. It is also noted that the refining capacity of Balikpapan is reported to be upgraded to 300 MBOPD in the future (*Figure 17*).

Figure 16 • Refinery Facility Output



Source: (Pertamina, 2024)

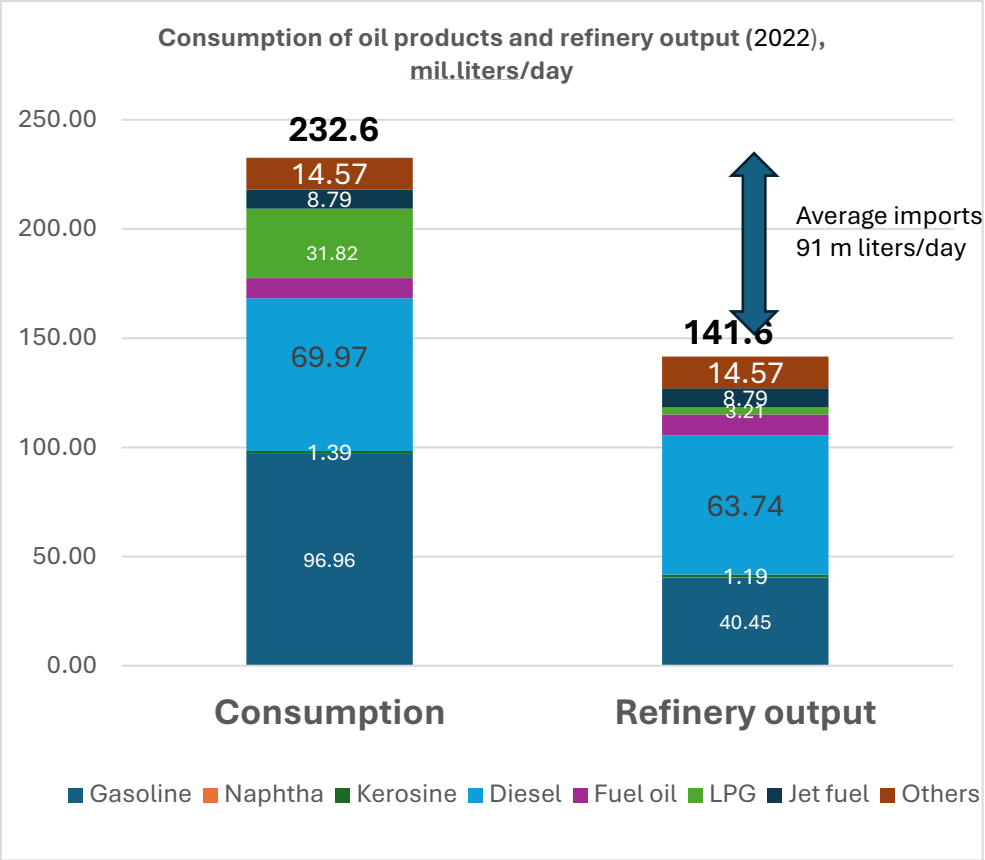
Figure 17 • Refinery capacity (kb/d) and capacity share (%), 2022



Source: (Pertamina, 2024)

Total consumption of refined products in 2022 stood at 232.6 million liters per day (MLD) and was partially met by outputs from domestic refineries. Total refinery outputs in 2022 averaged at 141.6 MLD, representing 61% of total consumption. As a result, Indonesia was relying on imports of refined products at 91 MLD in 2022 (*Figure 18*). Specifically, Indonesia relied on imports of almost 60% and 83% of consumption for gasoline and LPG, respectively.

Figure 18 • Consumption of Oil Products and Refinery Output 2022



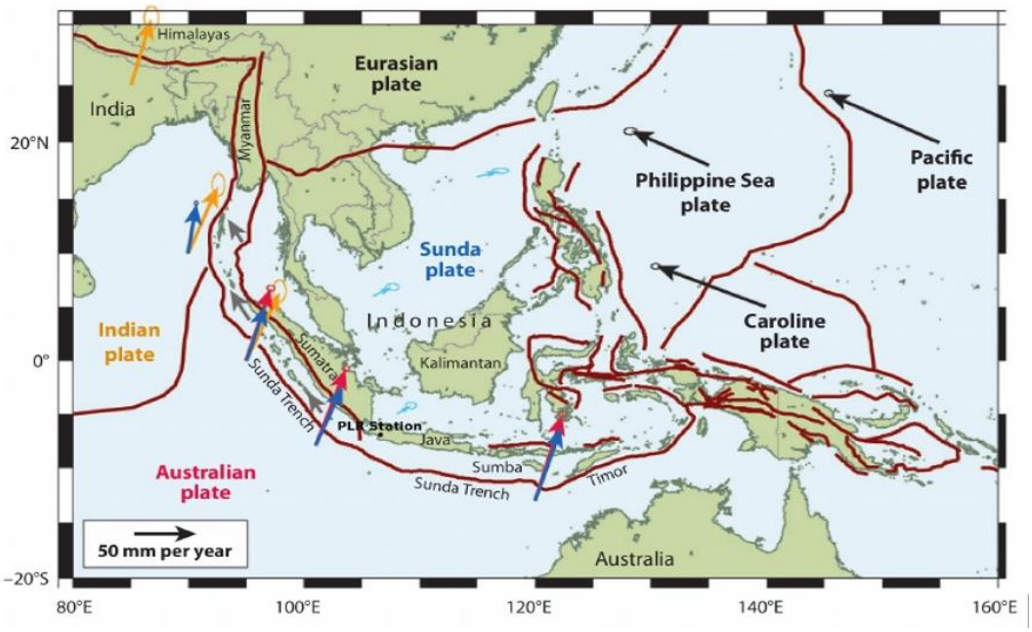
Source: (APERC, 2025 NP)

In addition, as an archipelagic economy, the distribution of refined oil products of Indonesia is carried out by extensive seaborne operations under the responsibility of the government-owned oil company, Pertamina. Products from domestic refineries are transported by seaborne vessels to transit oil terminals and oil depots located in various archipelagic demand locations. Airborne transportation is used to deliver oil products to specific remote locations where seaborne operation is not an option. Oil trucks and oil product pipelines are employed for inland transportation in certain locations. Imports of oil products from Singapore and other sources are transported to major oil terminals to be further redistributed to demand areas.

Earthquake Risk

Geographically, Indonesia is bordered directly by three active tectonic plates and is included in the Pacific Ring of Fire (*Figure 19*), resulting in Indonesia being prone to risks of earthquakes. In the last few years, a number of large-scale earthquakes have rocked Indonesia, such as the ones that hit Palu in Central Sulawesi in 2017 and Lombok (Nusa Tenggara) in 2018. Data from the Ministry of Energy and Mineral Resources in 2021 also noted that over the last 20 years, there were as many as 26 destructive earthquakes (Badan Geologi, 2021).

Figure 19 • Maps Tectonic Plates of Indonesia



Source: (Pramono, Utama, & Swastikarani, 2023)

Stage 1: Major fire incident at Balikpapan Refinery

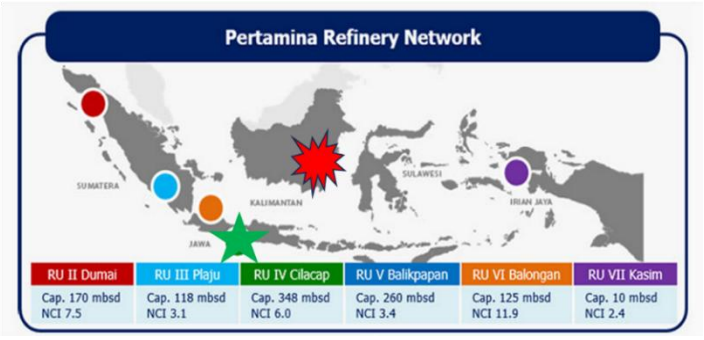
During the oil supply emergency exercise, a simulated news report called *APERC Breaking News* was created and presented to the audience to enhance the realism of the scenarios *(Figure 20)*. According to the mock report, at 2 a.m. of 4th February 2025, a significant explosion followed by a major fire incident broke out at Balikpapan refinery (260 MBOPD) in Kalimantan (*Figure 21*). The fire is suspected to have occurred from a vapor cloud explosion due to leakage of the main distillation unit. The fire was under control after 20 hours, leaving severe damage to the main distillation and associated units. The incident happened while another major refinery, the Cilacap refinery (348 MBOPD) in Java is under its 90-day scheduled shutdown for a major turnaround maintenance.

Figure 20 • APERC Breaking News

Source : (APERC, 2025 NP)

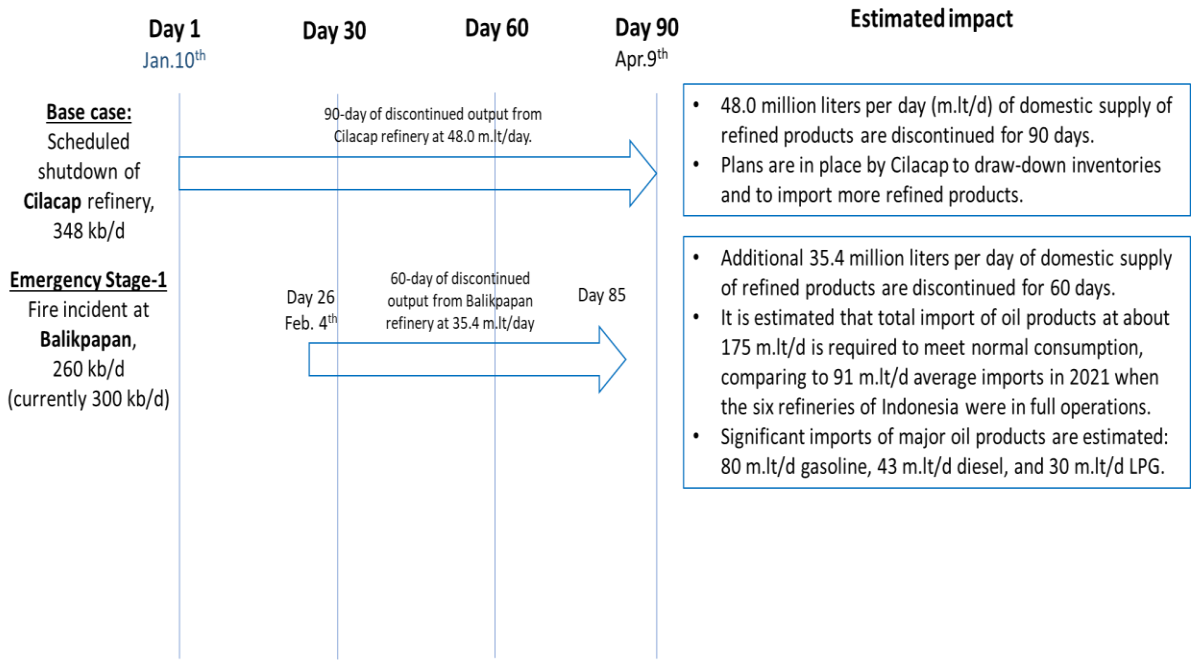
Initial assessment of the incident reveals that 48.0 MLD (million liters per day) of the domestic supply of refined products will be discontinued for 90 days. However, the plans are in place to draw down inventories and to import more refined products to compensate for the discontinued output from the Cilacap incident. The estimated impacts and timeline of the incident in emergency stage 1 are shown in *Figure 22*. Specifically, more imports of refined products are needed to satisfy domestic consumption under normal conditions. Total imports could potentially increase to almost double at 174.6 MLD from an average 91 MLD (*Figure 23*). Imports of gasoline and diesel to meet normal consumption could reach 80.4 MLD and 43.8 MLD, respectively (*Figure 24*).

Figure 21 • Oil Emergency Scenario Stage 1: Fire Incident at Balikpapan Refinery



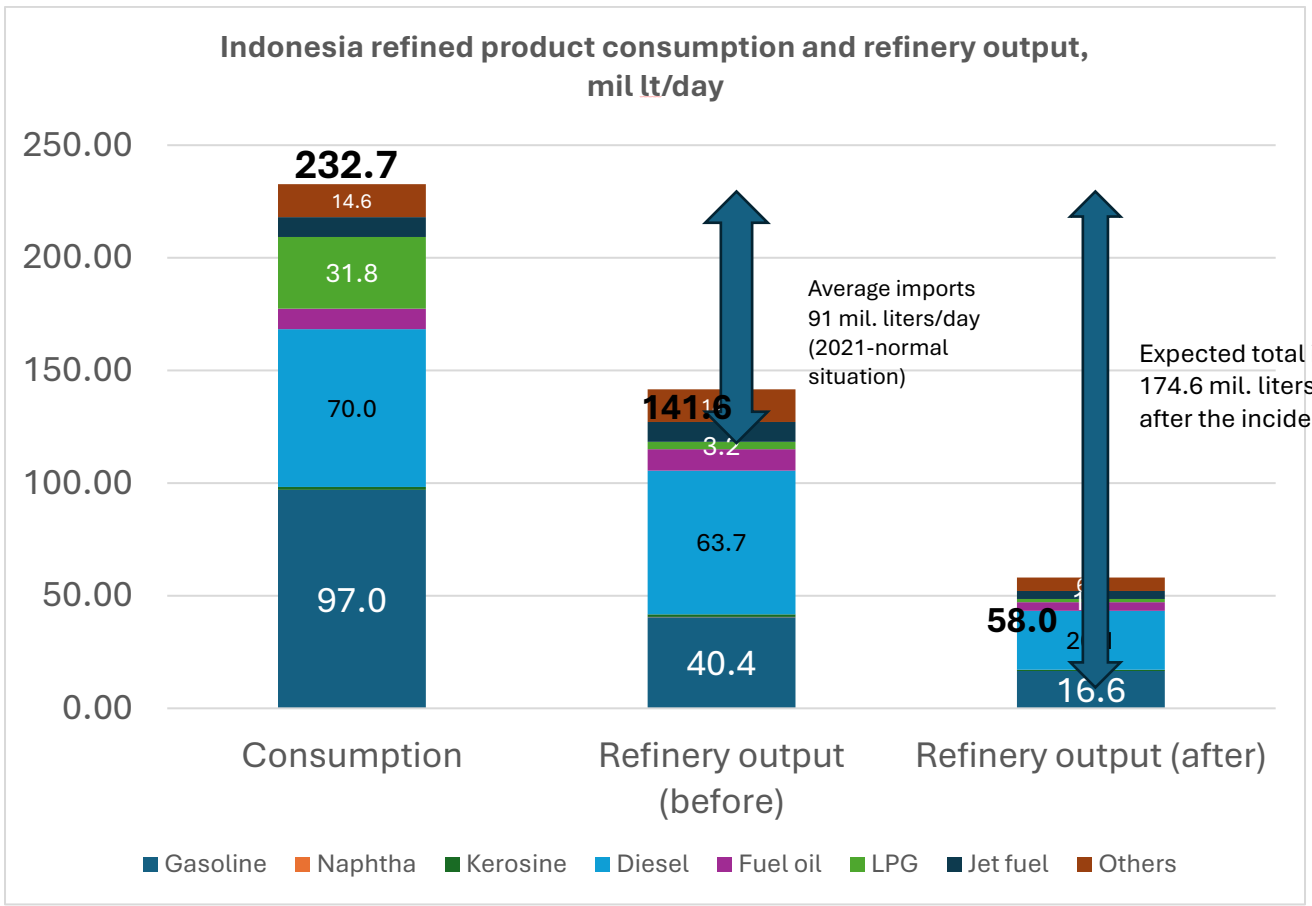
Source : (Antara News, 2021)

Figure 22 •Timeline and estimated impact of Oil Emergency Scenario Stage 1



Source : (APERC, 2025 NP)

Figure 23 • Estimated required imports after Cilacap incident



Source : (APERC, 2025 NP)

Figure 24 • Additional required imports by product

	Million liters/day		
	Consumption	Supply from domestic refineries (Before)	Estimated imports
Gasoline	97.0	40.4	56.5
Kerosine	1.4	1.2	0.2
Diesel	70.0	63.7	6.2
Fuel oil	9.2	9.6	-0.4
LPG	31.8	3.2	28.6
Jet fuel	8.8	8.8	0.0
Others	14.6	14.6	0.0
Total	**232.7**	**141.6**	**91.0**

EGEDA

	Million liters/day		
	Consumption	Supply from domestic refineries (After)	Estimated imports
Gasoline	97.0	16.6	80.4
Kerosine	1.4	0.5	0.9
Diesel	70.0	26.1	43.8
Fuel oil	9.2	3.9	5.2
LPG	31.8	1.3	30.5
Jet fuel	8.8	3.6	5.2
Others	14.6	6.0	8.6
Total	**232.7**	**58.0**	**174.6**

EGEDA and scenario assumption

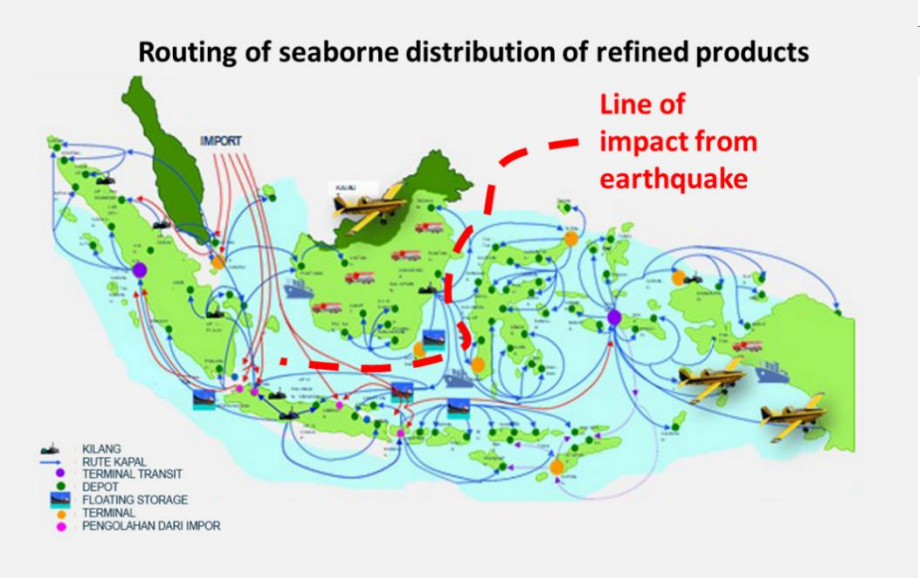
Stage 2: Major earthquake disrupts seaborne transportation of crude oil and oil products

At approximately 4 p.m. on 11th February, a major earthquake with a magnitude of 7.2 broke out due to an abrupt movement between the Pacific and Caroline tectonic plates. The earthquake caused significant damage to oil terminals and depots along the coastlines of West Sulawesi, East Kalimantan, and northeast Java.

A preliminary impact assessment indicates that as many as 21 major oil terminals and local depots across the coastlines of West and South Sulawesi, East and South Kalimantan and Central Java are unable to load or unload products. These facilities must be closed for damage repairs and safety inspections, expected to last approximately three weeks (21 days).

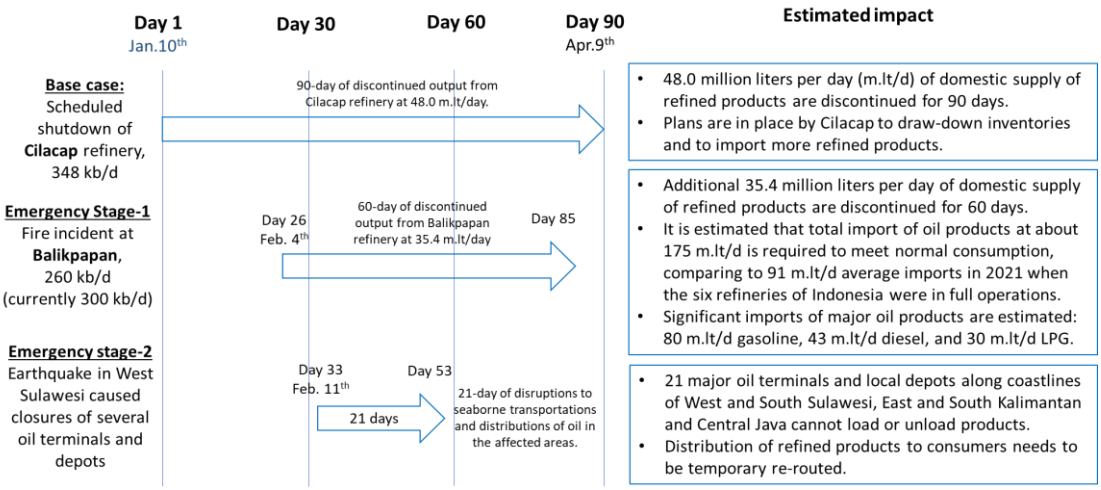
As a result, distributions of the refined oil products to and from the affected terminals and depots must be temporarily halted. Distribution to customers of refined products will need to be temporarily rerouted accordingly (*Figure 25 and 26*).

Figure 25 • Estimated impact of oil emergency stages 1 and 2



Source : (Dunia Energi , 2024)

Figure 26 • Timeline and estimated impact of oil emergency stages 1 and 2



Source: (APERC, 2025 NP)

2.2 The Response

Following the discussion on emergency response measures, Indonesian stakeholders provided brief inputs on both Oil Emergency Stages 1 and 2. Although concise, their responses addressed the key actions required for the scenarios presented. Based on the discussion, the responses to both stages can be grouped as follows:

A. Government response

Through Presidential Regulation No. 41/2016 and MEMR Regulation No. 12/2022, the government, acting through the National Energy Council (DEN) and the Ministry of Energy and Mineral Resources (MEMR), is responsible for assessing the most significant impacts of an incident and determining whether a supply crisis should be declared.

B. Assessment of the impact

The Indonesian stakeholders assessed that the incidents in the two scenarios were deemed to be under control and that the scenarios presented would not pose a critical supply disruption. There is a possibility that the incident may only impact the shortage of primary supply to a specific region in Indonesia.

To their understanding, the shutdown of the refinery did not involve the entire Balikpapan facilities. They also assumed, as the fire did not affect all the facilities, that there are still other production facilities that are operating and can be tapped.

The Energy Council of Indonesia (DEN) and the Ministry of Energy and Mineral Resources (MEMR) will assess the situation if the incident is an economy-wide situation.

C. Basic stance of the government

❖ Supply measures

The scenarios presented did not mention the specific petroleum products that are affected. The operators assessed that they could immediately supply the needed products, sourced from the nearby domestic refineries.

The stakeholders will also ensure the smooth distribution of the new supply by adjusting the transportation schedule. If there is a need for additional supply transportation, they will prioritize either the spot charter of a tanker or a ship. Depending on the severity of the disruption, there may be a possibility of international cooperation for establishing a temporary terminal (jetty). There may be an immediate government-to-government discussion with the neighboring economy for possible technological support for a temporary jetty to unload fuel from a ship to a truck. The stakeholders will also support the utilization of available harbors that are used for fuel storage, other than those of Pertamina.

The stakeholders will also support the possible increase in oil lifting.

Referring to Presidential Regulation No. 41/2016 and MEMR Ministerial Regulation No. 12/2022, the government, through DEN and MEMR, will identify the most significant impact from the incident and declare whether there is a supply crisis. They will assess the possibility of utilizing the operational stocks. If there is a possibility that operational stocks are below 7 days and there is a shortage for 30 days, and neither the business entities have the ability to address the emergency responses, DEN immediately takes a countermeasure as stipulated in the regulation that calls for a crisis condition. The government may have to carry out an immediate additional importation of petroleum products.

The possibility of international support, such as the ASEAN Petroleum Security Agreement (APSA). If APSA is already operational, this cooperation will be explored when the fuel supply crisis becomes severe.

- ❖ Demand measures

The government's response was to assess the immediate impact on the consumers and their reaction to the possible supply disruption. It will immediately distribute information to raise public awareness, especially among those living within the damaged facilities.

As stipulated in Presidential Regulation No. 41/2016 and MEMR Ministerial Regulation No. 12/2022, the government may impose demand restraints.

In general, the stakeholders provided responses based on the authorities and responsibilities of each institution. The stakeholders who are physically present find the responses are not the full responses due to absence of PT Pertamina Refinery's personnels (operator of refinery facilities) and also PT Pertamina Patra Niaga (operator of distribution facilities).

There is currently no specific regulation regarding demand restraint, and hence further discussion is needed on how the government should address and regulate this issue. Since its inception, DEN has never conducted a plenary hearing to determine or declare an economy-wide energy emergency. In the event of an energy crisis, one of the key references should be the Minister of Energy Regulation No. 12 of 2022.

2.3 Observations and recommendations from the expert team

Prior to the discussion session, APERC added that the stakeholders were allowed to make additional assumptions relating to the incidents in order to discuss and to come up with responses and mitigation measures.

Institutional arrangements and communication strategy

1. To develop pragmatic emergency response measures, it is recommended that stakeholders utilize the guidelines outlined in the APEC Emergency Model Procedure (EMP). However, the

EMP will be updated to incorporate the latest developments in emergency response practices within APEC.

2. The first response should be to evaluate how well-informed stakeholders are about the situation. Stakeholders must apply critical thinking to the problem, for example, assessing whether it is possible to monitor stock levels in real time.
3. It was recommended to identify the roles of relevant agencies and stakeholders of Indonesia in an emergency situation. It is recommended to manage communication between government authorities and the public carefully, for instance, through the establishment of a joint communication committee during an incident. Lessons can be drawn from Japan's experience: during the 1979 oil shock, rumours of shortages in household necessities triggered panic buying, and during the 2011 Great East Japan Earthquake, similar rumours led to panic buying of household necessities. Indonesian stakeholders may refer to these cases to better anticipate and manage public reaction. Therefore, it is advisable to create an "*Emergency Manual*" that details the processes, procedures, responsibilities and decision-making structure.
4. During a disruption, the National Energy Council or DEN is responsible for making public announcements. If DEN assesses that operational stock falls below seven days and continues to decline toward 30 days, it will convene a meeting. It is recommended that DEN and the Indonesian Government refer to the procedures outlined by APEC and the IEA, which specify how stakeholders should respond during emergencies—particularly which body is responsible for official announcements and how the Government should manage public perception to prevent panic buying at gas stations.
5. DEN members are appointed from various stakeholder groups and agencies. However, DEN has yet to convene a plenary meeting. Although the committee exists by regulation, it has not officially met yet. It is still unclear whether there is an official list of members or if the positions are merely titular, leaving some members possibly unaware of their responsibilities in an emergency situation. Contact mechanisms should also be clarified.
6. It is recommended to establish an institution, such as a National Emergency Strategy Organization (NESO), that can operate across different ministries during emergencies. This body could potentially expand to include additional stakeholders and industries while maintaining a core set of key institutions. If DEN serves a similar function to NESO, it is recommended that DEN study NESO's operations to better prepare for emergency situations.

Supply measures

7. If possible, the Indonesian oil stakeholders should start with a thorough analysis of the situation to estimate the actual supply disruptions. While many solution options were proposed during the discussion, these must be carefully evaluated to determine priorities. In an emergency, the Government and industry will not have sufficient time to review all alternatives. Therefore, it is essential to prioritize certain measures early on to enable a rapid and effective response.
8. Quantification is essential, starting with numerical factors such as refinery capacity to determine whether a situation qualifies as a crisis. This allows for defining the scale of the impact and establishing timelines, such as how long it would take to secure additional imports or for the government to allocate resources. Equally important is understanding the infrastructure, verifying facts with updated information, and assessing the current status. Analysis should include breaking down the operational status, examining the impact on distribution routes, considering possible emergency scenarios, utilizing redundant facilities

such as spare refinery capacity, and evaluating temporary solutions, for example, constructing a temporary jetty.

9. Supply-side analysis should also include an assessment of available storage. It is important to determine the exact storage capacity in the affected area and whether it is sufficient to mitigate the impact of disruptions. Since energy buffer stock regulations have been established, emergency situation management should begin by reviewing the available energy buffer stock.
10. It was recommended to have medium-to-long-term measures. For example, the use of LPG is also a supply emergency alternative. LPG is an important source as it the demonstrates effectiveness during fuel supply emergencies

Demand measures

11. Demand restraints should be clear whether they are already a set of measures that could be implemented, or they have clear rules for how these can be implemented. On the demand side, it is a very important tool to deal with disruptions, and the demand side has to be well documented to be used during an emergency.
12. Given that energy subsidies are implemented in Indonesia, supply-side price analysis is essential. In a crisis, insufficient volumes of motor gasoline and diesel could immediately affect prices and demand. Understanding the potential impact on prices is critical for timely decision-making and for implementing measures to stabilize supply and consumption and prevent soaring subsidies.
13. It is important to estimate the likely duration of the crisis, as this may have an impact on pricing. This information should be clearly communicated to consumers, particularly if rationing becomes necessary. Decisions must be made on which sectors should receive priority for the available stock—whether retailers, the power sector, or the household sector. Currently, DEN regulations do not specify such priorities, and there is no regulation on demand restraint in Indonesia. Additionally, it is critical to determine how subsidies might be maintained, adjusted, or removed during a crisis.

Data management and accessibility

14. It was also mentioned the importance of how soon stakeholders could be informed in a similar situation simulated in the exercise. This is also a measure of whether the response team has the ability to access the oil stock in each region on a real-time basis.
15. The experts also added the importance of documenting the response measures and the roles and responsibilities of the emergency response team. The OGSE experts raised a similar but essential point in OGS exercises.

Regional cooperation

16. It was highlighted that any economy that would become a member of the IEA should have a kind of internal organization usually called NESO or National Emergency Strategy Organization. This is a group within the agency where experts from different industries or ministries gather together when the economy faces an emergency situation in the energy sector. The group lists down actions to be taken to solve the energy crisis.
17. It is important to note that Indonesia is well-aware of the APSA. When it's implemented in the future, this will be a good respond measures in an oil emergency situation. In addition, even though the ASEAN Petroleum Security Agreement (APSA) is not yet in place, Indonesia could seek additional immediate supply from Singapore which is the nearest neighboring resource.

3. Gas Supply Emergency Exercise

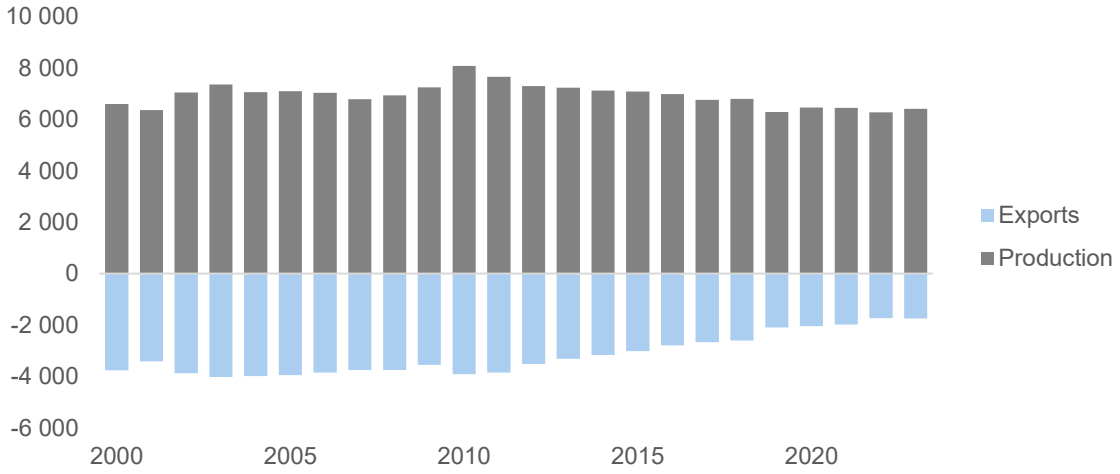
3.1 Gas emergency scenario: stages 1, 2, and 3

Background *Natural Gas profile*

Indonesia is one of the significant players in the global and APEC natural gas market. With proven reserves totaling 44.2 trillion cubic feet (tcf) as of end 2020, it is the fourth largest in Asia-Pacific, after China; Australia; and India.

Domestic gas production, in general, fluctuated between 2000 and 2023, with its peak reaching over 8,000 million standard cubic feet per day (mmscfd) in 2010. Since then, production declined to 2019 levels due to a combination of factors such as reserve depletion and infrastructure challenges. Production after 2019 increased marginally due to increased output from existing fields and new discoveries (*Figure 27*).

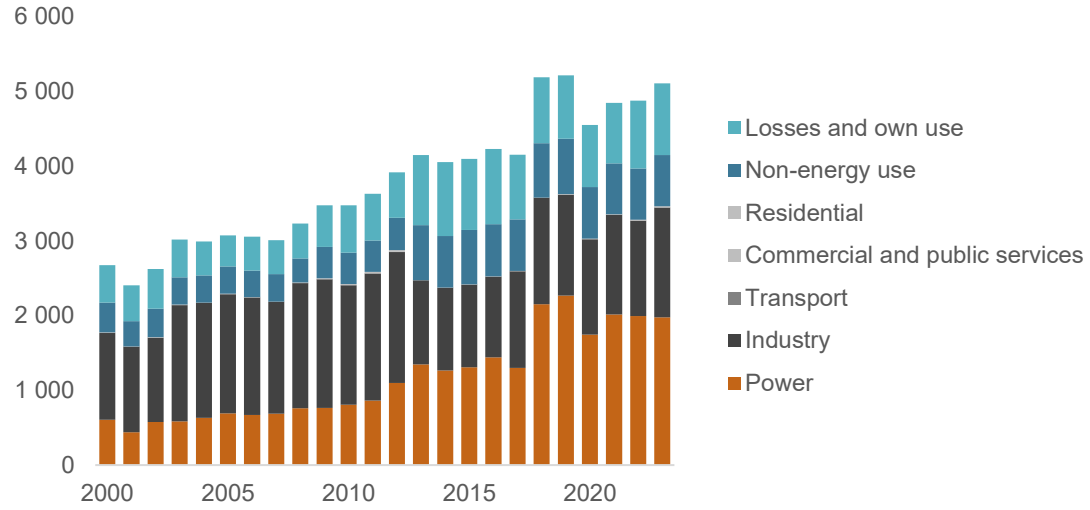
Figure 27• Natural Gas Production and Export



Source: (EGEDA, 2024)

Indonesia's natural gas has always been aimed at export markets. However, the general decline of domestic production has made the government shift its policy towards mandating a higher share of domestic consumption over exports. As shown in *Figure 28*, overall domestic gas demand grew by 91% between 2000 and 2023, with demand for the power sector more than tripling. Future projections from the government and other various institutions will see the gas demand continue increasing significantly, driven by industrialization and downstreaming, which are the government's primary priorities.

Figure 28 • Indonesia's gas demand by sector (mmscfd), 2000 – 2023



Source: (EGEDA, 2024)

The table below (*Table 2*) shows that existing gas fields in Indonesia are spread across various regions, with the major ones being in West Papua, South Sumatera and East Kalimantan. Additionally, there are other fields in Java with considerable outputs, one of which is the Jambaran Tiung Biru (JTB) unitized gas project, which started production in 2022.

Table 2 • Major natural gas-producing fields in Indonesia

Field name	Location	Production (mmscfd)	
		Starting year	Production in 2023
Tangguh	West Papua	2009	1,530
Corridor PSC	South Sumatera	1998	691
Mahakam PSC	East Kalimantan	1974	503
Merakes	Makassar Strait	2021	380
Senoro-Toili PSC	Central Sulawesi	2005	372
Subang	West Java	2002	309
Pendopo & Prabumulih PSC	South Sumatera	1949	287
Other fields	Various	2000	256
Jangkrik Complex	East Kalimantan	2017	245
Jambaran Tiung Biru unitized project (JTB)	East Java	2022	192

Source: (Global Data, 2024)

The Java gas infrastructure

Home to about 154 million people, Java Island holds the distinction of being the most densely populated island in Indonesia. Consequently, gas demand is mainly concentrated within the island, particularly in West Java, with an estimated total demand of over 246 mmscfd. However, the gas reserve in West Java is limited and hence, the area could potentially face supply shortages in the

future as demand is expected to accelerate. On the contrary, East Java houses substantial natural gas reserves of about 4.66 tcf, but the demand is lower than that in the West (*Figure 29*).

Figure 29 • Java natural gas infrastructure

Source: (Ndaru, 2023)

In the long term, the Cirebon-Semarang (Cisem) gas pipeline and the Gresik-Semarang (GreSem) gas pipeline will be pivotal in facilitating the transport of surplus natural gas from East Java to meet demands in West and Central Java. Construction on the Cisem pipeline is anticipated to be completed by early 2026.

Jambaran Tiung Biru (JTB) gas project

The Jambaran Tiung Biru (*Figure 30*) is a significant onshore gas field located in Bojonegoro, East Java, owned and operated by PT Pertamina (Persero). The gas field produces an annual average of 192 mmscfd , which goes into a nearby gas processing facility to create clean and marketable gas. Of the total, 100 mmscfd is allocated for power generation, specifically for Tambak Lorok gas-fired power plant in Semarang, Central Java. In addition, about 17 mmscfd is distributed to Petrokimia Gresik, which is a fertilizer plant located in Gresik, East Java, and the remaining volume of gas is allotted to residential and industrial consumers.

Figure 30 • Jambaran Tiung Biru gas processing facility

Source: (Dunia Energi, 2023)

Gresik-Semarang (GreSem) gas pipeline

The GreSem pipeline is a significant infrastructure that connects JTB gas processing facility with consumers in East and Central Java. It has been operational since the commencement of the JTB gas project in 2022. Operated by PT Pertamina Gas (Pertagas), it has a length of 275 km and can carry a maximum gas volume of 500 mmscfd.

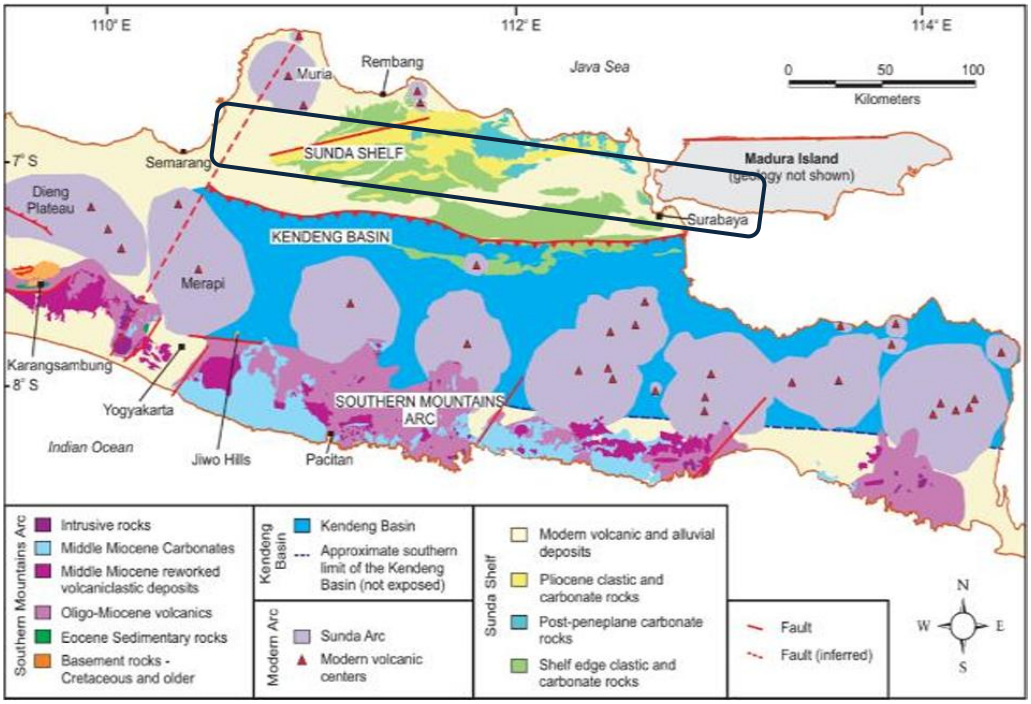
Kepodang gas field

Kepodang is an offshore conventional gas field situated approximately 180 km northeast of Semarang in the Java Sea. Like JTB, Kepodang field is connected to the Tambak Lorok power plant via GreSem pipeline. The field produced about 91 mmscfd of gas, which was the peak, in 2016. However, several challenges ensued, mainly due to lower gas reserves, leading to a stoppage in production in late 2019. Upon the resumption of operation, the field has been yielding between 15 and 20 mmscfd.

Risk of seismic-related activities

Indonesia is located on top of multiple active tectonic plates, making the economy prone to earthquakes and volcanic activity. Java island is one of the areas with high seismic activity, and East Java is not spared from it. A particular fault, called the Kendeng Fault, is a major active fault that runs between Semarang and Surabaya, East Java. Based on historical data, the fault has generated several past earthquakes between 1972 and 2022 (*Figure 31*).

Figure 31• Geological map of East Java, including the Kendeng Fault (circled)



Source: (Putri , et al., 2022)

The JTB gas facility and the GreSem gas pipeline are within the proximity of the Kendeng fault, therefore exposing them to seismic risks. This was acknowledged by the Regional Disaster Management Agency (BPBD) of Bojonegoro Regency based on a disaster risk assessment conducted in early 2018. In addition, an earthquake measuring 6.0 on the Richter scale struck the nearby Tuban Regency, with the impact felt as far as Bojonegoro Regency. Consequently, the JTB gas processing facility experienced disruption due to the earthquake vibration.

The 6th APEC OGSE gas emergency scenarios focused on the Jambaran Tiung Biru network and related facilities in central and eastern Java. This scenario examines the integration of multiple sectors along the gas supply chain, from upstream to downstream activities. Similar to the oil emergency, an APERC breaking News (*Figure 32*) was developed to simulate the situation.

Stage 1: Force majeure fire at the JTB gas processing facility

On 1 February 2025, a major fire hit the JTB gas processing facility in the early hours. A faulty compressor was the main cause of the fire, and consequently, gas production at the nearby JTB onshore gas field was partially halted. The rehabilitation of the compressor at the gas processing facility could take about three weeks, depending on the severity of the damage. As a result, the production of gas from the nearby gas field was reduced from 192 mmscfd to 96 mmscfd (*Figure 33*).

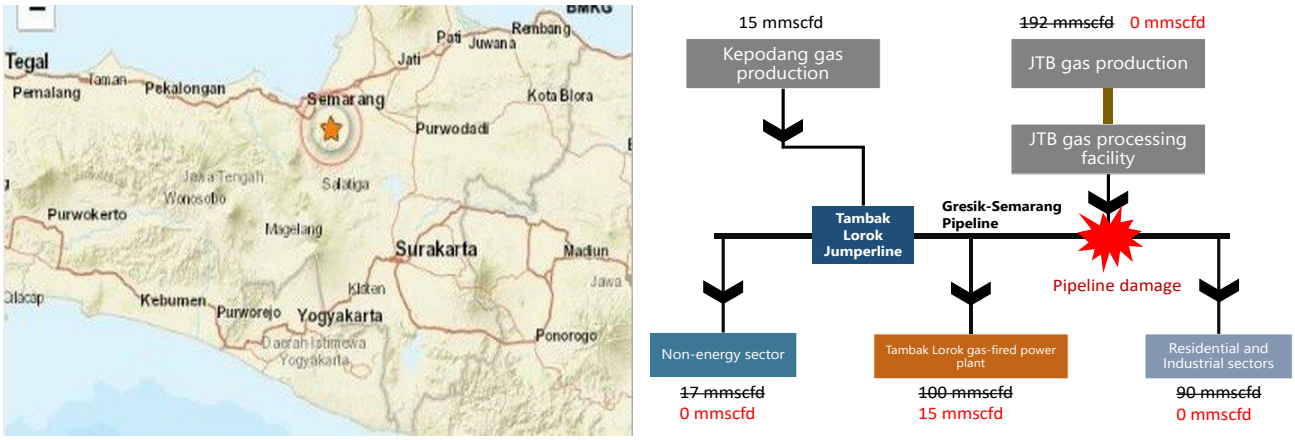
Figure 32 • APERC Breaking News: A Major Fire at Jambaran Tiung Biru

Source: (APERC, 2025 NP)

Stage 2: GreSem pipeline damage due to major earthquake

Immediately after the JTB gas processing facility serviceresumed, a strong earthquake with a magnitude of 8.2 on the Richter Scale hit the Semarang area in the early hours of 21 February 2025. The earthquake directly impacted and caused explosions on the section of the GreSem pipeline closest to the gas processing facility. Consequently, the severe damage sustained on the pipeline has forced the JTB gas field to stop delivering 192 mmscfd of gas to the gas processing facility, thus halting the supply to all the demand points.

Figure 33 • Emergency Scenario Stage 2: Earthquake in Semarang

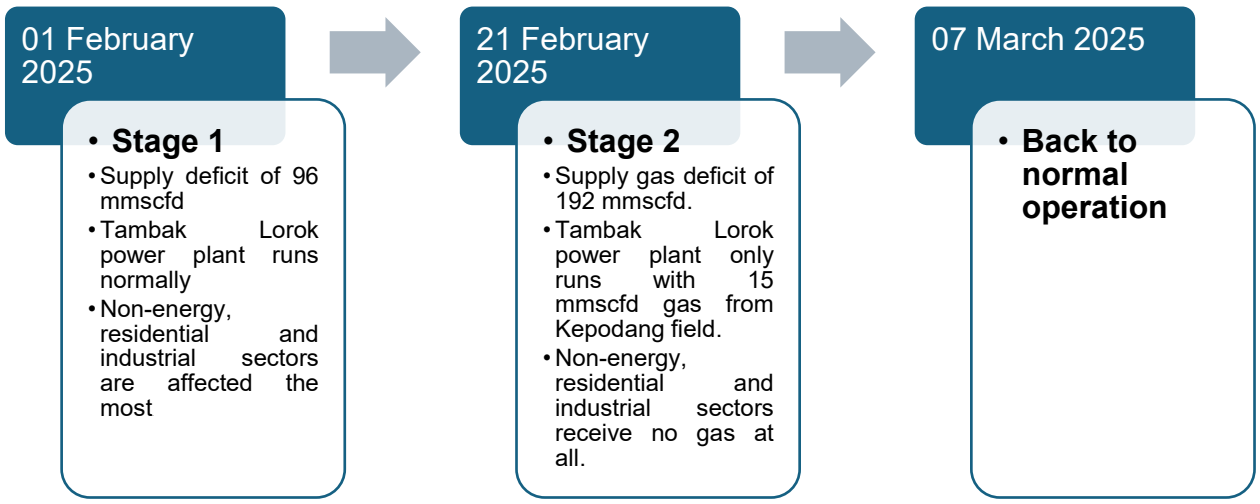


Source: (Detik Jateng, 2024)

3.2 The response

The Figure below (*Figure 34*) shows the sequence of the gas scenario across Stage 1 and Stage 2. Stage 1 took place between 1 February and 21 February 2025, spanning 21 days. Stage 2 took place from 21 February to 07 March 2025, lasting for an additional 14 days. The values in the figure represent the status of gas supply and the corresponding supply requirements.

Figure 34 • Timeline of Stage 1 and Stage 2 gas scenarios



Source: (APERC, 2025 NP)

3.2.1 Stage 1 Response

A. Government Response

An immediate activation of internal energy response procedures will have to be undertaken. The PT Pertamina EP Cepu, as the operator of the JTB project, will maximize the fire response facilities in Pertamina Group around East Java and Central Java to handle the fire. In addition, the Ministry of Energy and Mineral Resources will coordinate with local government, relevant ministries, operators, police and other relevant stakeholders to assess the impact on facilities and the environment.

B. Assessment of the impact

The first stage of the gas emergency exercise resulted in a loss of 96 mmscfd of natural gas from JTB. Given the prominence of the Tambak Lorok power plant, most of the gas that is still available (85 mmscfd) will be allotted to the plant, with support of 15 mmscfd of gas from Kepodang field. The remaining 11 mmscfd of gas from JTB is assumed to be absorbed by residential and industrial sectors. However, Petrokimia Gresik, a fertilizer plant, is assumed to receive no gas at all.

C. Basic stance of the government

- ❖ Supply measures

The Indonesian stakeholders have identified several potential alternatives for gas supply to meet the total gas demand. These include gas supplied by Gundih Gas Processing Plant, Husky-CNOOC Madura Limited (HCML), Kangean Energy, Pertamina Hulu Energy and Petronas.

- ❖ Demand measures

On the demand side, there are proposals for gas demand prioritization. For instance, consumers with much lower gas demand may be supplied with compressed natural gas (CNG) from nearby sources.

3.2.2 Stage 2 Response

A. Government response

An immediate activation of internal energy response procedures will have to be undertaken. PT Pertamina Gas (Pertagas) will close the valve on the damaged pipeline and immediately repair the damage.

B. Assessment of the impact

The second stage saw a significant gas loss of 192 mmscfd for 14 days. This poses a substantial challenge to meet most of the demand, including the Tambak Lorok power plant. This situation warrants immediate attention and strategic planning to secure a continuous and stable gas supply to these demand points.

C. Basic stance of the government

- ❖ Supply measures

The operator is looking into optimizing the gas production from JTB. Additionally, the stakeholders will identify alternative sources of LNG within Java Island.

- ❖ Demand measures

For the demand side, the same measures as in stage 1, albeit more enhanced, will be implemented. In addition, the existing Java-Bali interconnection system may enable electricity supplies from other power plants to support Tambak Lorok power plant. Alternatively, the utilization of alternative fuel(s) is explored as an input to the affected power plant.

3.3 Observations and recommendations from the expert team

Institutional arrangements and communication strategy

1. Details on the specific functions and respective agencies are essential. The economy should specify which institution will immediately act upon the emergency situation and quantify the

impact. It is necessary to understand the situation at hand when an emergency happens. It is good to know that Indonesia have already established the National Energy Council or Dewan Energi Nasional (DEN); however, the members have not met yet. The Technical units in the Directorate General Oil and Gas and Directorate General of Electricity as well as DEN Secretariat should establish a regular meeting schedule to assess the everyday situation of energy supply in Indonesia and its local areas.

2. The Directorate General of Oil and Gas has a regional Assistance Team with key players assigned to help local units. Each unit's function needs to be organized so that it can act in an orchestrated manner during an emergency situation.
3. During an emergency, the crisis must be quantified immediately. It is important to identify which government unit can obtain and deliver the needed data during the crisis.
4. It was recommended to develop an emergency manual that records the whole handling process. Emergency manuals will help in many situations. As government and industry staff may often change, institutional memory is essential during an emergency situation.
5. It is essential to assess the severity of the emergency situation to allow for immediate action from the concerned unit to solve the problem. Depending on the severity, the situation can be taken care of by the industry, or an intervention of the government is needed. For example, the Transmission System Operator (TSO) is said to have the authority to act during a crisis, as the transmission operator has a rule of operation, especially during load shedding. However, at some point, when the TSO is no longer able to make a decision, the Government may intervene.
6. Needs more coordinated action within the institution, inter-agencies and stakeholders to address the emergency situation. For instance, PLN already has the Plant Condition Management System (PCMS) in place in TSO. It only works if all the stakeholders work together. PCM in the PLN corporation is a comprehensive software solution used in industrial facilities to manage and optimize various aspects of plant operations, particularly related to mechanical integrity. It's a centralized database that tracks, analyzes, and manages information about equipment, inspections, and maintenance, ultimately improving plant safety and reliability. For government utilities, it is very important in terms of prices.
7. It was recommended that a National Risk Register be established. This Risk Register can be initialized by listing the top 10 things that the government and the industry, as well, will do during a crisis.

Supply measures

8. Quantifying the impact of the emergency situation on the supply side is highly recommended. This quantification needs to assess the damage at the first stage of the emergency and the work level required. Secondly, the quantification has to assess the timeline or time limitation of supply in the situation. e.g.:
   - Gas will not be able to be distributed within fourteen days to all customers.
   - The Gas stock in the power plant will only last 10 days in operation.
9. If the situation can be assessed well, alternative solutions can be immediately implemented, such as:

- The possibility of the power plant running on dual fuels (e.g. natural gas and diesel) could be explored further, as this would offer flexibility to ensure a continuous supply of electricity for several days.
- Introducing Liquefied Petroleum Gas (LPG) to the residents may be a good option during the crisis. For example, during the 2011 Japan earthquake, LPG was able to supply energy to the residents even when electricity and pipelines were unavailable because LPG is a decentralized energy source, as it demonstrated its effectiveness during crises. It may also be a good option to introduce facilities that combine the LPG storage tanks, supply equipment and power generator to medical facilities, welfare facilities, and public evacuation shelters.
- Experts acknowledged the possibility of dispatching compressed natural gas (CNG) by the Indonesian stakeholders in times of crises. However, quantification is required, such as the number of readily available compressors needed for immediate gas supplies.
- In case the amount of disrupted gas supply is large enough, PLN is allowed to use fuel oil, although it should be the last resort. It will cause a significant increase in the cost of electricity production and will have an impact on the energy subsidy borne by the government.

10. The supply network of energy is also needed to analyze, such that:
    - Analyzing the gas distribution network between supply and demand could help stakeholders identify potential vulnerabilities that necessitate immediate attention and corresponding measures. For example, when the gas supply is disrupted, particularly in the Java Bali System, which is considered a mature system, it should be easily resupplied from other sources.
    - The grid system and electricity alternative supply should be analysed, including the capacity of grid lines and the flexibility of the AC/DC transmission system.
    - Analyzing the condition of the power generation system, whether there are any power plants under scheduled/unscheduled maintenance.
11. It is recommended to refer to previous incident analysis or supply emergency simulation or exercise which has been conducted regularly. Some important facts from prior experience of PGN include:
    - Tambak Lorok power plant has previously experienced shortage of supply from Jambaran Tiung Biru, where PGN successfully substituted gas supply from JTB to Tambak Lorok from Kepodang Field through KJG pipeline. Demand from Central Java at the time was 15 mmscfd, and therefore the remaining gas supply from Kepodang Field could be flown to East Java through Gresik – Semarang pipeline. Even though from the beginning of operation, gas from JTB was usually flown east to west, but when JTB plan is not producing, gas supply from Kepodang can be delivered through Gresik - Semarang from west to east;
    - Demand from East Java was arranged by PGN, where some end users have limitations to absorb the gas from PGN.
    - Tambak Lorok power plant is not only supplied from Kepodang Field or JTB but also from Pertamina Gundih which, can reach 15 mmsfcd at the maximum level. Therefore, it is also possible to utilize supply from Pertamina Gundih if the emergency scenario truly happens.

Demand measures

12. A demand-side is essential to enable the government to act swiftly in the event that rationing becomes necessary during a supply shortage. To support this, it is recommended to conduct an initial quantification of demand. Where detailed data is unavailable, assumptions or alternative data sources may be used as a basis. Examples of such quantification include:

    - **Petrochemical industry:** A gas supply of 100 MMSCFD is equivalent to approximately 28 MW of electricity. Losing this supply would have a relatively small impact, as nearby power plants could compensate. For instance, PLN could buffer the shortfall given the proximity of the Paiton coal-fired power plant, which has a capacity exceeding 1,000 MW.
    - **Fertilizer Industry c.q. Petrokimia Gresik plant:** A supply of 17 MMSCFD equates to around 8 tons per day of urea production, a negligible amount compared to the plant's total capacity of 20,000 tons per day.
    - **Industry and residential sectors:** A reduction of 75 MMSCFD cannot be easily quantified, as it directly affects households and communities.

    By undertaking such quantification, it becomes easier to generate options, prioritize actions, and, where necessary, curtail non-essential demand.

13. It is recommended that the procedures for curtailment by the state utility (PLN) be incorporated into the demand-side response analysis. In the event of a supply shortage, PLN typically implements curtailment measures. Before doing so, an assessment of both the disrupted power supply and the projected load for the same day must be carried out. PLN also maintains a list of priority and non-priority customers, which serves as the basis for implementing curtailments. During such events, communication with affected customers is conducted to ensure transparency. Under this scheme, the load dispatch center holds the highest authority in decision-making and execution.

14. It is recommended to conduct demand mapping and quantification to support demand classification (e.g., residential, priority residential, priority industrial, and non-critical demand). This process should include:

    - **Analyzing demand distribution:** Residential consumers may be considered a priority, particularly due to essential uses such as cooking. A clear priority list should be developed to distinguish urgent demand (e.g., households or critical factories) from less urgent needs.
    - **Reviewing contractual arrangements:** Mapping should also assess any interruptible contracts with customers, as well as agreements that specify demand priorities in the event of a rapid decline in gas supply.

15. Exploring alternative demand solutions such as:

    - Demand can be backed up by CNG that can be injected somewhere along the Gresik – Semarang pipeline;
    - Supply for demand from the household and industry sectors can be backed up by CNG trucking;
    - Supply from Kepodang field can be maximized at 15 mmscfd, which can satisfy the demand in Central Java
    - Central Java is experiencing growing electricity demand, which PLN has anticipated by expanding the Tambak Lorok Gas Power Plant with a new 1,000 MW gas turbine, supplementing the existing 300 MW unit. Although the new facility is still in its

commissioning phase and has not yet reached whole load operation. Under the emergency scenario provided, an alternative option could be to secure gas supply from this new plant, as PLN is expected to have carefully planned and designed the gas supply infrastructure.

Data management and accessibility

16. Data management and accessibility are necessary during emergencies:
    - Immediately provide quantification of gas demand in all demand sectors (power, residential, industries, etc), so that stakeholders can classify the priority level.
    - Risk register and documentation of the importance of data
    - The Emergency council contact list should also be readily accessible. They need to be available during an emergency.
    - The Indonesian government needs to collect data on the inventory of the CNG capacity and the number of compressors available.
17. Developing a model or manual is essential. The staff and officials in charge do not need to remember all details, but should understand their specific responsibilities. For example, Korea previously did not have a centralized manual, but now operates a Resource Security Center that consolidates all data needed during a crisis. Previously, data collection was fragmented, with oil information sourced from oil companies and gas data from gas companies. The current system integrates all sectoral data, enabling more efficient crisis management.

Regional Cooperation

18. The IEA conducts a series of exercises, including capital-based exercises communicated via email. Whenever the IEA sends out such an email, it activates the Emergency Committee, which then proceeds through the various steps of the scenario.
19. The workshop highlights some simple yet important measures to reduce facility downtime. In Japan, based on earthquake simulations, actions such as deploying drones and strengthening pipelines have been implemented. Since Japan, like Indonesia, frequently experiences earthquakes, Japan is eager to share its experiences.

General Recommendation

20. Preparing emergency scenario mappings, such as tsunami hazard maps and liquefaction assessments, helps enhance the development and implementation of countermeasures—for example, reinforcing buildings and pipeline, and relocating the important facilities such as power receiving and transforming facilities which is at risk of tsunami flooding.
21. Conducting routine safety assessments, such as HAZOP studies every five years at PLN or Pertamina facilities, should be expanded to a nationwide scope rather than being limited to individual plants. The impact of such assessments extends beyond the facility to the entire nation. Emergency scenarios may include major events such as COVID-19, tsunamis, and other large-scale hazards.

4. Evaluation and feedback from the expert team and Indonesian stakeholders

From the experts

- The experts commended the Indonesian host for bringing together the stakeholders from the relevant oil and gas sector. The experts likewise complemented their flexibility in responding to the exercise despite the physical absence of some of the government officials and staff.
- It was good to note that Indonesia recently signed a directive forming a committee to act on the oil and gas emergency situation. It is recommended that the members know their respective roles and that a regular meeting should be conducted, taking into account the needs of each committee involved.
- It was noted that a well-informed decision is necessary for emergency situations, such as determining the reporting period, the extent of the delay, and how the fuel subsidy would be affected so that the government can act accordingly. Therefore, the government should work more on the readiness of data.

From Indonesian stakeholders

- The exercise is very relevant and timely as Indonesia has just recently formed an emergency committee, but has yet to convene soon.
- The exercise was a learning experience for Indonesian stakeholders, as each agency has its own emergency plans but has not experienced collaborating and conducting the exercise with each other.

5. Conclusions

- The 6th Exercise has successfully delivered its goal to Indonesia, which is to respond effectively to the emergency situation presented. Strong institutional coordination between offices is clearly needed to develop strong responses. Stakeholders should adopt the APEC Emergency Model Procedure (EMP) as a guide while ensuring that roles, responsibilities, and communication mechanisms within DEN, or a NESO-like body, are clearly defined. This structure allows for coordinated action across ministries, agencies, and industry stakeholders during a crisis.
- Stakeholder awareness and preparedness are critical. Real-time monitoring of data, such as, stock levels, timely information sharing, and critical assessment of the situation, enables rapid and informed decision-making. During an emergency, prioritization of mitigation measures is essential, including quantifying refinery capacity, evaluating storage availability, and considering medium- to long-term alternatives such as LPG. Redundant facilities and temporary solutions, like constructing temporary jetties, can also help minimize disruptions.
- Managing demand is equally important. Clear and documented demand restraint measures, careful monitoring of pricing and subsidies, and communication of the crisis duration to consumers are necessary to prevent panic and ensure equitable distribution. Authorities must also prioritize which sectors, such as retail, power, or household sectors, would receive supplies first, especially in the absence of existing regulations.
- Accurate data management and regional cooperation are key to resilience. Rapid access to reliable stock information, thorough documentation of response measures, and alignment with regional frameworks such as APSA or support from neighboring economies strengthen the overall emergency response capability and help safeguard energy security.
- In the Gas Emergency Scenario, a coordinated institutional framework, clear communication, and robust data management would result in strong and coordinated responses. Strengthening the role of the National Energy Council and relevant technical units, along with establishing an Emergency Manual and a National Risk Register, will ensure timely decision-making and institutional memory during crises.
- Supply-side measures should focus on quantifying the impact, exploring alternative fuels, and analyzing energy networks to maintain system resilience.
- On the demand side, prioritization, curtailment procedures, and alternative solutions like CNG trucking or dual-fuel options are essential to balance critical needs.
- Reliable data collection, centralized management, and accessible contact lists are fundamental to effective coordination.
- Regional cooperation, learning from international best practices, and proactive scenario mapping, such as hazard and safety assessments, strengthen domestic preparedness and ensure rapid, well-informed responses to emergencies.

ANNEX I

List of Participants

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22	Mr. Kusdi Widodo	Pertagas
23	Mr. Putut Panji Utomo	Pertagas
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27	Mr. Adi Cahyo Prabowo	PLN
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ANNEX II

List of Invited Experts

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2	Mr. Takayoshi Higashida	JOGMEC, Tokyo	Deputy Director, Engineering Division, Safety, Environment and Engineering Department
3	Dr. Tae Eui Lee	KEEI, Ulsan	Leader, Energy Industry Resource Group,
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5	Dr. Han Phoumin	ERIA, Jakarta	Senior Economist
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7	Mr. Thanan Marukatat	APERC, Tokyo	Research Fellow
8	Ms. Elvira Gelindon	APERC, Tokyo	Research Fellow
9	Mr. Nabih Matussin	APERC, Tokyo	Senior Researcher
10	Mr. Juniko P. Parhusip	APERC, Tokyo	Senior Researcher

REFERENCES

Antara News. (2021). Retrieved from https://en.antaranews.com/news/199553/police-send-forensic-team-to-investigate-fire-at-pertaminas-refinery.

APERC. (2025 NP). *Oil Emergency Scenario for Oil and Gas Security Exercise in Indonesia 2-4 February 2025*.

APERC. (2025 NP). *Oil Emergency Scenario for the Oil and Gas Security Exercise in Indonesia 2-4 February 2025*.

APERC. (2025 NP). Gas Emergency Scenario for Oil and Gas Security Exercise in Indonesia, 2-4 February 2025. Denpasar, Bali.

Asia Pacific Energy Research Centre. (2025). Indonesia Oil Refinery Modelling Result for APEC Energy Outlook 2025 . *Not Published* .

Badan Geologi. (2021). Retrieved from https://geologi.esdm.go.id/media-center/gempa-bumi-merusak-di-indonesia-tahun-2021.

Detik Jateng. (2024). Retrieved from https://www.detik.com/jateng/berita/d-7611589/gempa-m-2-7-terjadi-di-semarang-pagi-ini.

Directorate General of Oil and Gas. (2012). Ministerial Decree Number 2700K/11/MEM/2012 . *National Gas Transmission and Distribution Network Planning*.

Directorate General of Oil and Gas, Republic of Indonesia . (2024). *Statistik Migas 2024* . Directorate General of Oil and Gas, Republic of Indonesia.

Dunia Energi . (2024). *https://www.dunia-energi.com/ikhlas-menjaga-denyut-nadi-energi/pola-operasi-bbm-pertamina/*. Retrieved from https://www.dunia-energi.com/ikhlas-menjaga-denyut-nadi-energi/pola-operasi-bbm-pertamina/.

Dunia Energi. (2023). Retrieved from https://www.dunia-energi.com/produksi-lapangan-jambaran-tiung-biru-sudah-110-mmscfd-phe-harap-konsumen-gas-bertambah/.

EGEDA. (2024). Retrieved from https://www.egeda.ewg.apec.org/egeda/database_info/index.html.

Energy Institute. (2024). Retrieved from https://www.energyinst.org/statistical-review.

Global Data. (2024). *https://www.offshore-technology.com/data-insights/indonesia-natural-gas-production/*.

Indonesia Statistic Office . (2024). *Statistic of Indonesia 2024* . Jakarta : Badan Pusat Statistik .

Ministry of Energy and Mineral Resources. (2023, February). Presentation of Minister at the Gas Exporting Countries Forum 2023 . *Indonesia's Strategy and Plan to Escalate Natural Gas Use* . Ministry of Energy and Mineral Resources.

Ministry of Energy and Mineral Resources, Republic of Indonesia. (2012). *Minister Decree Number 2700K/11/MEM/2012*. Ministry of Energy and Mineral Resources, Republic of Indonesia. Retrieved from www.esdm.go.id.

Ministry of Energy and Mineral Resources, Republic of Indonesia. (2023). *Minister Decree Number 10K/01/MEM/2023*. Ministry of Energy and Mineral Resources, Republic of Indonesia. Retrieved from www.esdm.go.id.

Ndaru, B. K. (2023). *PetroRaya*. Retrieved from https://www.petroraya.com/article/from-east-to-west-the-java-gas-infrastructure-integration/.

Pertamina. (2024). *Refinery Operation of Pertamina*. Retrieved from https://kpi.pertamina.com/en/profil-perusahaan/bisnis-kami.

Pertamina Patra Niaga. (2025). Retrieved from https://pertaminapatraniaga.com/page/profil.

Pramono, S., Utama, M. J., & Swastikarani, R. (2023). Implementation Early Design of Prototype EEWS. *Research Square* .

PricewaterhouseCoopers. (2024). *https://www.pwc.com/id/en/energy-utilities-mining/assets/oil-gas-guide-2024.pdf.*

Putri , D. S., Wibiseno, S. P., Maharani, T. E., Aribowo, B. W., Fauzan, M. A., & Alfaiz, K. (2022). Peak Ground Acceleration (PGA) Analysis of Kendeng Fault Using Earthquake Information of The Last 50 Years . *Annual Meeting of Indonesia Geologist Association .* Makassar, South Sulawesi : Indonesia Geologist Association.

Special Task Force for Oil and Gas. (2023). *https://www.skkmigas.go.id/page/Renstra%20IOG/renstra-iog-4.0FvnzU*.

Special Task Force for Oil and Gas. (2025). *https://www.skkmigas.go.id/*.

World Bank . (202). *https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=ID*.

World Bank. (2024). *https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=ID*.