



# COUNTRY PROFILING 2024

**REVEALING UPDATE**

on the energy landscape of **10** Southeast Asian Countries





**COUNTRY  
PROFILING  
2024**

## FOREWORDS

Distinguished Leaders, Partners, and Colleagues, In an era defined by both unprecedented challenges and remarkable opportunities, the energy landscape in ASEAN is undergoing a transformative shift. As the energy demands of our growing economies continue to rise, so too does the urgency to adapt, innovate, and collaborate across borders. The ASEAN Council on Petroleum (ASCOPE) stands at the forefront of this evolution, uniting our member nations with a shared commitment to fostering energy security, affordability, and sustainability. At the heart of ASCOPE's mission is the belief that collaboration between our nations is the key to unlocking new pathways for growth and resilience. By strengthening business ties, sharing expertise, and building upon our collective strengths, we can address the complex challenges facing the oil, gas, and energy sectors, while also positioning ASEAN as a global leader in the transition to a cleaner, more diversified energy future.



This Country Profiling initiative offers a comprehensive view of each member nation's resources, energy landscapes, and strategic priorities. More importantly, it serves as a gateway to business collaboration, providing insights into potential synergies that can drive forward not just national agendas but also our collective regional aspirations. Whether through investments in upstream and downstream operations, the development of LNG infrastructure, or the acceleration of renewable and low-carbon energy projects, each profile reflects opportunities for meaningful partnerships that will

In this pivotal era of transformation, ASCOPE's roles in driving innovation and building resilient energy ecosystems is essential. Our ability to collaborate strategically and align on a shared vision will be the cornerstone of navigating the complexities of today's energy market. Together, through collaboration and a shared vision, we will navigate the complexities of today's energy market and lay the foundation for a sustainable, secure, and prosperous future for ASEAN.

**Henricus Herwin**  
PT Pertamina (Persero)  
ASCOPE Secretary in-Charge 2024 - 2029

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ENHANCING  
CONNECTIVITY

**ASCOPE**  
ASEAN COUNCIL ON PETROLEUM



ASCOPE (ASEAN Council on Petroleum) is a multilateral forum for the oil and gas industry in Southeast Asia. It provides a platform for national oil and gas companies from ASEAN member countries to collaborate, share knowledge, and address industry challenges. It was established in 1975 aiming to promote active collaboration and mutual assistance in the development of the petroleum resources in the region through joint endeavors in the spirit of equality and partnership.

The ASEAN Council on Petroleum (ASCOPE) was proposed by Pertamina, the Indonesian state-owned oil and gas company, in June 1975. The primary aim was to foster regional cooperation in the petroleum industry among ASEAN member countries. At its inception, the ASEAN member countries involved were Indonesia, Malaysia, Philippines, Singapore, and Thailand.

ASCOPE then is one of the ASEAN's Specialized Bodies under the pillar of ASEAN Economic Community (AEC). As Energy is key to realizing the ASEAN Economic Community (AEC)'s goal of a well-connected ASEAN, In September 1980, ASEAN Economic Ministers convened the first ASEAN Economic Ministers on Energy Cooperation (AEMEC) in Bali, Indonesia. The Agreement on ASEAN Energy Cooperation signed by ASEAN Member States on 24 June 1986 marked the formal establishment of the energy cooperation.

Various energy Sub Sector Networks (SSN), Specialized Energy Bodies (SEB) and other energy platforms are organized to work under or in coordination with the Senior Official Meeting on Energy (SOME). The bodies provide technical recommendations to SOME and AMEM in their areas of specialization and pursue joint and cooperative activities among Member States, with the help of their respective subsidiary bodies.

**Under the ASCOPE organization structure, there are four (4) Task Forces:**

1. Exploration and Production (E&P)
2. Gas Advocacy (GA)
3. Clean Energy (CE)
4. Policy, Research, and Capability Building (PRCB)

ASCOPE has been instrumental in strengthening regional cooperation in the petroleum industry within ASEAN. By facilitating dialogue and joint initiatives, ASCOPE has helped member countries leverage their collective expertise and resources, contributing to more effective management of the region's energy resources. The establishment of ASCOPE marked a significant step towards regional collaboration in the oil and gas sector, reflecting the importance of collective efforts in addressing the complex and evolving challenges of the industry.

**Recently there are 10 ASCOPE Members:**



Ministry Of Energy  
Brunei Darussalam



Ministry of Mines  
and Energy  
Cambodia (MME)



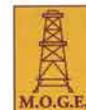
National Oil Company of  
Indonesia (Pertamina)



Lao State Fuel  
Company (LSFC)



Petroleum  
Nasional Berhad  
(PETRONAS)



Myanmar Oil and  
Gas Enterprise  
(MOGE)



Philippine  
National Oil  
Company (PNOC)



Singapore LNG  
Corporation Pte Ltd  
(SLNG)



PTT Public Company  
Limited (PTT)



Vietnam Oil & Gas  
Group (Petrovietnam)

# Key Milestone and Evolution

## 1 Formation and Initial Objectives (1975)

June 1975: ASCOPE was proposed by Pertamina of Indonesia to foster regional cooperation in the petroleum industry among ASEAN member countries. The initial members were Indonesia, Malaysia, Philippines, Singapore, and Thailand.

## 3 Expansion of Membership (1980s-1990s)

1980s-1990s: ASCOPE expanded its membership as more ASEAN countries joined the association. This included countries like Brunei (1984), Vietnam (1990), Myanmar (1996), and Laos (1997). This expansion helped integrate more diverse perspectives and resources into ASCOPE's activities.

## 5 Establishment of the ASCOPE Energy Portal (2000s)

2000s: The ASCOPE Energy Portal was established as a central repository for information and resources related to the petroleum industry. This portal aimed to facilitate better access to data, research, and best practices for member countries.

## 7 Commemoration of 40th Anniversary (2015)

2015: ASCOPE celebrated its 40th anniversary, marking four decades of regional cooperation and progress in the petroleum sector. This milestone highlighted the organization's achievements and the ongoing commitment of its member countries to collaboration and development.

## 9 Emphasis on Energy Transition and Innovation (2020s)

2020s: ASCOPE has increasingly focused on the energy transition, innovation, and digital transformation in the oil and gas sector. This includes exploring new technologies, supporting the shift towards renewable energy sources, and adapting to changing global energy dynamics.

## 2 Formal Establishment and Early Activities (1976)

1976: ASCOPE was formally established as an organization dedicated to improving collaboration and knowledge exchange in the oil and gas sector. The organization began organizing regular meetings and working groups to address industry challenges and promote joint initiatives.

## 4 Development of Joint Projects and Initiatives (1990s-2000s)

1990s-2000s: ASCOPE launched several joint projects and initiatives aimed at improving technology, increasing efficiency, and addressing common industry issues. These included joint research projects, training programs, and collaborative ventures in exploration and production.

## 6 Focus on Sustainability and Environmental Issues (2010s)

2010s: ASCOPE began to place greater emphasis on sustainability and environmental concerns. This included initiatives to address the environmental impact of oil and gas activities and promote the adoption of cleaner technologies.

## 8 Introduction of the ASCOPE Strategic Plan (2020)

2020: ASCOPE introduced a new strategic plan focusing on enhancing regional energy security, promoting sustainable practices, and leveraging digital technologies. This plan aimed to address the evolving challenges of the industry and align ASCOPE's activities with the broader goals of ASEAN.

## 10 Strengthening Regional Integration and Collaboration (Ongoing)

Ongoing: ASCOPE continues to strengthen regional integration and collaboration, working on new projects, addressing emerging challenges, and enhancing its role as a key player in the ASEAN energy sector.

The 4th ASCOPE Mid-Year Task Force Meeting was held virtually for the first time on the 13th August 2020 due to Covid-19 pandemic situation. The meeting was chaired by Dr. Tran Hong Nam, ASCOPE Secretary-In-Charge and attended by ASCOPE Country Coordinators, Task Forces Chairpersons and Members.



## ASCOPE Core Functions

### Knowledge Exchange

ASCOPE facilitates the sharing of expertise and best practices among its member organizations, helping them stay abreast of the latest technological advancements and industry trends; Plan, identify, evaluate and recommend to the Council members areas of cooperation and new business opportunities/projects for Member Countries' consideration.

### Cooperation Initiatives

ASCOPE promotes joint ventures and cooperative projects among its members, fostering regional integration and enhancing the overall competitiveness of the Southeast Asian oil and gas sector; Pursue the strategies and objectives of ASCOPE towards realizing the new ASCOPE vision in each respective area of business development, technology and service.

### Critical Issues

The organization addresses pressing issues facing the oil and gas sector, such as resource management, environmental concerns, and regulatory changes. This collaborative approach helps member companies tackle challenges more effectively; Seek the Council members' approval on specific areas of cooperation among Member Countries or business joint venture projects to be pursued, particularly those that would require funding.

### Gas Cooperation within ASCOPE

One of the most significant initiatives of ASCOPE, the Trans ASEAN Gas Pipeline (TAGP) Project is envisioned to "establish interconnecting arrangements of electricity and natural gas in ASEAN" to ensure greater security and sustainability of energy supply in the region.

A TAGP Masterplan has been prepared and this serves as the blueprint and/or plan of action in undertaking the gas pipeline project in the region. To date, 13 bilateral connections have already been established with a total of 3,631 kilometers of pipeline connections making possible the transmission of gas molecules to and from ASCOPE Member Countries or Member States.

The ultimate aim is to have multilateral pipeline projects. Following an assessment of its strategic direction in 2012, the focus of TAGP Project now includes liquefied natural gas (LNG) as an option for gas supply in the region, especially for countries that physical pipelines may not be economic, whereby LNG would be supplied to regional regasification terminals (RGTs) acting as virtual pipelines.

Currently, the operationalisation of nine (9) Regasification Terminals (RGTs) in 7 countries (Indonesia, Malaysia, Singapore, Myanmar, Philippine, Vietnam and Thailand). The current total capacity for regas terminal is 57.76 MTPA. While there are several challenges at hand such as shortage of gas sources, huge investment requirements (for the infrastructure needed), among others, ASCOPE Member Countries have been closely working to address the same in the spirit of cooperation and synergy.

Fired power plants, and LNG import facilities totalling over US\$50 billion are at high risk of cancellation as gas-fired electricity becomes unaffordable in emerging markets

Picture: Southeast Asian Development Solutions (SEADS)

# Organization and Structure

## 1. ASCOPE COUNCIL

The ASCOPE Council is the highest authority within the Organization. The Head of the National Oil and Gas Company in each Member Country serves as the Council Member. In the event there is no National Oil and Gas Company, then the Head of the national entity responsible for oil and gas serves as the Council Member.

## 2. ASCOPE COUNTRY COORDINATORS

In each Member Country an ASCOPE National Committee is set up as the principal administrative arm. The ASCOPE National Committee is responsible for:

1. implementing the policies and decisions directed and approved by the ASCOPE Council
2. carrying out the work of the Council in between the ASCOPE Council meetings
3. servicing all meetings held by ASCOPE

## 3. THE ASCOPE SECRETARIAT

The ASCOPE Secretariat is headed by the ASCOPE Secretary In Charge. Its scope of works are: serving as the coordinating body for all ASCOPE activities; representing ASCOPE in dealings with external

organizations and institutions; maintaining consolidated information, data, and materials on petroleum collected by the ASCOPE Working Committees.

To run its coordination mechanism, the ASCOPE national committee conducts meetings regularly. The Chairmen of the ASCOPE National Committee are appointed by their respective ASCOPE Council Members. Later, the result is reported to the ASCOPE Council. Recently there are four (4) Task Forces under ASCOPE coordination:

- Exploration and Production (E&P)
- Gas Advocacy (GA)
- Clean Energy (CE)
- Policy, Research, and Capability Building (PRCB)

The annual joint meetings are a central feature of ASCOPE's activities, bringing together representatives from all member companies to discuss ongoing projects, set future agendas, and reinforce their collaborative efforts. These meetings are crucial for aligning strategies, addressing sector-wide challenges, and exploring new opportunities for growth and innovation.

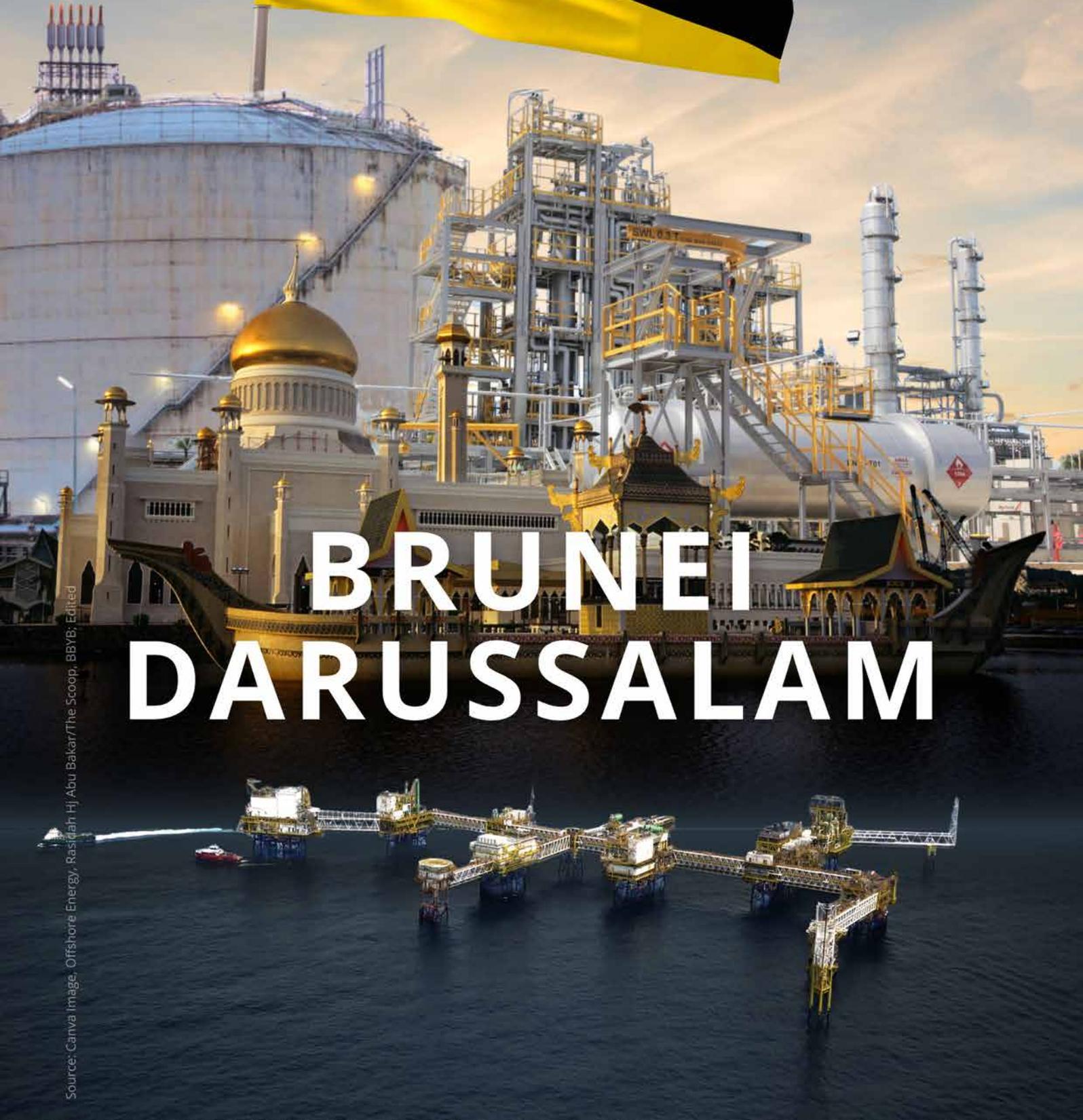


# TABLE OF CONTENTS

<b>iii</b>	<b>ASCOPE</b>
<b>1</b>	<b>BRUNEI DARUSSALAM</b>
<b>14</b>	<b>CAMBODIA</b>
<b>27</b>	<b>INDONESIA</b>
<b>41</b>	<b>LAO PDR</b>
<b>50</b>	<b>MALAYSIA</b>
<b>62</b>	<b>MYANMAR</b>
<b>79</b>	<b>PHILIPPINES</b>
<b>91</b>	<b>SINGAPORE</b>
<b>106</b>	<b>THAILAND</b>
<b>119</b>	<b>VIETNAM</b>

The Jagus East and Geronggong discoveries will be tied back to Shell's Gumusut-Kakap production facility offshore Malaysia

Picture: SHELL



# BRUNEI DARUSSALAM

## Country Key Highlights

### Government/ Political System

Absolute Monarchy or Sultanate<sup>1</sup>

### Demography

460,000 (2024)<sup>2</sup>

### GDP and Percentage From O&G

The Sultanate's GDP in 2023 was USD 15.13 Billion.<sup>3</sup> GDP in current prices in Brunei Darussalam was forecast to continuously increase between 2024 and 2029 by a total USD 4.3 billion (+27.72 %). In the Q1 of 2024, Brunei Darussalam's Economy Grew 6.8% at BND 4,973.1 million<sup>4</sup>

In 2023, The oil and gas sector, comprising oil and gas mining and LNG manufacturing, accounted for 49.2 % of the total gross value added (GVA). While in 2024, The Oil and Gas Sector accounted for 46.9%, comprising oil and gas mining and manufacture of LNG<sup>5</sup>

### GDP Per Capita

USD 35.11 Thousand (2024)<sup>6</sup>

### Reserves

In March 2024, crude oil reserves for Brunei Darussalam was 92.4 thousand barrels/day<sup>7</sup>  
Natural gas: 9,200 BCF (April, 2024)<sup>8&9</sup>

### Oil & Gas Production

2022

Oil: 92 thousand barrels/day

Gas: 196 thousand BOE/day (Approx. 1,100,458.33 CF)

LNG: 758,016 MMBTU/day<sup>10</sup>

2023

Oil: 91.1 thousand barrels/day

Gas: 29.0 million meter cubic/day)

LNG: 718,862 MMBTU/day<sup>11</sup>

### Refining Capacity

In 2021, the refinery capacity in Brunei reached 341,307 TJ.<sup>12</sup> But, the government plans to increase its oil refinery capacity from 160,000 barrels/day to 280,000 barrels/day.<sup>13</sup>

### Domestic Demand

In February 2024, the oil demand reached 182 billion barrels/day.<sup>14</sup> While the gas demand in May 2024 was 252 MCM (approx. 8,9 BCF).<sup>15</sup>

### Upstream Fiscal Term

Production Sharing Contract (PSC) system<sup>16</sup>



# Energy Demand

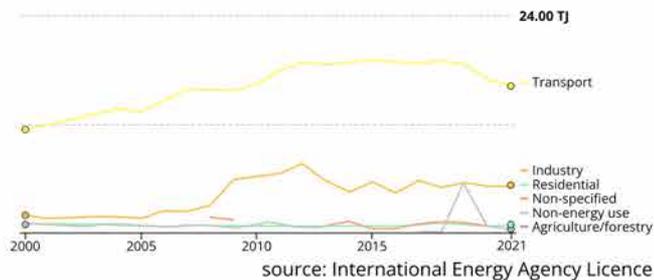
## Oil

### Oil Products Final Consumption by Sector, Brunei Darussalam, 2021



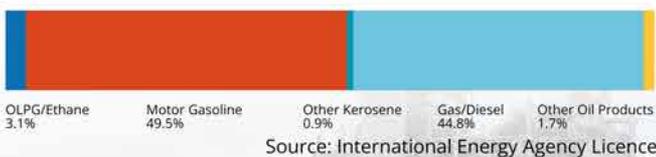
Most of the oil products were used in the transportation sector, it counted 71.9% in 2021. Industrial sector followed by 23.3% to consume oil.<sup>17</sup>

### Evolution of Oil Products Final Consumption by Source in Brunei Darussalam Since 2000



Evolution of oil final consumption by product in Brunei since 2000. It shows that the nations demanded high energy products for society transportation.<sup>18</sup>

### Oil Final Consumption by Product, Brunei Darussalam, 2021



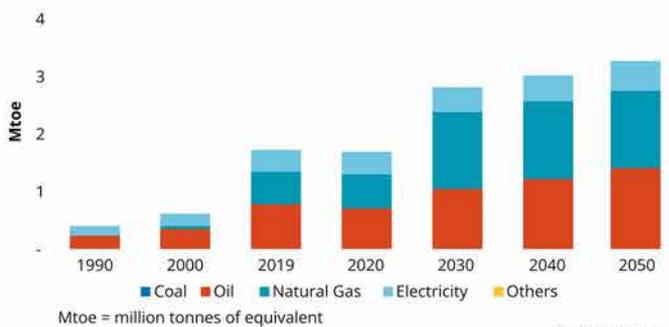
Motor gasoline demanded the most within Brunei society in 2021. It counted 49.5% and followed by gas/diesel at 44.8%.<sup>19</sup>

Entering January 2024 the demand for oil in Brunei was 175.7 thousand Bbl/day, seeing from the previous year 2023 the demand for oil in Brunei decreased by 15.3%.<sup>20</sup>

### Brunei Darussalam - Oil Demand

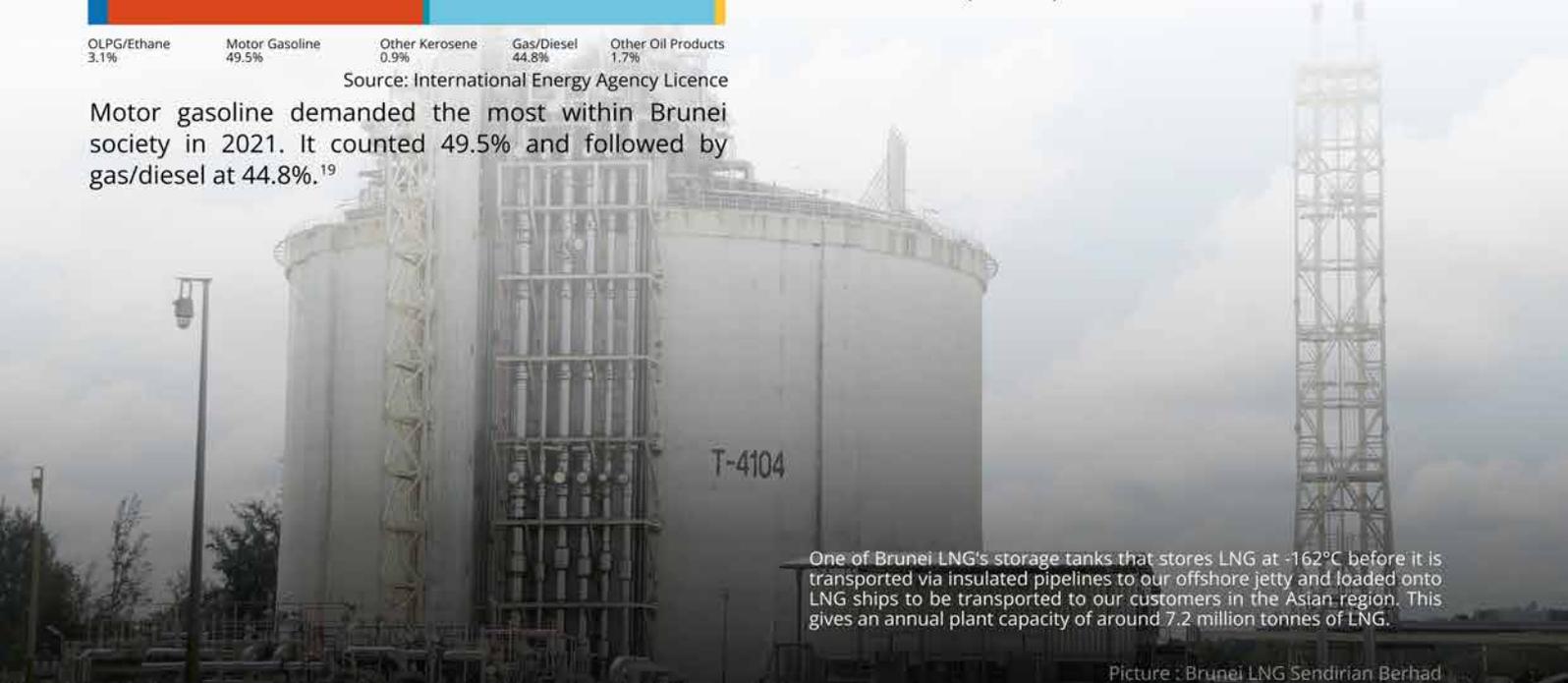
Brunei exports most of its petroleum liquids output, primarily to key Asian oil consumers, given the country's minimal domestic consumption. Brunei's consumption of total liquids has averaged about 17,000 b/d over the past several years, some of which is met by a small domestic refinery.<sup>21</sup>

### Final Energy Consumption by Fuel, Business as Usual



In 2023, ERIA predicted the oil demand will increase until 2050. Followed by natural gas in Brunei's energy mix.<sup>22</sup>

In 2022, Brunei imported \$5.05B in Crude Petroleum, becoming the 30th largest importer of Crude Petroleum in the world. In the same year, Crude Petroleum was the 1st most imported product in Brunei. Brunei imports Crude Petroleum primarily from: Malaysia (\$1.19B), United Arab Emirates (\$935M), Kazakhstan (\$540M), Qatar (\$523M), and Saudi Arabia (\$340M).<sup>23</sup>



One of Brunei LNG's storage tanks that stores LNG at -162°C before it is transported via insulated pipelines to our offshore jetty and loaded onto LNG ships to be transported to our customers in the Asian region. This gives an annual plant capacity of around 7.2 million tonnes of LNG.

Picture : Brunei LNG Sendirian Berhad



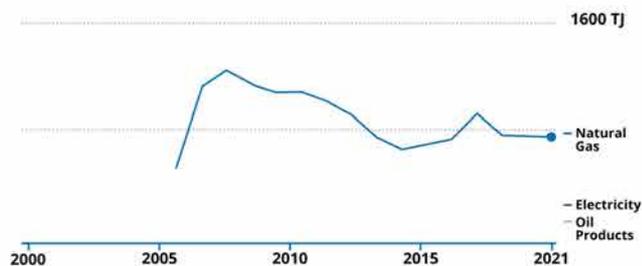
**An oil platform off the coast of Brunei**

In 2017, the Ministry of Energy introduced the National E&P Guidelines for Decommissioning and Restoration of Upstream Industry. The guidelines require all operators to take into account safety risks and environmental impact in managing their late-life onshore and offshore operations.

Picture: The Scoop

**Gas**

**Evolution of Residential Total Final Consumption by Source in Brunei Darussalam since 2000**



Source: International Energy Agency

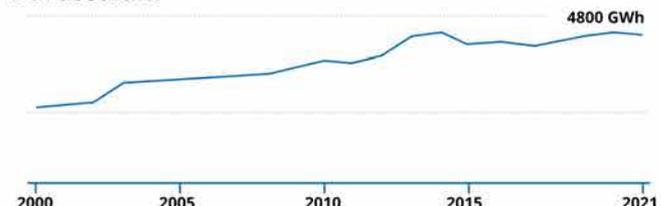
Approximately 77% of natural gas usage is allocated for electricity use, here is the evolution of residential total final consumption of natural gas by source in Brunei Darussalam Since 2000 with total usage in 2021 amounting to 748 TJ.<sup>24</sup>

About 98% of the electricity supplied in Brunei comes from natural gas, with a remaining 1% collectively coming from diesel and solar PV. The Department of Electrical Services (DES) – which owns four natural gas power stations (Gadong 1A, Gadong 2, Bukit Panggal, and Lumut) and a diesel power station (Belingus) – supplies about 58% of the national electricity requirements covering mainly residential areas. They were mainly used for cooking and water heating.<sup>25</sup>

The Berakas Power Company (BPC) – which operates three main natural gas power stations (Berakas, Gadong 3, and Jerudong) – supplies the remaining 42% that covers most of the strategic and critical areas such as government offices, hospitals, an international airport, etc.

The two major public utilities are owned by the Department of Electrical Services and the Berakas Power Company. All public utility power plants use natural gas to fuel the electricity grid.<sup>26</sup>

**Electricity Generation from Gas, Brunei Darussalam**



Source: International Energy Agency

Until 2021, natural gas has fulfilled the 4800 GWh electricity production of the nation. Therefore, the electrification rate in Brunei reaches 100%.<sup>27</sup>

In 2021, the top partner countries from which Brunei Imports Fuels include the Russian Federation, Malaysia, Saudi Arabia, Australia, and Singapore.<sup>28</sup>

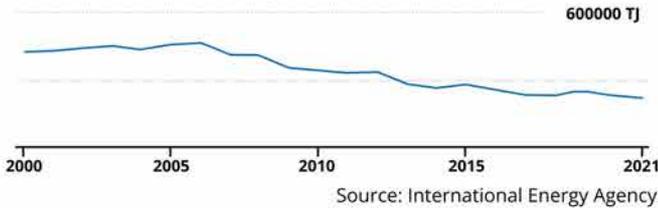
In 2022, Brunei imported \$370k in Petroleum Gas, becoming the 185th largest importer of Petroleum Gas in the world. Brunei imports Petroleum Gas primarily from: South Korea (\$197k), Malaysia (\$65.7k), China (\$59.3k), Singapore (\$30.8k), and United Kingdom (\$14.7k).<sup>29</sup>

The top imports of Brunei are Crude Petroleum (\$5.05B), Refined Petroleum (\$544M), Cars (\$249M), Coal Briquettes (\$165M), and Gas Turbines (\$128M), importing mostly from Malaysia (\$1.92B), United Arab Emirates (\$979M), China (\$866M), Singapore (\$662M), and Qatar (\$546M).<sup>30</sup>

# Energy Production

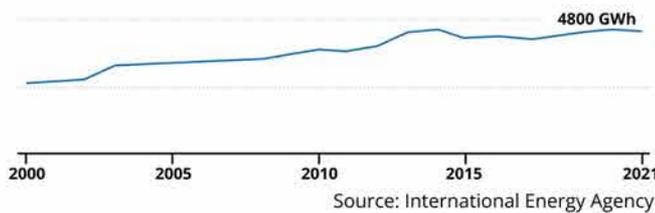
## Oil

### Crude Oil Production, Brunei Darussalam

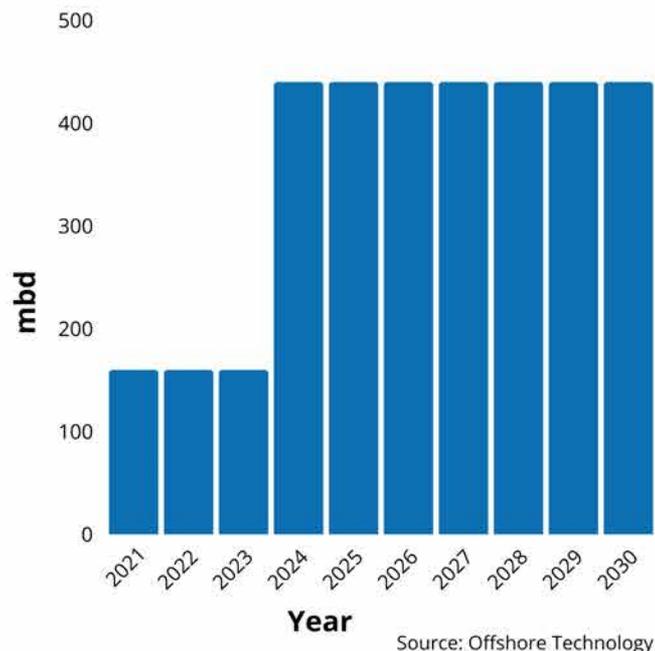


Between 2000 and 2021, there is an increasing trend in production for about 90%. In 2021, total oil supply in Brunei was 42813 TJ (Terajoule) and the crude oil production in total reached 224602 TJ (Terajoule). This oil production contributes to the electricity generation for 36GWh nationally.<sup>31</sup>

### Electricity Generation from Gas, Brunei Darussalam

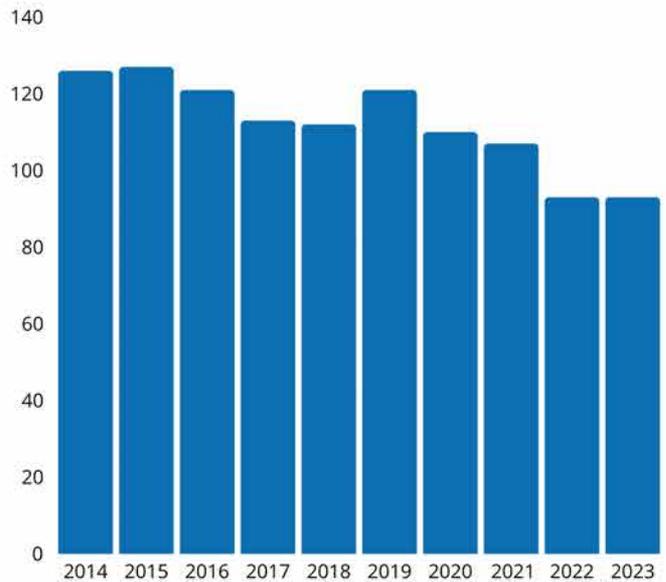


### Pulau Muara Besar Refinery Capacity, 2020-2030



The capacity of the refinery is expected to increase to 440mbd by 2030. During the period 2021-2025, the Pulau Muara Besar refinery is expected to witness an estimated capex of \$4,914.38 million.<sup>32</sup>

### Oil Production in Thousands of Barel per Day



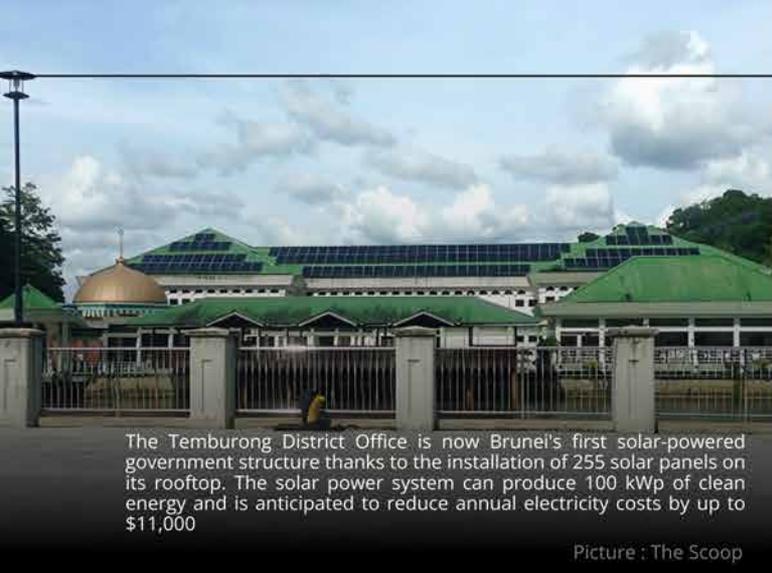
The oil production in Brunei stood at around 93 thousand barrels per day in 2023. This represented the same level of production as in the previous year. Comparatively, the oil production in Brunei was 126 thousand barrels per day in 2014.<sup>33</sup>

Despite repeated calls for diversification, Brunei's economy remains overwhelmingly dependent on the income derived from the sale of oil and gas and downstream products, which represents 80% of Brunei's total exports and 53.5% of the country's GDP on average.<sup>34</sup>

The largest destinations for Brunei exports (mostly mineral fuels) for 2022 were Australia, Japan, and China. The largest export sectors by market value were mineral fuels, chemicals, and machinery and transport equipment.<sup>35</sup>

In 2022, Brunei exported \$2.1B in Crude Petroleum, making it the 36th largest exporter of Crude Petroleum in the world. In the same year, Crude Petroleum was the 3rd most exported product in Brunei. The main destinations of Crude Petroleum exports from Brunei are: Australia (\$998M), Thailand (\$288M), India (\$277M), Singapore (\$259M), and Japan (\$76.8M).<sup>36</sup>

In 2021, Brunei exported Petroleum oils, preparation, worth 3,139,692.14US\$ Thousands.<sup>37</sup>

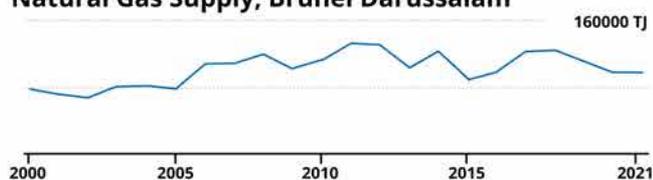


The Temburong District Office is now Brunei's first solar-powered government structure thanks to the installation of 255 solar panels on its rooftop. The solar power system can produce 100 kWp of clean energy and is anticipated to reduce annual electricity costs by up to \$11,000

Picture : The Scoop

## Gas

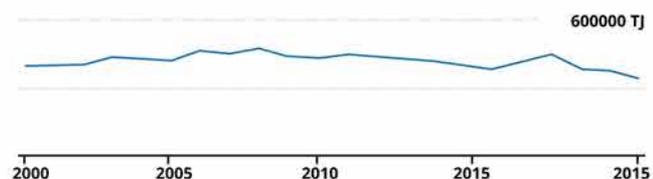
### Natural Gas Supply, Brunei Darussalam



Source: International Energy Agency

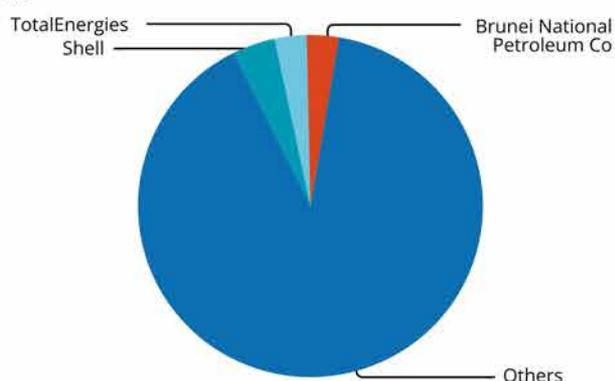
In 2021, the natural gas supply in Brunei Darussalam was 97562 TJ (Terajoule) in total, which showed an increasing trend up to 26% since 2000. The share of domestic gas production reached 340485 TJ (terajoule) in the same year. This production contributed to 77.5% electricity generation nationally, which accounted for 4417 GWh.<sup>38</sup>

### Domestic Natural Gas Production, Brunei Darussalam



Source: International Energy Agency

### Share of Natural Gas Production by Company, 2023



Source: GlobalData Oil & Gas Intelligence Center

Share of natural gas Production by Company, 2023. There are five natural gas producing fields in Brunei, all located offshore.

The South China Sea has the majority of the natural gas fields in the country.<sup>39</sup>

Brunei has 5 largest natural gas fields which supports the national demand on the fuel. The list are as follows:<sup>40</sup>

### Largest Natural Gas Producing Fields in Brunei (2023)

Fieldname	Constituententity	Production start year	Operator	Participants	Natural gas production in 2023 (mmcf)
Other Fields Brunei	Unknown	2000	Unspecified	Others	764
Maharaja Lela Jamalul Alam	South China Sea	2000	Total E&P Borneo	Shell; TotalEnergies; Brunei National Petroleum Co.	69
Gannet	South China Sea	1992	Brunei Shell Petroleum Company	Shell; Government of Brunei Darussalam	19
South West Ampa	South China Sea	1965	Brunei Shell Petroleum Company	Shell; Government of Brunei Darussalam	
Fairley	South China Sea	1978	Brunei Shell Petroleum Company	Shell; Government of Brunei Darussalam	

Source: Offshore Technology

While the three other gas fields remain underdeveloped. As follows:

### Largest Natural Gas Fields Under Development in Brunei (2024 - 2028)

Fieldname	Constituententity	Operator	Participants	Status	Start Year	Natural gas production in 2023 (mmcf)
Merpati-Meragi	South China Sea	Brunei Shell Petroleum Company	Shell; Government of Brunei Darussalam	Announced	2025	34536
Kelidang Cluster	South China Sea	Petronas Carigali Brunei	Petroleum Nasional; Mitsubishi; Shell; Brunei National Petroleum Co	Announced	2025	30000

Source: Offshore Technology

Brunei exported Natural gas, liquefied, worth 2,593,505.19 (US\$ Thousands) in 2021.<sup>41</sup>

In 2022, Brunei exported \$3.99B in Petroleum Gas, making it the 26th largest exporter of Petroleum Gas in the world. In the same year, Petroleum Gas was the 2nd most exported product in Brunei. The main destinations of Petroleum Gas exports from Brunei are: Japan (\$2.2B), Malaysia (\$757M), Thailand (\$262M), China (\$258M), and South Korea (\$191M).<sup>42</sup>

The top exports of Brunei are Refined Petroleum (\$4.94B), Petroleum Gas (\$3.99B), Crude Petroleum (\$2.1B), Cyclic Hydrocarbons (\$1.98B), and Nitrogenous Fertilizers (\$241M), exporting mostly to Australia (\$2.66B), Japan (\$2.32B), China (\$2.19B), Singapore (\$1.97B), and Malaysia (\$1.37B).<sup>43</sup>

### Exports Volume of Crude Oil and LNG (Q1 2023 & Q1 2024)

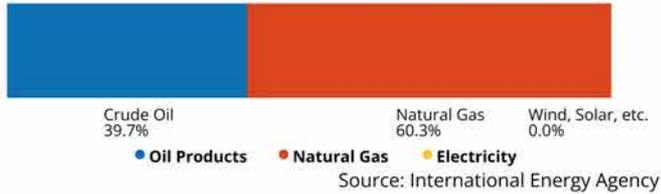
	Q1 2023	Q1 2024
Crude Oil (Thousand barrels per day)	59.4	77.5
LNG (MMBtu per day)	744388	749356

Source: Eenergy Department, Prime Minister's Office

Compared to the first quarter of 2023, the volume of exported gas in 2024 increased to 749,356 MMBtu per day.<sup>44</sup>

# Overall Energy Outlook

## Domestic Energy Production, Brunei Darussalam, 2021

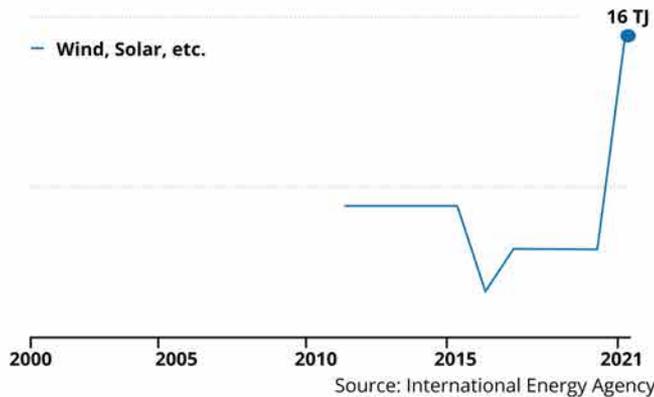


In 2021, overall domestic energy production of Brunei Darussalam was as follows:

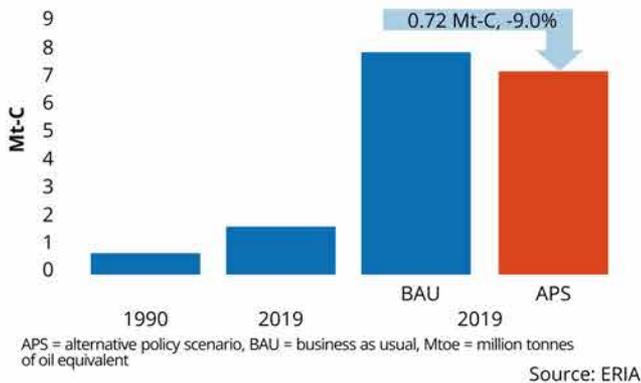
- a) Crude Oil 224 602 TJ;
- b) Natural Gas 340 485 TJ;
- c) Renewable Energy 15 TJ.

Natural gas remains the biggest share of Brunei’s energy mix. However, there is a significant development on the use of renewable energy especially wind and solar.<sup>45</sup>

## Evolution of Domestic Energy Production in Brunei Darussalam since 2000



## Brunei Darussalam – CO2 Emissions, Business as Usual and Alternative Policy Scenario



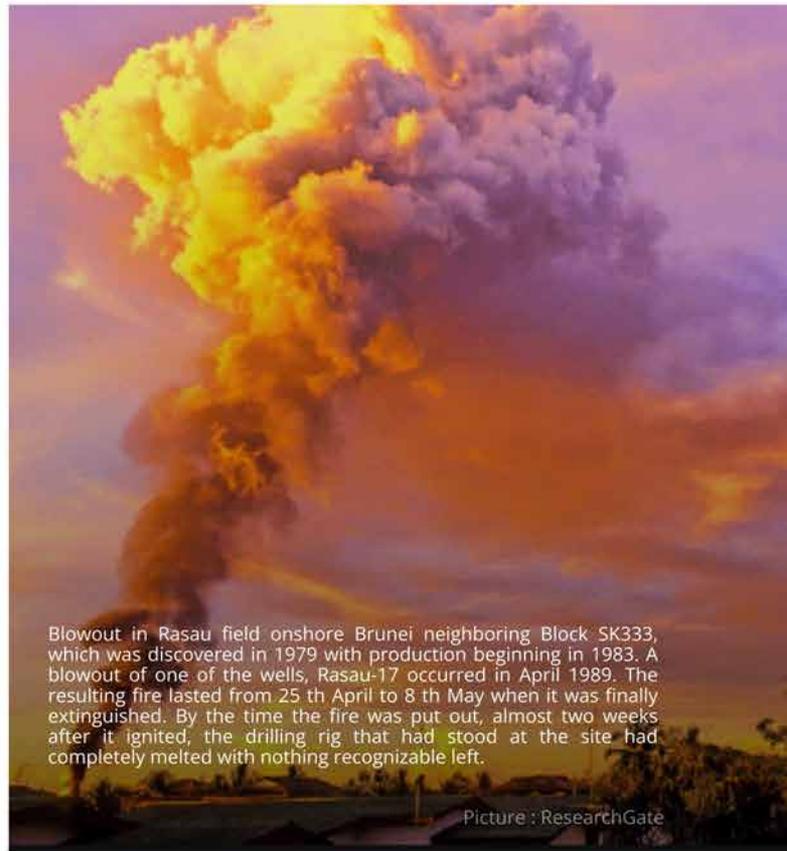
The government is expected to implement EEC initiatives, improve thermal efficiency in power generation plants, and integrate renewables, to reduce the total primary energy supply (TPES) by 1.1 Mtoe or 7.9% from Business as Usual (BAU) in 2050. It is related to the climate adaptation by the nation.<sup>46</sup>

Brunei has already implemented a solar demonstration power plant with the capacity of 1.2 MW. It is planned to expand this plant in the future. Moreover, in the long-term Brunei aims to develop offshore wind projects with a total capacity of between 18 and 20 MW. At this moment, the projects are in an early stage and feasibility study is required before further implementation.<sup>47</sup>

Brunei has been delivering gray hydrogen to Japan since 2019. The initial project caused a stir because it was the first time that hydrogen was exported internationally, in this case, over a distance of more than 4,000 kilometers (2,500 miles). Although the hydrogen from Brunei certainly reduced emissions in Japan, the gas, itself, is not currently being produced, using carbon-neutral processes.<sup>48</sup>

Brunei has implemented the National Appliance Standards and Labelling Regulation, which aims at reducing domestic energy consumption in order to enable higher exports of gas. The Energy Efficiency and Conservation Program envisages the reduction of energy use by 45% by 2035 based on 2005 level.<sup>49</sup>

According to the Energy White Paper, the national target is to increase the share of Renewable energy in the total power generation mix by 10% or 954,000 MWh in 2035 and at the same time to reduce energy intensity by 45% in line with Brunei’s commitment to Asia-Pacific Economic Cooperation (APEC).<sup>50</sup>



## Oil

Brunei has 12 power plants all over the country, most of them are natural gas based, as follows:<sup>51</sup>

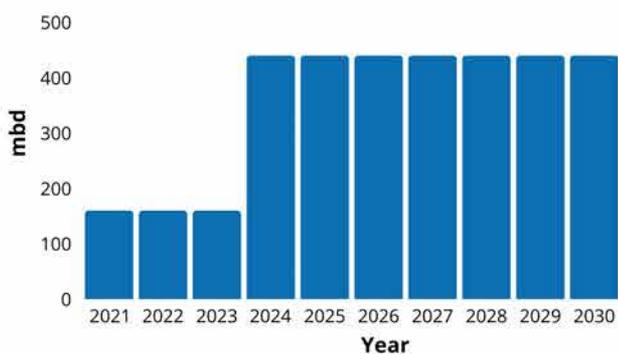
### All 12 Power Plants in Brunei

Name	English Name	Operator	Output	Source	Method
Lumut Cogen Power Plant		Department of Electrical Services	246 MW	Gas	Combustion
Hengyi Pulau Muara Besar Cogen Power Plant		Department of Electrical Services	220 MW	Gas	Combustion
Gadong Power Station 2		Department of Electrical Services	128 MW	Gas	Combustion
Bukit Panggal Power Plant		Department of Electrical Services	110 MW	Gas	Combustion
Berakas Power Plant		Berakas Power Company	102 MW	Gas	Combustion
Tenaga Suria Brunei Power Station			1.20 MW	Gas	Combustion
Belingus Power Station		Department of Electrical Services		Diesel	Combustion
Gadong Power Station 3		Berakas Power Company		Gas	Combustion
Jerudong Power Station		Berakas Power Company		Gas	Combustion
Stesen Janakuasa Gadong 1A	Gadong Power Station 1A	Jabatan Perkhidmatan Elektrik		Gas	Combustion

Source: Open Infrastructure Map

The most significant recent downstream project development is the full commercial operation of the Pulau Muara Besar (PMB) Refinery and Petrochemical Plant in November 2019. The PMB Refinery and Petrochemical Plant is the largest foreign direct investment project in Brunei Darussalam, with the capacity to refine 175,000 barrels per day of crude oil per year and generate 8 million tonnes of petroleum and petrochemical products per year.<sup>52</sup>

### Pulau Muara Besar Refinery Capacity, 2020-2030



Source: Offshore Technology

Hengyi Industries Sdn operates the Muara Besar Island refinery, located in Brunei and Muara, Brunei. It is an integrated refinery owned by Zhejiang Hengyi Group and Damai Holdings. The refinery, which commenced operations in 2019, has an NCI of 11. The capacity of the refinery is expected to increase to 440mbd by 2030. During the period 2021-2025, the Pulau Muara Besar refinery is expected to witness an estimated capex of \$4,914.38m.<sup>53</sup>

Brunei created high-end industrial parks with necessary infrastructure facilities to help businesses. The first initiative, which began in 2007, is the Sungai Liang Industrial Park (SPARK), a 271-ha site intended to be "a globally competitive industrial hub, with high end facilities and a streamlined administrative hub, centred in a business friendly environment. The complex is also a house to the integrated oil refinery in Brunei."<sup>54</sup>

A fertilizer plant with a production capacity of 1,365,000 MT of urea per year also commenced operations in early 2022. Oil industry by-products are used as a component to make commercial fertilizer. Local media suggest that the plant would employ some 500 people – primarily for local people – while providing greater in-country value. The facility is one of the largest fertilizer plants in the Southeast Asian region.<sup>55</sup>

## Gas

The largest producers of natural gas in Brunei are Shell, Total Energies and Brunei National Petroleum Co. Shell was the largest producer of natural gas in 2023 with output down by 18% in 2022. Most of the gas for LNG comes from three fields in Brunei Shell's western area of operation, South – West Ampa, Fairley and Gannet. Beginning 1st April 1999, gas to BLNG will come from Jamalul Alam and Maharaja Lela fields of BBJV.<sup>56</sup>

Liquefied natural gas (LNG) is the main product produced by Brunei LNG. Brunei LNG's 130-hectare plant has five liquefaction trains capable of processing 9,700m<sup>3</sup> of gas per day, with natural gas supplied by Brunei Shell Petroleum Company Sdn Bhd (BSP) and Block B Joint Venture (BBJV) comprising of Total E&P Borneo BV, Shell, and Petroleum Brunei.<sup>57</sup>

The LNG of Brunei LNG is stored in specially designed storage tanks prior to shipping by dedicated LNG tankers to the customers in the Asian region. Part of the feed is conditioned and exported to the Department of Electrical Services (DES) power plants located in Lumut. At the LNG Plant on the coast of Lumut five liquefaction trains remove impurities from the gas, dehydrate it and cool it to its liquid state at -162°C when it occupies one six hundredth of its volume as gas.<sup>58</sup>

Brunei LNG is delivered to customers every two or three days, over 14-day round trips. The vessels measuring 147,000m<sup>3</sup> – 154,800m<sup>3</sup> are managed by Brunei Gas Carriers Sdn Bhd.<sup>59</sup>

## Other Energy Sources

Renewable energy deployment in Brunei Darussalam is still in its infancy - the country currently has only a 1.2 MW solar photovoltaic (PV) plant, Tenaga Suria Brunei located at Seria in Belait District, in addition to small-scale grid-connected and off-grid solar projects. Achieving 10 percent renewable energy in the electricity generation mix is a challenge, despite abundant sunshine with solar radiation between 4.83 kWh/m<sup>2</sup>/month to 5.83 kWh/m<sup>2</sup>/month.<sup>60</sup>

The Temburong District Office is now Brunei's first solar-powered government structure thanks to the installation of 255 solar panels on its rooftop. The solar power system can produce 100 kWp of clean energy and is anticipated to reduce annual electricity costs by up to \$11,000, according to a statement released on 10 July 2021 by the Ministry of Energy.<sup>61</sup>

A methanol plant has been operational in Brunei since 2010, while the multi-billion-dollar Pulau Muara Besar (PMB) Refinery and Petrochemical Plant opened at the end of 2019.

Phase one of the PMB refinery commenced operations with a crude oil refining capacity of 175,000 B/D.<sup>62</sup>

A demonstration project jointly conducted between Brunei Darussalam and Japan, and operated by the Advanced Hydrogen Energy Chain Association for Technology Development (AHEAD). The project has reached a significant milestone after successfully transporting hydrogen produced from the Sungai Liang Industrial Park (SPARK) to Japan, since December 2019. This hydrogen was successfully extracted and supplied to Japanese power plants on 25 May 2020. This landmark achievement marks the success of the world's first international hydrogen supply chain.<sup>63</sup>

The Brunei Fertilizer Industries' ammonia and urea production plant also add to the expansion of the country's downstream energy portfolio. In 2019, the construction of the project generated local employment of 411. The plant is scheduled to start operations in the second quarter of 2021 with a production capacity of 3, 900 metric tonnes per day of urea.<sup>64</sup>



## Recent

## Oil

Beyond Brunei Shell Petroleum (BSP), Brunei Liquefied Natural Gas (BLNG) is also a major player in the petrochemical industry that may seek equipment and services.<sup>65</sup>

BSP showed updated information about business opportunities through its website portal: <https://www.bsp.com.bn/main/icv/business-opportunities/expression-of-interest>. It can be accessed openly for all people.<sup>66</sup>

The Petroleum Authority of Brunei Darussalam and the Brunei Economic Development Board (BEDB) signed an Implementation Agreement with Hengyi Industries for the Pulau Muara Besar (PMB) Phase 2 Development Project. The development includes:<sup>67</sup>

- a. Creating over 2,000 jobs by 2029, with 50% allocated for Bruneians.
- b. An 1.65MMTA ethylene cracker and a 2.5/2.2MMTA PTA/PET plant, among other facilities, to produce refined petroleum products for various industries.<sup>68</sup>

TotalEnergies' sale of its wholly-owned subsidiary, TotalEnergies EP (Brunei), to Hibiscus Petroleum for \$259 million is expected to close in the fourth quarter of 2024. The recent situations are:<sup>69</sup>

- a. The French player's Brunei business arm owns and operates a 37.5% interest in Block B, with Shell Deepwater Borneo (35%) and Brunei Energy Exploration (27.5%) as partners.
- b. The field represented a net production for TotalEnergies of approximately 9,000 barrels of oil equivalent per day in 2023.

- c. Hibiscus expects Block B to add a net of up to 21.7 MMboe to its 2P reserves, a hike of 36% from 60.9 MMboe to 82.6 MMboe as of January 1, 2024, while total daily net production of oil, condensate, and gas is anticipated to increase by about 7,865 boe per day from 21,398 boe per day to 29,263 boe per day in CY2024.

The second phase of Hengyi Industries' refinery and petrochemical plant in Pulau Muara Besar (PMB) is slated to increase its production capacity by two million tonnes per annum (MTPA), totalling 11 MTPA.

With the integration of the existing refining facility, the new phase two project at PMB Industrial Park which operations to begin in 2029, will garner new sources of refined petroleum products such as ethylene, polyethylene, butadiene, and polypropylene.<sup>70</sup>

### Salman Total Production

Salman is a conventional oil development located deepwater in Brunei and is operated by Brunei Shell Petroleum Company Sdn. Salman was discovered in 2011, lies in block BSP 1 & 2 Offshore Agreement Area, with water depth of around 220 feet. The project is currently in commissioning stage and is expected to start commercial production in 2024. The development cost is expected to be \$568 m. The Salman conventional oil development will include subsea tree and wellhead platforms.<sup>71</sup>

The In Country Value Opportunities are derived from Brunei Shell Petroleum (BSP). Open collaboration in:

- o Infrastructure development, especially in marine vessels
- o Training and Professional development
- o In-Country Manufacturing
- o Local Services
- o Digitalization
- o Energy Transition

### Hengyi Industries' refinery and petrochemical plant in Pulau Muara Besar (PMB)

Hengyi began operations on Pulau Muara Besar in November 2019 and has since exported over \$1.4 billion in petroleum products, giving a significant boost to Brunei's economy. The sultanate recorded positive GDP growth of 3.9 percent in 2019, the first time in four years.

Picture : The Scoop

## Gas

Expansion Projects in Brunei Darussalam:<sup>72</sup>

- **LNG Plant Upgrades:** Investment opportunities exist in upgrading existing LNG plants to increase efficiency and capacity. This includes the introduction of new technologies to improve gas extraction and processing).
- **New LNG Projects:** There are ongoing efforts to explore new gas fields and develop additional LNG facilities to meet growing global demand.

### Largest natural gas fields under development in Brunei (2024 – 2028)

Field name	Constituent entity	Operator	Participants	Status	Start year	Natural gas production in 2023 (mmcf)
Merpati-Meragi	South China Sea	Brunei Shell Petroleum Company	Shell; Government of Brunei Darussalam	Announced	2025	34536
Kelidang Cluster	South China Sea	Petronas Carigali Brunei	Petroliaam Nasional; Mitsubishi; Shell; Brunei National Petroleum Co	Announced	2025	30000

source: Offshore Technology

Largest natural gas fields under development in Brunei (2024 – 2028). There are five natural gas producing fields in Brunei, all located offshore. The South China Sea has the majority of the natural gas fields in the country with four.<sup>73</sup>

Brunei Shell Petroleum (BSP) and Brunei LNG (BLNG) opened the opportunity for IT companies and startups to explore business opportunities in digitalisation.<sup>74</sup>

#### Kelidang Cluster Total Production

Kelidang Cluster is a conventional gas development located in ultra-deepwater in Brunei and is operated by Petronas Carigali Brunei. It lies in block Block CA 2, with water depth of around 8,531 feet. The project is currently in the feed stage and is expected to start commercial production in 2025. Final investment decision (FID) of the project was approved in 2023. The field is owned by Brunei National Petroleum Co Sdn, Mitsubishi, Petroliaam Nasional and Shell.<sup>75</sup>

#### Merpati-Meragi Total Production

Merpati-Meragi is a conventional gas development located deepwater in Brunei and is operated by Brunei Shell Petroleum Company Sdn. Production from the Merpati-Meragi conventional gas development project is expected to begin in 2025 and is forecast to peak in 2025. Based on economic assumptions, the production will continue until the field reaches its economic limit in 2065. It is located in Merpati-Meragi Complex in Brunei.

The project is held through a joint venture with Shell and Brunei National Petroleum Company (PetroleumBrunei), with Petronas as the operator. It aims to provide a reliable backfill supply for Brunei's largest domestic LNG plant in Lumut, which is crucial for maintaining production levels. The project's field development plan involves a Floating Production, Storage, and Offloading (FPSO) vessel with a gas handling capacity of up to 450 million standard cubic feet per day (MMscfd), strategically installed at a water depth of 150 meters. This FPSO will be connected via a network of flowlines to up to six subsea trees, which will be installed in deeper waters at depths of 2000 meters, ensuring efficient gas extraction. Upstream cited industry sources as saying that the proposed floater will be leased on a 12-year charter contract with an option period of 3 years.<sup>76</sup>

## Other Energy Sources

The Philippines offers Brunei attractive investment opportunities with its abundant renewable energy resources and strong economic growth of 5.6% last year. The fastest in southeast Asia.<sup>77</sup>

The ministry also has called for proposals from interested parties to build and operate a 30 MW solar PV plant in Sungai Akar area of Brunei-Muara District.<sup>78</sup>

In an effort to advocate the Temburong district's green concept, the ministry has recently installed an 8 kW solar PV system on three-floor shop houses at Bumiputera Commercial Building in the district. The system is expected to reduce diesel fuel consumption of 4,200 litres per annum, and a corresponding carbon dioxide emissions reduction of 2,838 kg per annum.<sup>79</sup>

The Ministry of Energy has pledged to raise the capacity of renewable energy to at least 300 megawatts. Using a public-private partnership (PPP) model, the ministry is now planning to build a 30 megawatt solar plant in Kampong Belimbing in Mukim Kota Batu. There are plans made by the government of Brunei to construct the largest power plant in Brunei at:

- Sungai Akar with a capacity of 30MW, along with two more power plants at Tutong (Bukit Panggal) and Temburong (Kampong Belingos) by 2025.
- An expansion project for Tenaga Suria Brunei which aims to increase its capacity from 1.2MW into 4.2MW, is also planned.<sup>80</sup>

Brunei now has two options: significantly expand solar energy for the production of green hydrogen, or invest in carbon capture with the goal of either storing the CO2 or separating out the carbon for industrial uses.<sup>81</sup>

## Ministries

Department of Energy. Among others, the division is responsible for the following areas:

1. International Affairs, Relations and Cooperation: To advance and safeguard Brunei Darussalam's national interest through international energy cooperation (bilateral, regional and multilateral)
2. Strategic Communications and Stakeholder Relations: To optimally engage with key energy stakeholders (oil and gas, power and related industries) through meaningful, effective and strategic engagements and communications.
3. Corporate Communications and Public Relations: To manage internal and external communication needs of the Department by carrying out public relations and communication related activities in alignment with the organization's strategic direction, objectives and values.<sup>82</sup>

The Petroleum Authority of Brunei Darussalam was established on the 31st December 2019, a statutory body tasked by the Ministry of Energy to oversee operations and infrastructure in the upstream, midstream and downstream oil and gas sector. Its establishment serves as a step towards further strengthening the regulation of the industry to ensure prudent and sustainable utilisation and development of the country's oil and gas resources for a more resilient and stable oil and gas industry.

The Brunei Climate Change Secretariat (BCCS), on the other hand, was formed in 2018 which functions as an operational wing to develop, implement, monitor and evaluate climate change policies, strategies and actions in Brunei Darussalam in addition to acting as a secretariat to coordinate the climate change governance.<sup>82</sup>

## Agencies



Autoriti Elektrik Brunei Darussalam (AEBD)



Sustainable Energy Division (SED)



Brunei National Energy Research Institute (BNERI)



Brunei Economic Development Board (BEDB)



Brunei Energy Services & Trading



Brunei LNG



Brunei Methanol Company



Brunei Fertilizer Industries Sdn Bhd (BFI)



Brunei Shell Petroleum

Brunei's first solar farm started operation in 2010. This B\$20 million solar farm is named 'Tenaga Suria Brunei (TSB)' and is located in Seria. With a nominal capacity of 1.2 kWp, the farm covers an area of about 12,000 sq meters with exactly 9,234 pieces of solar panels.

Picture : SolarBrunei.com

**Seria Oil Field**

The largest oil field in northwest Borneo on a 6-hour drive from Bandar Seri Begawan that explores Brunei's logging, resource extraction, and conservation efforts. The sites consist of Brunei Liquefied Natural Gas Plant, the Forestry Museum, and the Seria Oil Field, then have a classic Brunei lunch in Kuala Belait.

Picture: Borneoguide



Brunei Darussalam aims to achieve an economic output of BND5 billion per year from its downstream oil and gas industry by 2035. The logistics sector has grown through partnerships with the government, private sector, and international companies, with Muara Port's enhanced capacity strengthening connectivity with China and positioning Brunei as a key hub for BIMP-EAGA-China cooperation. Key data: BND5 billion target and Muara Port's role in regional connectivity.<sup>83</sup>

The Ministry of Energy to accelerate renewable energy deployment. One of them being the Renewable Energy Installation Certificate (REIC) programme introduced by the Sustainable Energy Division of the ministry. It is a nationwide renewable energy recognition programme, open to individuals, private and government sectors who have existing and new renewable energy technology installations with a rated capacity of 1 kW and above.<sup>84</sup>

A step in the right direction are plans for the development of Temburong – the easternmost district in Brunei – as a smart city. It is also the home of Brunei's only solar farm that has been in operation since 2010. The Temburong Smart City project is made up of two phases.

The first phase would introduce energy efficiency technology on existing infrastructures like buildings and roads as well as smart grid technologies. The subsequent phase would use a computer simulation to determine the suitable capacity of power sources to provide electricity to the district.<sup>85</sup>

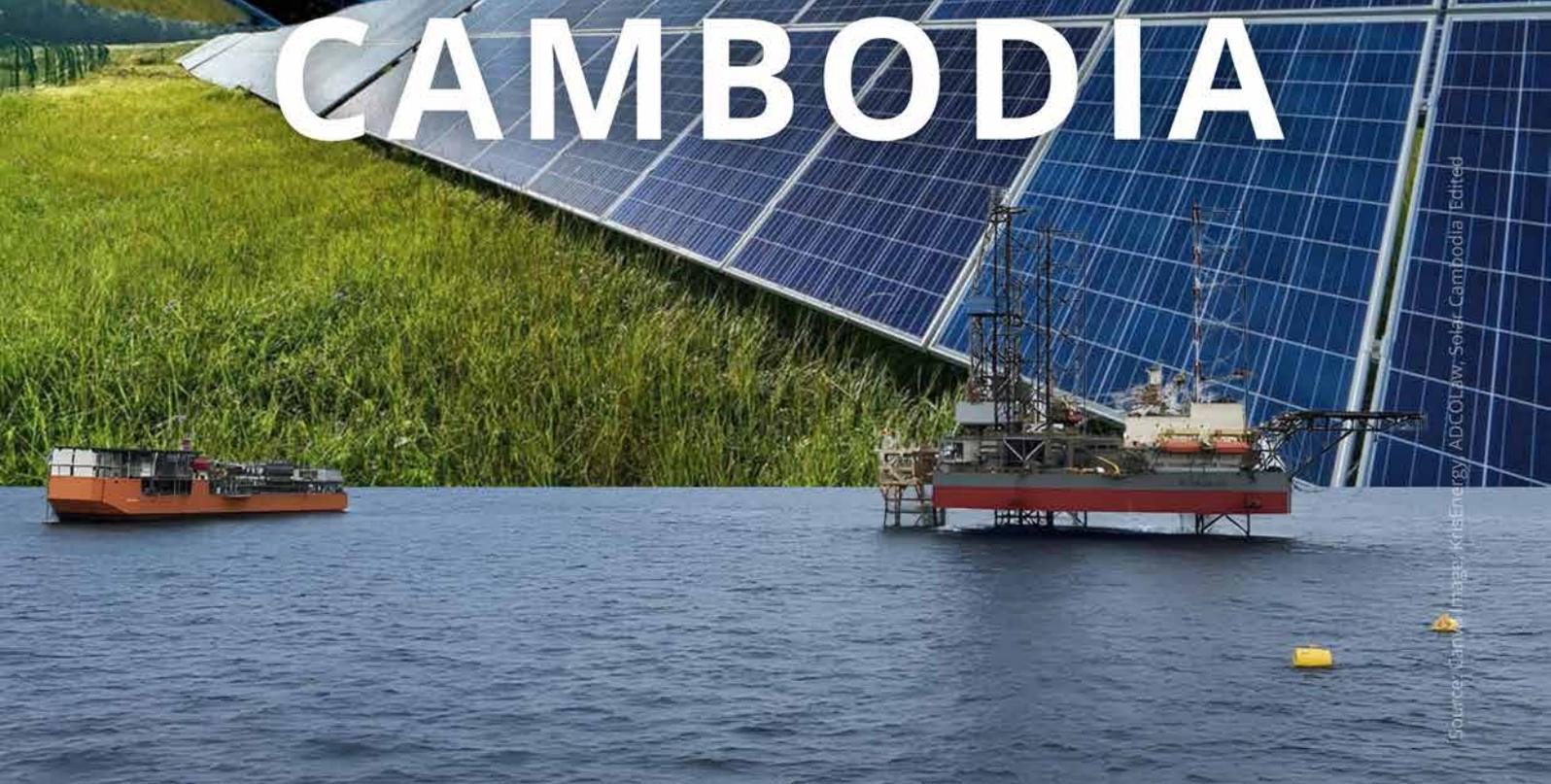
According to the Energy White Paper, the energy sector, in particular oil and gas, is a core driver of Brunei's economy as it accounts for more than 60% of Brunei's GDP and employs around 24,000 people with the target at 50,000 people by 2035.<sup>86</sup>

The government has already announced a range of plans, including increased solar capacity and streamlined investments in sustainable hydrogen infrastructures.<sup>87</sup>

The establishment of its first methanol plant is expected to pave the way for more opportunities in the downstream oil and gas industry in Brunei Darussalam including methanol-related derivatives, besides other potential gas-based petrochemical projects such as ammonia and urea. The Brunei Methanol Company is a landmark development for the country, symbolizing its efforts to transition towards a more diversified and sustainable economy.<sup>88</sup>



# CAMBODIA



## Country Key Highlights

### Government/Political System

- The Kingdom of Cambodia operates under a constitutional monarchy coupled with a parliamentary representative democracy.<sup>1</sup>
- The head of state is the King, a position currently held by Norodom Sihamoni. The King's role, while largely ceremonial, symbolizes national unity and continuity within the realm of Cambodian governance.<sup>2</sup>

### Demography of Cambodia

17.1 million (2024), with an annual growth rate of about 1.04%.<sup>3</sup> The country has a population density of 82 people per square kilometer.<sup>4</sup>

### GDP and Percentage From O&G

#### GDP Overview

In 2023, Cambodia GDP was worth 31.77 billion US dollars. Cambodia's economy is expected to grow robustly in 2024, with various forecasts placing the growth rate between 5.8% and 6.6%.<sup>5</sup>

### Contribution from Oil and Gas

Cambodia's oil and gas sector is still in the nascent stages and does not yet contribute significantly to the national GDP.<sup>6</sup> The country's offshore oil reserves have seen some exploratory activities, but commercial production is limited. The focus has largely been on developing infrastructure and regulatory frameworks to support future exploitation of these resources.<sup>7</sup>

### GDP Per Capita

As of 2024, Cambodia's GDP per capita stands at approximately \$1,765.

Key Sectors Driving GDP Per Capita: (1) Tourism, especially in cultural heritage; (2) Manufacturing, especially in electronics and automotive parts; (3) Agriculture.<sup>8</sup>

### Reserves

Cambodia's oil and gas sector is still in its nascent stages, with significant developments occurring only recently.<sup>9</sup>

### Oil & Gas Production

Oil: 7.500 barrels/day peak production rate expected;<sup>10</sup>  
Gas: Cambodia does not produce fossil gas as of 2023.<sup>11</sup>

### Refining Capacity

capable of processing 5 million tonnes of crude oil a year.<sup>12</sup>

### Domestic Demand

The Ministry of Mines and Energy predicts that by 2030, the Kingdom's demand for oil and gas products will reach 4.8 million tonnes, a considerable rise from the 2.8 million recorded in 2020.<sup>13 & 14</sup>

### Upstream Fiscal Term

Concession and Production Sharing Contract (PSC) term<sup>15</sup>



Picture: Canva Image

# Energy Demand

## Oil

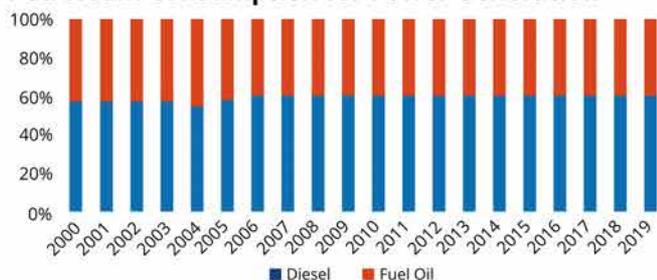
### Petroleum Demand in the Final Sector



Source: GDE-MME in house data (2021)

Cambodia currently imports 100% of its petroleum products. Cambodia’s petroleum products demand in the final sector (industry, transport, commercial, residential, and others) increased from around 556 ktoe in 2000 to 3,055 ktoe in 2019, a more-than-fivefold increase over the 2000–2019 period. As mentioned, the average annual growth rate (AAGR) of petroleum products’ consumption was 9%.<sup>16</sup>

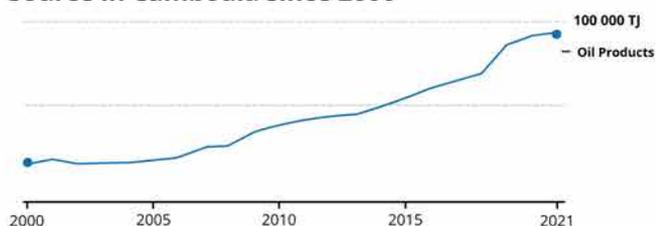
### Petroleum Consumption for Power Generation



Source: GDE-MME in house data (2021)

The consumption of petroleum products for power generation consisted of diesel and fuel oil. Total consumption was 126 ktoe in 2000 and increased to 206 ktoe in 2019 at an average rate of 3% per year.<sup>17</sup>

### Evolution of Transport Total Final Consumption by Source in Cambodia since 2000

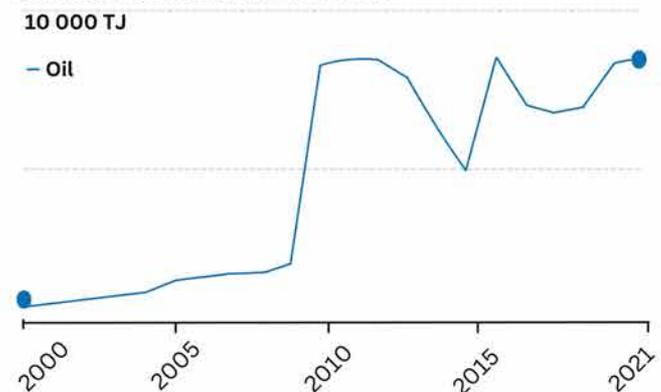


Source: International Energy Agency

Cambodia has been experiencing robust economic growth, which boosts demand for transportation services.

Evolution of transport total final consumption by oil in Cambodia since 2000, in the country of Cambodia from 2000 to 2021 100% transportation uses oil as a source of transportation energy.<sup>18</sup>

### Evolution of Industry Total Final Consumption by Source in Cambodia Since 2000



Source: International Energy Agency

Nationally, the use of oil in the industrial sector amounted to 8524 TJ. The following is the evolution of the total final consumption of industrial oil in Cambodia since 2000.<sup>19</sup>

In 2022, Cambodia imported \$450M in Petroleum Gas. Cambodia imports Petroleum Gas primarily from: Vietnam (\$297M), Thailand (\$77M), Malaysia (\$44.5M), Indonesia (\$17.6M), and Brunei (\$8.7M).<sup>20</sup>

Cambodia spent over \$2.17 billion on diesel and petroleum imports in 2023, marking a 7.6% decrease from 2022. The diesel imports accounted for \$1.32 billion, a 12.2% increase, while petroleum imports dropped slightly by 0.26% to \$850 million.<sup>21</sup>

### Sectoral Petroleum Demand of Cambodia, 2040

Sector	Gasoline (kl)	Diesel (kl)	LPG
Industry		521,147	
Road	2,449,820	4,553,775	173,258
Residential			120,675
Commercial		273,998	327,422
<b>Total</b>	<b>2,449,820</b>	<b>5,348,920</b>	<b>621,355</b>

kl = kilolitres; LPG = liquefied petroleum gas.

Source: ERIA

ERIA predicted that there will be an increase in oil products demand especially in transportation sectors. Therefore, the government plans to The Ministry of Mines and Energy is currently exploring the potential establishment of a national company for offshore oil exploration, aiming to reduce the country’s reliance on imports.<sup>22</sup> Rapid urbanization is occurring in Cambodia, particularly in cities like Phnom Penh. There is a greater reliance on vehicles for commuting and goods transportation, driving up fuel demand.



**Solar Farm**  
A solar farm in Takeo province, pictured in 2019. Cambodia is planning a move towards solar and wind energy to meet its rising power demands.

Picture : The Phnom Penh Post

## Gas

Looking at the demand and supply, according to Natharoun Ngo Son, Country Director of EnergyLab Cambodia, LNG is a fossil fuel that is needed to help accelerate Cambodia's energy transition.<sup>23</sup>

Currently, CNGC is the only buyer in Cambodia with an LNG import license. In January 2020, Cambodia received its first import of LNG from the Chinese firm CNOOC.<sup>24</sup>

Gas consumption in Cambodia is almost negligible. With no gas-fired power plants or petrochemical factories, the country previously had little use for natural gas. Cambodia will not have natural gas in 2030 but it will account for 8.5% in 2040 at 900 MW.<sup>25</sup>

In 2022, Cambodia imported \$161M in Natural gas, liquefied, becoming the 41st largest importer of Natural gas, liquefied in the world. Cambodia imports Natural gas, liquefied primarily from: Vietnam (\$116M), Malaysia (\$19.8M), Indonesia (\$17.6M), Singapore (\$3.31M), and Thailand (\$2.12M).<sup>26</sup>



Chairman of the KrisEnergy Group Tan Ek Kia (L) shakes hands with Cambodian Minister of Economy and Finance Aun Pornmoniroth during a signing ceremony in Phnom Penh, Cambodia on August 23, 2017. Cambodia finally began oil production, from offshore fields in the Gulf of Thailand. A joint venture between the Cambodian government and Singaporean company KrisEnergy Ltd started production, and will be ramping up new wells.

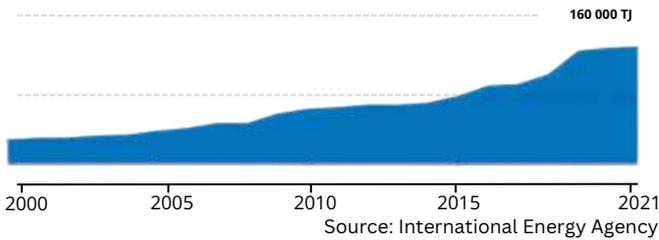
Picture : Council on Foreign Relations

The fastest growing import markets in Natural gas, liquefied for Cambodia between 2021 and 2022 were Vietnam (\$114M), Malaysia (\$19.8M), and Singapore (\$3.31M).<sup>27</sup> In 2023, leading companies such as Old Navy (1.62k), Gap (1.26k), and Michael Kors (1.24k) were at the forefront of shipping Natural gas, liquefied from Cambodia to the United States.<sup>28</sup>

# Energy Production

## Oil

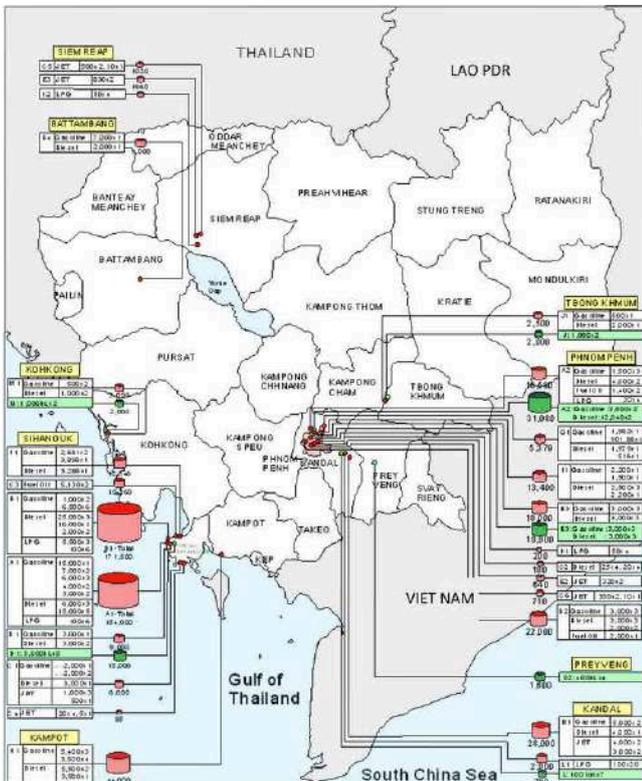
### Total oil supply, Cambodia



Oil share in energy supply 38.6% of total energy supply 2021, total oil supply in Cambodia in 2021 is 138183 TJ with an increasing trend of 376% from 2000 to 2021.<sup>29</sup>

The biggest import base for gasoline and diesel oil is Sihanoukville terminals by large tankers; the second is Phnom Penh terminals by small tankers via the Mekong River. Sihanoukville accounts for 60% of the total imports; the rest are from Phnom Penh and Kandal, etc. The total storage capacity is about 517,000 kilolitres (kl) nationwide, 70% in Sihanoukville. About 70,000 kl of the new expansion is planned, but about 70% is the second terminal near Phnom Penh.<sup>30</sup>

### Cambodia Oil Terminal Map<sup>31</sup>



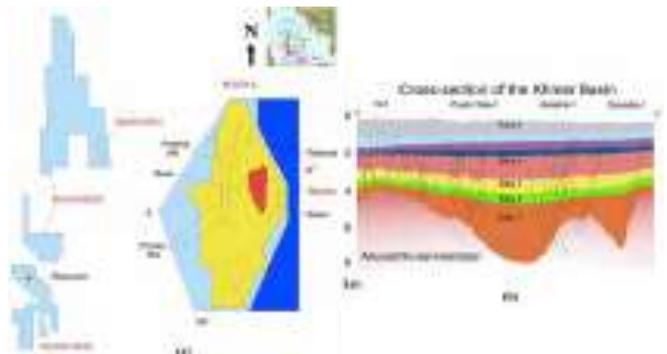
In 2020, the Prime Minister announced officially the first drop of Cambodian crude oil was pumped successfully from its exclusive seawater by KrisEnergy.



It is about fifty years to become an oil-producing country since many international companies have explored hydrocarbon resources through different political regimes.<sup>32</sup>

Production of crude oil only lasted 8 months and stopped in August 2021, before the operating company declared bankruptcy and failed to reach its minimum production levels in Apsara field (Block A).<sup>33</sup>

Thailand and Cambodia are back at the negotiating table over joint Gulf of Thailand oil and gas exploration. At stake is a so-called Overlapping Claims Area (OCA) in the Gulf of Thailand that consists of a 27,000 square km section ripe with gas and oil reserves.<sup>34</sup> Cambodia delineated the area in the west in 1972, while Thailand counterclaimed in the east in 1973. The southern boundary is marked by the 1991 Cambodian-Vietnam maritime border.<sup>35</sup>



Cambodia is still a high possibility to produce oil and gas successfully in the Khmer Basin and/or the overlapping claim area (OCA) with Thailand.<sup>36</sup>

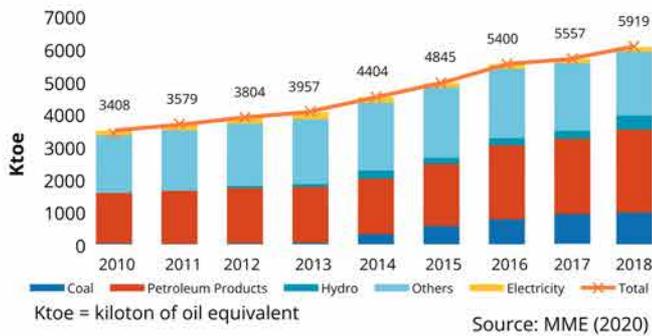
## Gas

Outdated infrastructure is a significant challenge in Cambodia's gas production. The country needs substantial investment to build a modern and efficient pipeline network. This includes securing funding and technical expertise to ensure the infrastructure can support large scale oil and gas operations.<sup>37</sup>

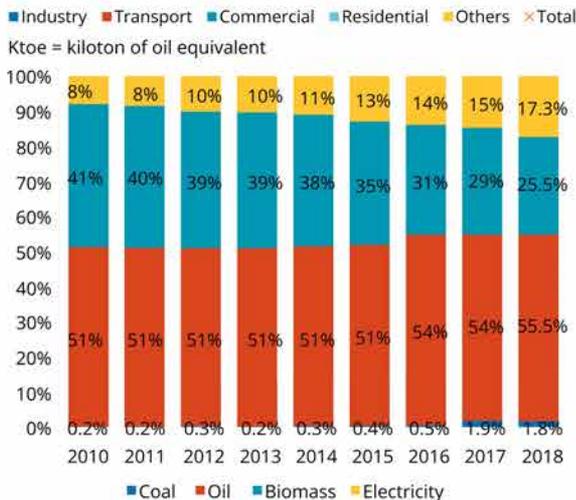
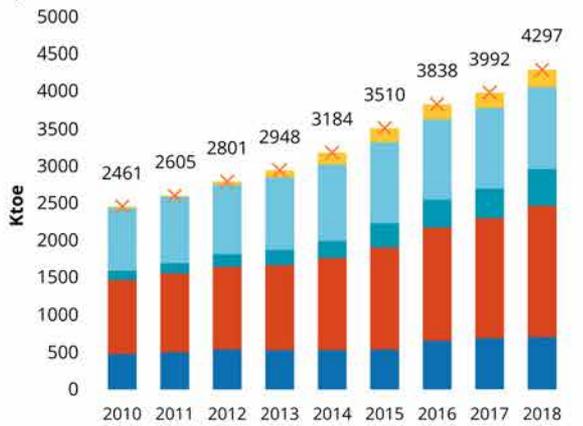
# Overall Energy Outlook

Oil had the highest share in the total primary energy supply (TPES) in 2018 (42%) as its demand increased with the number of vehicles. Oil supply grew at an average 6% per year over 2010–2018. Between 2017–2018, the growth was almost 10%, indicating a rapid increase in the road transport demand of gasoline and diesel oil. Hydro supply share was 7% in 2018. Although small, hydro supply increased the fastest at 74.7% in 2017–2018.<sup>38</sup>

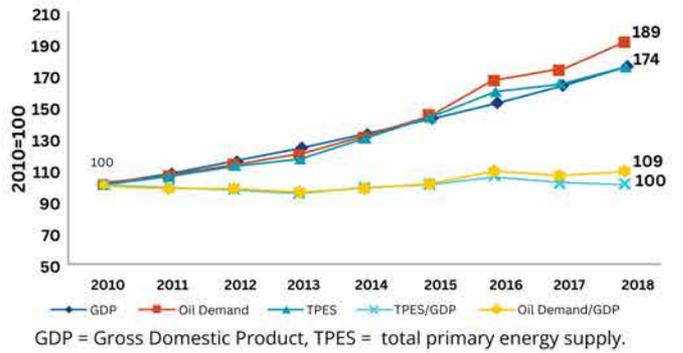
## Total Primary Energy Supply, 2010–2018



## Total Final Energy Consumption, by Sector and by Fuel, 2010–2018



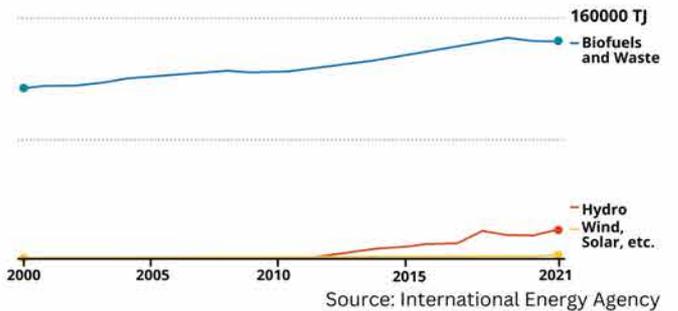
## Energy Intensity, 2010–2018



## Renewable Energy Targets

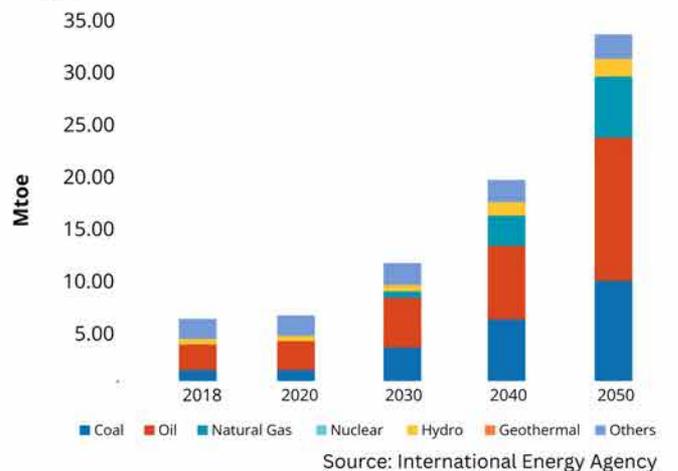
Cambodia still requires additional funds and comprehensive data analysis in this sector. So far, the country does not have any specific targets for renewable energy development except for large hydro plants. It is included in PDP 2018-2021 that 2,241 MW capacity of large hydropower plants will be built by 2020, which contributes to approximately 80% of the total installed capacity.<sup>39</sup>

## Evolutions of Total Energy Supply in Cambodia since 2000



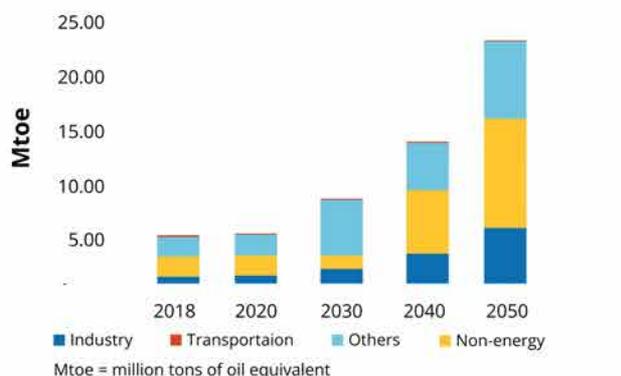
The evolution of total energy supply in Cambodia since 2000 shows a considerable use of biofuels and waste at 145031 TJ, it shows a considerable supply of energy compared to hydro at 19159 TJ and wind, solar, etc at 2315 TJ.<sup>40</sup>

## Primary Energy Supply by Source, Business as Usual



The AAGR for primary energy supply is 5.6% in 2018-2050. Primary energy supply will increase from 5.9 million tons of oil equivalent (Mtoe) in 2018 to 33.27 Mtoe in 2050, which is slightly faster than final energy consumption, from 4.3 Mtoe in 2018 to 22.33 Mtoe in 2050. By 2050. The fastest-growing energy sources are solar and wind power, with an AAGR of 18% in 2018 - 2050.<sup>41</sup>

**Final Energy Consumption by Sector, Business as Usual**

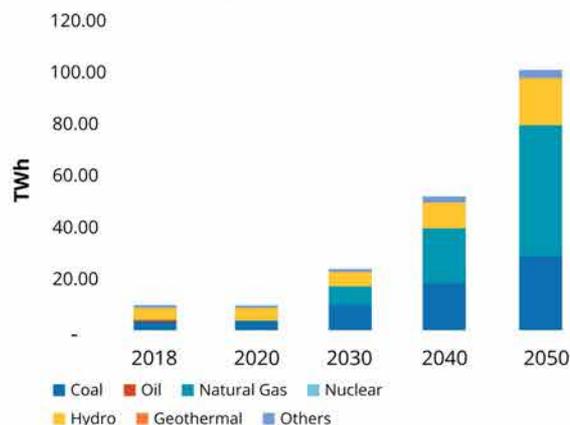


Source: ERIA

Final energy consumption will have an AAGR of 5.3% in 2018–2050. Final energy consumption by sector will increase from 4.3 Mtoe in 2018 to 22.33 Mtoe in 2050. The strongest demand growth is projected to occur in:

1. The industrial sector, with an annual average rate of 6.2% in 2018-2050 or 5.9 times, from 0.72 Mtoe in 2018 to 5.04 Mtoe in 2050. 2018-2050 or 5.9 times, from 0.72 Mtoe in 2018 to 5.04 Mtoe in 2050.<sup>42</sup>
2. Transportation is projected to grow at an annual rate of 5.6% or 4.78 times, from 1.75 Mtoe in 2018 to 10.12 Mtoe in 2050. 2050, followed by 'other' at 4.4%, from 1.81 Mtoe in 2018 to 7.15 Mtoe in 2050.

**Power Generation by Fuel, Business as Usual**



Source: ERIA

Electricity generation will increase by 8% per year, from 8.48 TWh in 2018 to 99.56 TWh in 2050. From 2030 to 2050, electricity generation will be provided mainly by LNG, 26.04%– 46.02%; coal, 42.05%–28.16%; and hydro, 26.00%–22.00%. Under BAU, power generation is projected to increase at an average rate of 8.0% in 2018– 2050. The fastest growth will be in 'others' (12.3% per year) followed by coal (7.0%) and hydro (4.9%). The share of oil-fired power plants will decrease by 0.8% due to high fuel cost.<sup>43</sup>

In order to alleviate these electricity access, the government has implemented two Renewable Energy Programmes as well as promoted cross-border power trade. The renewable programmes are Solar Home Systems (SHS) and Biogas focusing on rural communities, whereas importing electricity from neighbouring countries aims to strengthen the grid supply stabilisation.<sup>44</sup>



**The Russey Chrum Krom hydropower dam produces 338MW**  
A proposed 150 MW hydropower project on the upper reaches of the Tatai river in Koh Kong province's northern Thma Bang district happened in 2020, as the government strives to promote investment in the electricity sector and increase supply.

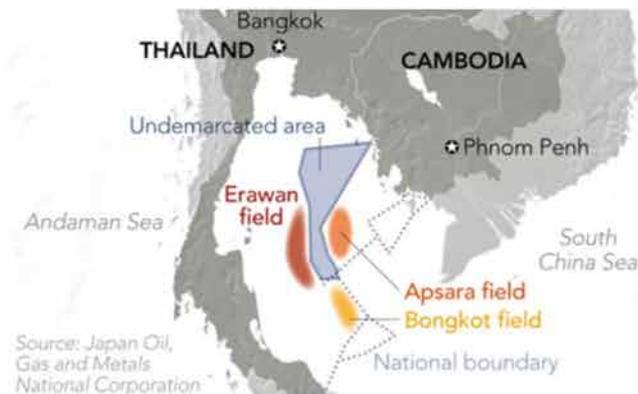
Picture : The Phnom Penh Post

## ENERGY INFRASTRUCTURES

### Oil

Construction on the first-ever oil refinery plant in Cambodia, expected to be complete by 2022, has been temporarily paused due to the developers' financial shortage. According to the initial plan, the project, which broke ground since 2017, should have already gone online since early 2019. Although completion was once postponed to 2022, and now construction has been paused once again. This project broke ground in May 2017, with US\$620 million of investment set for the first phase. It is a joint venture between local investment firm Cambodia Petrochemical Co Ltd and China's CNPC's Northeast Refining and Chemical Engineering Co Ltd.<sup>45</sup>

### The undemarcated area between Cambodia and Thailand may contain oil and gas



Source: Cambodia Constructors Association

The Preah Sihanouk Refinery as the first significant refinery project in Cambodia is located in Preah Sihanouk province. This \$1.6 billion project, initiated by the Cambodian Petrochemical Company (CPC) in collaboration with Chinese partners, aims to produce 5 million tons of refined oil annually, nearly three times the country's current domestic demand.<sup>46</sup>

The Preah Sihanouk Refinery construction is planned in multiple phases, with the first phase costing around \$620 million. The project is funded by Sino Great Wall International Engineering Co., backed by China's Export-Import Bank. It recently delayed.<sup>47</sup>

Kampot Province Refinery is set to begin in Kampot province, with an estimated cost of \$2.3 billion. This refinery is expected to produce up to 2 million tons of oil annually in its initial phase.<sup>48</sup>

Significant and major oil production infrastructure has been built, installed and completed in Block A for the production process. This includes the construction of the oil platform on Batam Island, Indonesia. The platform arrived in Cambodia's Block A. The oil-production vessel was installed, repaired and equipped in Singapore and arrived in Cambodia's Block A. The tanker was ready to operate in Block A.<sup>49</sup>



The groundbreaking ceremony for the Cambodian Petrochemical Co refinery in Preah Sihanouk province in a photograph uploaded to the Mines and Energy Ministry's facebook page. Construction began in Preah Sihanouk province on Cambodia's first oil refinery, a massive \$1.6 billion project capable of producing almost three times Cambodia's domestic needs.

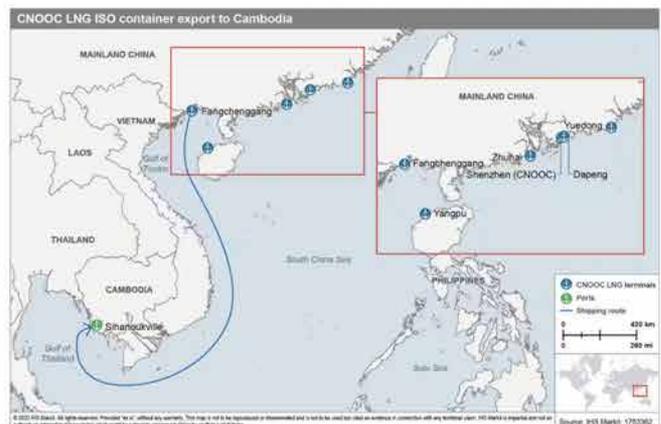
### Gas

Cambodia Natural Gas Corp. Ltd. (CNGC) has a long-term plan (2020-2034) to develop natural gas infrastructure. This plan is divided into three five-year phases that include building an LNG receiving terminal, urban LNG multifunction stations, a fleet of LNG trucks, and a 2,825 km pipeline network that will serve 25 provinces and cities.<sup>50</sup>

#### Development Phases

- **First Phase (2020-2025):** Constructing a pipeline network and introducing LNG to commercial sectors such as hotels and restaurants.
- **Second Phase (2026-2030):** Developing a gas power generation facility with a 0.55 mtpa capacity using a Floating Storage and Regasification Unit (FSRU).
- **Third Phase (2031-2034):** Building an LNG import terminal with a 3 mtpa capacity.

Cambodian government has announced plans to build natural gas power plants with a capacity of 3,600 MW by 2030 to diversify energy sources and meet the growing demand. Several international investors have shown interest in this sector, including companies from China and Japan considering investments in LNG storage terminals and related projects.<sup>51</sup>



Source: S&P Global Commodity Insights

China National Offshore Oil Corporation (CNOOC), who supplied the gas for this first shipment, sent the ISO tanks from its Fangchenggang transfer terminal in Guangxi province to Sihanoukville, Cambodia. The company is well-positioned to access the Southeast Asian market via its terminals along the Southern Chinese coast and had previously planned for a "South-to-North" gas supply program in the domestic market.<sup>52</sup>

Cambodia has abandoned plans to build a \$1.5 billion 700 megawatt (MW) coal-fired power project in a protected reserve along the southwestern coast and will build an 800 MW natural-gas fired plant instead.<sup>53</sup>

The country has no LNG receiving terminals, long-distance pipeline networks, urban gas supply facilities, regasification stations or other natural gas infrastructure. Given the absence of this gas transmission network, LNG-to-power projects will have to rely on their own regasification and gas transportation facilities, probably limiting commercially viable projects to coastal schemes that do not require extensive pipelines from LNG receiving terminals.<sup>54</sup>

## Other Energy Sources

ADB signed a transaction advisory services mandate with Cambodia's national utility, Électricité du Cambodge (EDC), to support the development of 2 gigawatts (GW) of solar power as part of Cambodia's goal to achieve carbon neutrality by 2050. ADB will also assist EDC in bidding out a 100-megawatt pilot project to the private sector, expected to mobilize up to \$100 million in investments and serve as a model for efficient procurement of renewable energy in Cambodia. This mandate builds on ADB's previous support for Cambodia's solar sector, including the country's first National Solar Park in Kampong Chhnang.<sup>55</sup>

**Solar and Cambodia's National Strategic Development Plan.** The Cambodian Cabinet approved four energy projects, a US\$231 million hydroelectric power and three solar power projects with a combined, rated, maximum power capacity of 140 MW. The latter are expected to come online and dispatch power to the national grid by 2020 and 2021 in four different provinces.<sup>56</sup>

Cambodia energy services provider SPHP is to develop the US\$58 million, 80-MW Stung Pursat I solar power project in Pramoy commune under a 39-year, build-operate-transfer model. Two other 60-MW solar power plants are to be built in Pursat Province's Krakor district and in Kampong Chhnang province's Tek Phos district by jointly owned Canadian-Cambodian project developer Schnei Tec Renewable Co. Ltd. as per a 20-year build-own-model.<sup>57</sup>

Schnei Tec also plans to increase the 60-MW solar power plant the company is building in Kampong Speu's Oudong District by 20 MW.<sup>58</sup>

Two new hydropower dams approved by Cambodian authorities in 2023 in the Cardamom Mountains. Both dams will be constructed inside Cardamom National Park, and are likely to have an impact on the Cardamoms REDD+ project, arguably Cambodia's most prominent foray into the carbon market. The anticipated location for the 100-megawatt Veal Thmor Kambot hydropower dam sits some 15 kilometers (9 miles) inside the borders of the REDD+ project, while the 70 MW Russei Chrum Kandal dam looks set to be built less than 2 km, or about a mile, outside the boundaries of the REDD+ project.<sup>59</sup>

Hydro Power Lower Sesan 2 Co., Ltd (abbreviated as Sesan-II), is the 400 MW hydropower project and the largest hydropower project in Cambodia, located in Se San District, Stung Treng Province. The project was put into operation in 2017 and fully generated power in December 2018. This hydropower station could generate and supply clean energy (1970 GWh annually) which significantly contributes to Cambodia's national power grid and reduces local power shortage. In 2020, Sesan-II hydropower station generated 1696 GWh of electricity, accounting for nearly 20% of Cambodia's total domestic electricity generation.

## Cambodia Hydropower Dams



Source: Open Development Cambodia (ODC), 2024

Until 2020, Cambodia has 75 total Hydropower dams listed: 74, with 10 dams fully operational, 36 dams of Potential, 1 dam is under construction and 27 dams are under study. The government collaborates with many international companies coming from South Korea, China and Vietnam. The production of electricity from hydropower dams has increased enormously in recent years. By 2016 it had grown almost 50 times, to 2567.9 GWh as more dams came into operation.<sup>60</sup>

## Recent

## Oil

Keppel Shipyard secured a S\$30 million contract to work on KrisEnergy's production barge, which will be deployed at Cambodia's first hydrocarbon development, the Apsara oil field. The project involves installing gas, oil, and water separation facilities, as well as a power generation module, with the barge capable of processing up to 30,000 barrels of fluid per day.<sup>61</sup>

**Strategic Partnerships:** Cambodia's future success in the oil and gas sector will depend heavily on strategic partnerships with neighboring countries and international investors. Collaborative efforts can help in sharing technology, expertise, and investments necessary for developing a robust oil and gas infrastructure (Open Development Cambodia (ODC)).<sup>62</sup>

There are six offshore petroleum blocks in Cambodian waters (blocks A–F) and 19 onshore blocks (I–XIX) for oil and gas exploration. There are also four more blocks in the offshore Overlapping Claims Area (OCA) with Thailand. This disputed area covers 27,000 square kilometers and it has been estimated to contain up to 11 trillion cubic feet of natural gas and up to 3.6 billion barrels of oil.<sup>63</sup>

## Gas

China Machinery Engineering Corporation (CMEC) plans to invest in Cambodia's Energy Sector for about \$3 billion in the gas sector over the next 10 years. The company said it would invest with two other corporations, without naming them. CMEC, a construction and engineering firm, is a subsidiary of SINOMACH, a state-owned company that specializes in water treatment, the energy sector and the development of infrastructures.<sup>64</sup>

CNGC's target to import 0.1 million metric tons (MMt) of LNG via ISO tanks in 2020 is equivalent to over 5,800 containers, which is quite a large number of tanks. Yet this barely amounts to one or two of regular size LNG cargoes. In addition, ISO LNG shipping is a low-barrier entry industry, meaning China will face competition from other players in the Southeast Asian region.<sup>65</sup>

Cambodia has revised its Power Development Plan 2020-2030 to include a larger share of natural gas and liquefied natural gas (LNG) consumption in the power generation mix. Around 3.6 GW of gas-based power generation is expected to come online between 2027 and 2030. As part of the project, Cambodia is exploring construction of a liquefied natural gas (LNG)

terminal to import the super-chilled fuel and re-gasify it for use in the power plant.<sup>66</sup>

Cambodian Natural Gas Corp Ltd, or CNGC, the country's primary gas company, has a 15-year plan up to 2034 -- split into three phases of five years each -- to build an LNG receiving terminal, 27 urban supply stations, an LNG trucking fleet, and 2,825 km of pipelines to supply 25 provinces and cities.<sup>67</sup>

The Cambodian government, in collaboration with international bodies, has laid out a Petroleum Master Plan for 2022-2040. This plan outlines the strategic development of the oil and gas sector, including the expansion of pipeline networks to support domestic production and transportation needs.<sup>68</sup>

## Other Energy Sources

Chinese state-owned China Datang Corporation, a major power generation company, said that it plans to invest \$600 million in solar and wind energy projects in the country. The company has already invested \$255 million in the 120 Megawatt Stung Atay Hydropower Project in Koh Kong province and the 230kV Phnom Penh-Battambang Power Transmission Project.<sup>69</sup>

Cambodia is concerned about the reliability of hydropower in the face of climate change and is planning to unveil a 1,000 megawatt hydro project soon. By 2040, hydropower is expected to dominate Cambodia's energy mix, with total installed capacity projected to reach 10GW by 2050 under the Business as Usual (BAU) scenario.<sup>70</sup>

Hydrogène de France (HDF Energy), a leading developer of large-scale green hydrogen infrastructure and high-power fuel cell manufacturer, has joined forces with the Ministry of Mines and Energy (MME) of the Kingdom of Cambodia to optimize Cambodia's energy landscape. The Renewable facilities, multi-megawatt hydrogen power plants developed by HDF Energy, are designed to seamlessly integrate intermittent renewable sources, with substantial on-site energy storage in the form of green hydrogen.<sup>71</sup>



**The Stung Atay Hydropower Project**

The first involves the installation on the dam toe of two sets of ten megawatt hydro turbines and generator units, while the second stage focuses on the lower dam's powerhouse,

Picture : Datang Corp



**Aspara Oil Field**

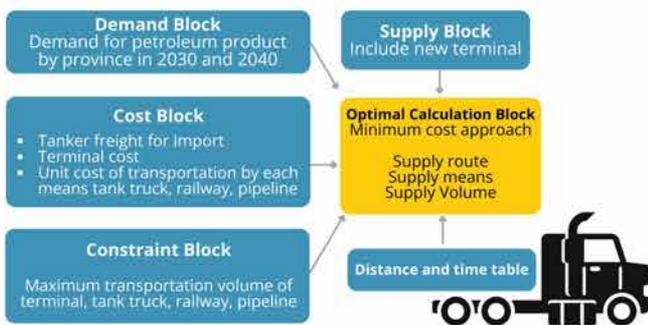
Apsara is Cambodia's first oil field in the offshore Block A concession. Credit: Kasey Houston from Freemages.

Picture : Eni

The Cambodian Cabinet approved four energy projects, including a US\$231 million hydroelectric power project and three solar power projects totaling 140 MW, expected to be operational by 2020-2021. Cambodia is leveraging a public-private partnership model, with the private sector contributing 75% of the US\$57.7 billion needed to fund the National Strategic Development Plan, aiming to foster inclusive growth and achieve the UN Sustainable Development Goals by 2030.<sup>72</sup>

While the Cambodia Power Development Program (PDP) shows an intention to boost solar production by 70% by 2030, a recent Asian Development Bank study has shown that Cambodia has the potential to generate as much as 10,000MW in solar power, while a separate UN Development Program reports a potential for a further 5,000MW of offshore wind power. The PDP offers a strategy to transition towards a cleaner power grid while meeting existing government agreements.<sup>75</sup>

**Structure of Logistics Optimisation Model for Cambodia**



Source: 2QFY23 Analyst Briefing, Tenaga Nasional Berhad

Based on the demand for petroleum, which consists of gasoline and diesel oil per province in 2030 and 2040, ERIA examined the optimal future petroleum supply chains from primary terminals to each province's capital by using the logistics optimization with minimum cost approach model.<sup>73</sup>

In a significant move to enhance regional energy cooperation, Singapore, Cambodia, and Lao PDR have established a working group aimed at facilitating cross-border electricity trade and advancing the ASEAN Power Grid (APG) vision. The inaugural meeting of the working group was co-chaired by Singapore's Second Minister for Trade and Industry, Tan See Leng, Lao PDR's Vice-Minister for Energy and Mines, Chansaveng Bounngong, and Cambodia's Minister for Mines and Energy, Keo Rottanak.<sup>76</sup>

**Battambang Solar Farm**

Battambang Solar Farm is a 73.9MW solar plant in rural western Cambodia. The plant produces 115GWh p.a. of renewable energy, enough to power 180,000 households. The plant was commissioned in 2021 and is the first (and currently only) provider of I-RECs in Cambodia.



Picture: Climate Trade

Cambodia also developed Biomass. In 2012, the government succeeded in conducting The Neang Kong Rey Stove (NKS) Program as an Attractive alternative to traditional cook stoves. This program generated more than 1,100 jobs.<sup>74</sup>

## Ministries

Cambodia's Ministry of Mines and Energy (MME) published the first official energy statistics that assist in formulating policies related to energy efficiency, building energy codes, and green building assessment tools. The statistics include identification of areas for energy efficiency improvement, projections of primary energy supply, final energy consumption by sector, and energy balance to 2035.<sup>77</sup>

Cambodia's Ministry of Economy and Finance is about to develop energy sector modeling tools for the country's sustainable future. It collaborates with AFD to launch a program to assist Cambodia in modeling energy transition scenarios up to 2050, focusing on long-term low-carbon development. This project, carried out by IED Group and Artelys with scientific support from IDDRI's Deep Decarbonization Pathways Initiative.<sup>78</sup>

Cambodian National Petroleum Authority (CNPA), established in 1998. The CNPA manages petroleum agreements, which include terms for exploration, production, royalties, and taxes. The Cambodian petroleum sector is regulated by the amended Petroleum Regulations of 1991. Cambodia uses a Petroleum Agreement (or Production Sharing Contract) for licensing companies to explore. This sets out:

- Duration: exploration 4 + 2 + 2 years; development 3 or 4 years
- Production: up to 30 + 5 years
- Exploration obligation: conduct 2-D seismic; conduct 3-D seismic; drilling 1–2 wells
- Royalty: 12.5%
- Signature bonus: negotiable
- Production bonus: negotiable
- Cost recovery: negotiable

- Profit oil split: according to sliding scale
- Profit gas split: according to sliding scale
- Income tax: 30 percent (although the Block A deal signed in 2017 sets a rate of 25 percent for the first five years, 30 percent thereafter)
- Domestic market obligation: required to meet the domestic demand of Cambodia
- State participant: Government shall have the right to participate in petroleum operation under Petroleum Agreement <sup>79</sup>

## Agencies

Cambodia Natural Gas Corp. Ltd. (CNGC), established in 2015, is the country's primary gas operator. CNGC holds 30-year franchise rights for gas development in Cambodia.<sup>80</sup>

**Stakeholder Consultation Plan:** Cambodia Country Partnership Framework.

The World Bank Group (WBG) is preparing a new Country Partnership Framework (CPF) with Cambodia for 2019 – 2023. The CPF builds on the Systematic Country Diagnostic (SCD), which was prepared by WBG staff in close cooperation with the government and other stakeholders in Cambodia. Objective CPF Consultations is to generate a shared understanding of Cambodia's most pressing development challenges and where the WBG should concentrate its support over the next five years.<sup>81</sup>

### Key Stakeholder Groups to Be Consulted

<b>Government and Parliament</b>	Officials from the Ministry of Economy and Finance; Chairman and Vice Chairman of specific commissions of the National Assembly; Officials and Representatives of selected Line Ministries; Officials and representatives of public entities such as the Anti-Corruption Unit; National Committee for Disaster Management (NCDM), Council of Agricultural and Rural Development (CARD) and the National Committee for Sub-National Democratic Development (NCDD)
<b>Sub-national Government</b>	Representatives from provincial, district and commune councils
<b>Private Sector</b>	Representatives of domestic and international private sector companies
<b>NGO and Civil Society</b>	Representatives of community-based organizations, service delivery NGOs, advocacy NGOs and youth organizations
<b>Development Partners</b>	Representatives from Donor and UN agencies

Source: The World Bank Group

### Oil extraction at a rig in Cambodian waters

Cambodia eagerly anticipates the opportunity to collaborate with Thailand for the renegotiation of a Joint Development Area (JDA) focused on oil and gas exploration within the 26,000sq km Overlapping Claims Area (OCA).

Picture : Phnom Penh Post

Looking at the demand and supply, according to Natharoun Ngo Son, Country Director of EnergyLab Cambodia, LNG is a fossil fuel that is needed to help accelerate Cambodia's energy transition.<sup>82</sup>

The development of renewable energy in Cambodia is primarily supported by foreign investments, with limited financial incentives currently available. The government has introduced some subsidies and incentives, but access to financial resources remains a significant barrier to broader implementation.<sup>83</sup>

### Strategy and Action Plan on Energy Efficiency in Cambodia

Objective		Budget Estimation
Industry	The Energy Efficiency of the industrial sector is improved	1,510,000 USD
	Capacity building in the field of EE&C in industry is strengthened	1,370,000 USD
	Attention of factory owners/managers about EE is raised	2,700,000 USD
End User or Household	Energy efficiency of end-user or household products has increased and residential electricity consumption is reduced	1,180,000 USD
	The market share of energy efficient residential appliances has increased	30,000 USD
	End user of residential appliances are aware of the concept of energy efficiency	50,000 USD
Buildings	Energy efficiency of new buildings is improved	175,000 USD
	Energy efficiency in public buildings is improved	110,000 USD
	Education and awareness of energy efficiency in buildings has increased	83,000 USD
Rural Electrification	Rural energy entrepreneurs (REEs) operate more efficient businesses	375,000 USD
	Increase knowledge around rural electrification efficiency	550,000 USD
Biomass	The National forest resources are protected by the sustainable and efficient use of biomass	370,000 USD
	Combustible solid biomass residues are utilized optimally to substitute firewood and/or charcoal	100,000 USD

Source: Ministry of Industry, Mines and Energy

The energy-saving program in Cambodia focuses on power generation, rural electrification, and transmission network expansion. According to the Asian Development Bank, about 80% of Cambodia's population lives in rural areas where electricity coverage is still sparse. Based on Cambodia's National Policy, Strategy, and Action Plan for Energy Efficiency, with funding and implementation assistance from international entities, specific activities and investment plans have been defined for five key sectors: industry, buildings, rural areas, biomass, and end-users.<sup>84</sup>

### Potential sites for Royal Group Planned 1,400 MW hydropower dam

Royal Group is planning a 1,400 MW hydropower dam on the Mekong River, with potential locations inside the Stung Treng Ramsar site which present significant threats to residents of the islands, as well impacting fisheries and agriculture further downstream.



While hydropower dominates Cambodia's energy landscape, there are opportunities for expansion and innovation. The government's commitment to developing large-scale hydropower projects, such as the Sambor Dam on the Mekong River. It will cost USD 9 billion to expand domestic generation capacity. USD 2.5 billion has already been allocated towards ongoing projects by 2025. The remaining USD 6.5 billion will be invested in hydro dams, solar PV plants, natural gas and biomass along with improved storage infrastructure from 2026.<sup>85</sup>

Cambodia will continue to import some power, even by 2040. This is mainly from neighbouring Laos and Thailand at around 3,000MW combined. Cambodia's power development plan sets a strategy for ongoing investment in power generation, along with improved grid capacity and efficiency. Opportunities exist for capable international energy companies to enter the Cambodia market.<sup>86</sup>



**Hydro Power Lower Sesan 2 Co., Ltd (abbreviated as Sesan-II)**  
A joint-venture of China Huaneng Group and Royal Group of Cambodia. The 400 MW hydropower project, Sesan-II, is the largest hydropower project in Cambodia, located in Se San District, Stung Treng Province.

Picture : The Royal Group



# INDONESIA

## Country Key Highlights

### Government/ Political System

Presidential Republic Democracy with a multi-party system<sup>1</sup>

### Demography

279,918,617 in 2024<sup>2</sup>

### GDP and Percentage From O&G

1.39 trillion US dollars in 2023<sup>3</sup>

Oil and gas contribution to GDP was 2.49% in 2023<sup>4</sup>

### GDP Per Capita

4,919.7 US dollars in 2023<sup>5</sup>

### Reserves

Proven oil and gas reserves have reached 2.41 billion barrels and 35.5 TCF (January 2023)<sup>6</sup>

### Oil & Gas Production

Oil: 221,088.90 barrels per day (2022)

Natural gas: 2,420.06 BSCF

### Refining Capacity

1.15million barrels per day(2022)

### Domestic Demand

Oil: 1,603.769 Barrel/Day in Dec 2023

Gas: 670,000 barrels per day (bpd) in 2023

### Upstream Fiscal Term

Production Sharing Contracts (PSCs) with cost recovery or gross split systems<sup>7</sup>

Picture : Detik's News

**The Cirata Floating Solar Power Plant (PLTS)**  
One of Indonesia's mega renewable energy projects, is the largest in Southeast Asia and the third largest in the world.



**Merakes Project Gas Exploration**

Located in Makassar, is operated by Eni East Sepinggan. The project, which will be operational in 2025, is a testament to Eni's efforts to optimize resources to improve efficiency and productivity. In this project, the infrastructure used utilizes the infrastructure used in the previously operating Jankrik project. Thus, the Merakes project can be put into operation faster without having to build new infrastructure.

Picture - Eni

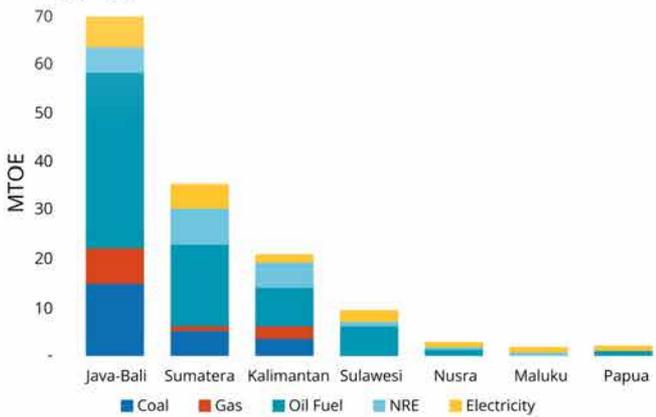


# Energy Demand

## Oil

In 2023, the national oil demand was 1,603.769 barrels per day. To fulfil this demand, Indonesia has a network of refineries and distribution systems that support its oil infrastructure.

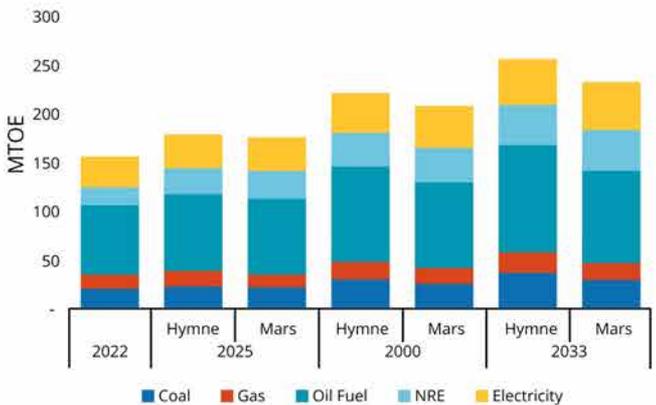
**Regional Final Energy Consumption in 2022 by Energy Type**



Source: CEIC

In 2022, The country's oil consumption increased, driven primarily by the transportation sector, which accounts for 62% of total oil consumption. The remaining consumption is distributed among residential, industrial, and agricultural sectors.<sup>8</sup>

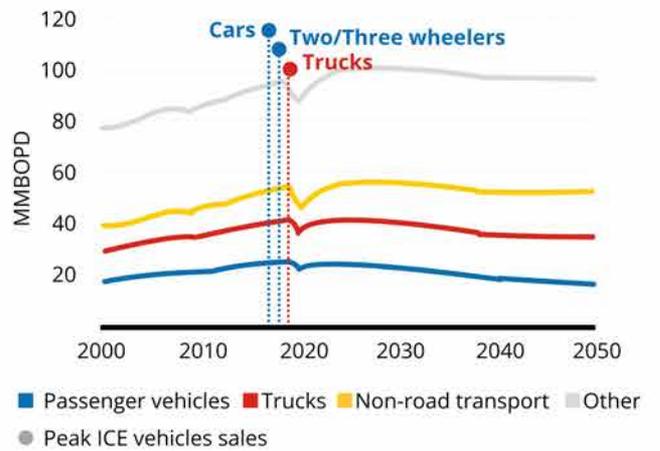
**Final Energy Demand by Energy Type**



Source: CEIC

Oil consumption in Indonesia is expected to continue to dominate for the next ten years. Thus, by 2033 oil consumption is expected to reach 113 million TOE on Hymne and 96 million TOE on Mars. This condition is influenced by the substitution of fuel oil to electric power.<sup>9</sup>

**Oil Demand**



Source: IEA, "World Energy Outlook 2023", 2023, modified

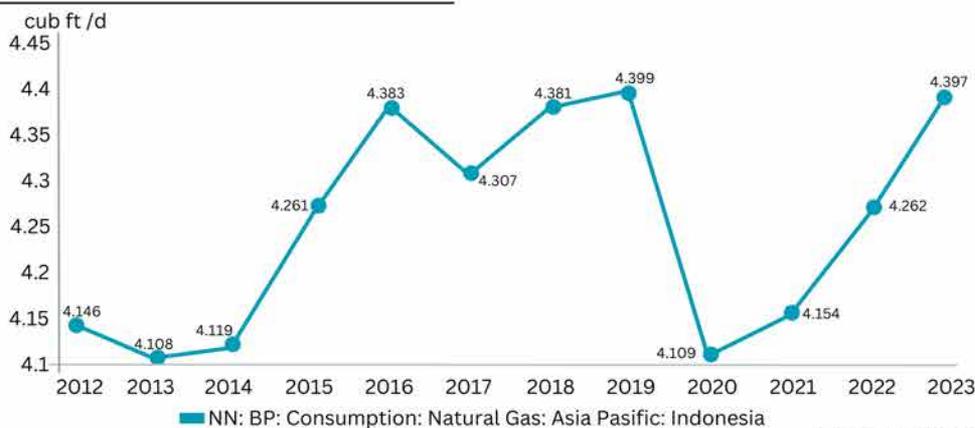
Oil demand in Indonesia is predicted to continue to increase. Oil demand through 2024 is projected to reach 635.23 barrels per day and grow at a Compound Annual Growth Rate (CAGR) of 1.60%. Currently, Indonesia is one of the Southeast Asian countries with the largest proven oil reserves.<sup>10</sup>



Cambodia also developed Biomass. In 2012, the government succeeded in conducting The Neang Kong Rey Stove (NKS) Program as an Attractive alternative to traditional cook stoves. This program generated more than 1,100 jobs.

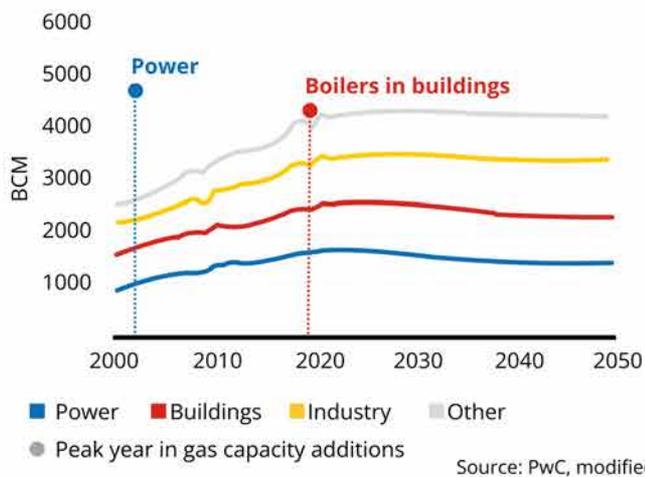
A spike in Indonesian imports would tighten the regional gasoline market and likely boost Asian refinery margins for the fuel. It could also accelerate plans for adding methanol and ethanol to gasoline to reduce its reliance on overseas supplies, a biofuel initiative that would add to the country's already extensive adoption of biodiesel.<sup>11</sup>

Gas



Source: WWW. CEICDATA.COM | BP PLC

Natural Gas Demand



Source: PwC, modified

Sinamar Project is a project that will be operational in the West Sumatra region by 2025. The project is brokered by PT Rizki Bukit Barisan Energi and participated by two participants, PT Wisesa Inspirasi Sumatera and PT Inti Energi Sejahtera. The project has a production capacity of 6,638 MMCFD.

Indonesia's gas consumption is reported at 4,397 cub ft/day in 2023. This increased from the previous record of 4,262 cub ft/day bn for 2022.<sup>12</sup>

Gas demand in Indonesia is predicted to continue to increase. Gas demand in Indonesia will continue to grow in line with the country's rapid economic growth. This condition causes the demand for gas energy to also grow.<sup>13</sup>

Industry is the largest consumer of gas (43%), followed by power generation with 33% and the hydrocarbon sector (oil and gas extraction and LNG plants) with 23%.<sup>14</sup>

Perusahaan Listrik Negara (PLN), which has pledged to stop expanding coal-fired capacity, is revising a long-term power supply plan to build 80 GW of new generation capacity, with a quarter to be powered by gas instead. They also expect its natural gas demand to nearly double by 2040 as it aims to build 20 gigawatt (GW) of gas-fired power plants.

In 2025, LNG demand by the utility firm was expected to be between 84 cargoes and 90 cargoes. If LNG meets all the gas needs for the 20 GW of capacity by 2040, that could translate into 400 cargoes of LNG per year.

Most of Indonesia's future gas supply is expected to come from its eastern region, while demand is centered in the west.<sup>15</sup>

The industrial sector is the largest gas consumer, followed by the electricity sector. Meanwhile, the Transportation sector and households are among the smallest natural gas users in Indonesia.<sup>16</sup>



Picture: Antara News

## ENERGY PROFILE



Pertamina Hulu Mahakam Adds the First Gas Production from the Second Platform of the JSN Project In Kutai Kartanegara

Picture: Pertamina

# Energy Production

## Oil

### Key indicators - Indonesia's oil and gas industry

Production												
Crude Oil (MBOPD)	918	825	789	786	831	804	772	745	708	659	612	606
Natural Gas (MMSCFD)	8149	8130	8218	8078	7938	7620	7764	7235	6665	6662	6490	6688
New Contracts Signed	39	14	7	12	2	0	11	6	0	2	5	13

Source: Reserves of oil and gas are obtained from DGOG, MoEMR

In 2022, Indonesia's oil production reached 660,000 barrels per day. In 2023, Indonesia's oil production was at 606 MBOPD.<sup>20</sup>

By the end of 2023, through its upstream sub-holding PT Pertamina Hulu Energi, it achieved a production level of up to 415 thousand barrels of oil per day (BOPD), accounting for 69% of the national crude oil production. This showed a significant increase of 10 percent compared to 2022.<sup>21</sup>

The Indonesian Government sets a target to boost its oil lifting to 1 million barrels a day in 2030. The Government has taken measures to increase oil production, among others, by maintaining the level of production in the existing fields as well as by conducting a "reserve to the production" program.<sup>22</sup>

The largest oil and gas production comes from Pertamina EP, Pertamina ONWJ, Pertamina Hulu Mahakam, and Pertamina Hulu Rokan, which took over the operational activities of the Rokan Block in August 2021. The Rokan Block is capable of contributing the highest oil production in Indonesia, amounting to 161,623 barrels per day.<sup>23</sup>

Large-scale oil and gas sources have been either recently or already discovered. In addition to the Masela Block in Maluku, there was also a recent discovery in the North Ganai Working Area in East Kalimantan.

The new findings are mostly about natural gas, the accompanying oil also has a great potential in large quantities. The tendency is that the oil produced from there is larger compared to the findings in regular wells. The oil or condensate can reach up to 10,000-15,000 barrels per day. The scale is huge.<sup>24</sup>

## Gas

Indonesia's gas production reached 6,630 million standard cubic feet per day in 2022.

In mid-2023, SKK Migas commenced gas production in the East Java region to address gas oversupply in the region. In this case, the oversupply is estimated to reach 200 MMSCFD from 2024 to 2026.

Indonesia continues to strive to reorganize natural gas for domestic use (in accordance with the 2006 policy). To pursue the lifting target, SKK Migas together with KKKS in the upstream oil and gas sector are making various efforts to boost gas production in Indonesia. One of them is completing the construction of several oil and gas projects, such as the Jambaran Tiung Biru Project.

Pipeline gas exports in 2023 amounted to 181 BSCF, a decrease from last year's 219 BSCF. In 2023, LNG production reached 847 BBTU and LNG exports reached 473 BBTU, each increasing by 7.4% and 9% from the previous year.<sup>25</sup>

Throughout 2023, PT Pertamina Hulu Rokan (PHR) successfully maintained its position as the largest oil and gas producer in Indonesia, with a production of 167,270 barrels of oil equivalent per day (BOEPD).

Indonesia has seven to eight potential gas fields that will start production between 2025 and 2026. One of the potential gas fields is the Makassar Strait gas field with huge gas reserves under Indonesia Deepwater Development (IDD) project.<sup>26</sup>



Picture: The Investor

With the new gas discoveries in the Andaman Block, South Andaman Block, and Makassar Strait Block, Indonesia will use gas for domestic use as part of the measures to reduce carbon emissions. Gas is needed to bridge our energy transition efforts before turning to renewable energy.<sup>27</sup>

Indonesia currently has an LNG plant capacity of 31.2 million tons per year. Most of the LNG is utilized for export purposes and only about 23% is used domestically, mainly to meet domestic demand. Used domestically, mainly to meet the needs of power plants.

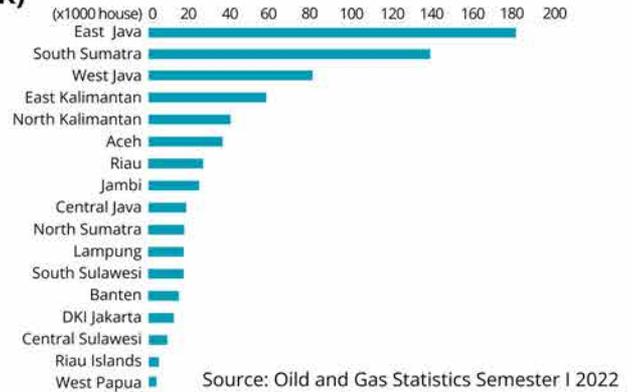
**Gas Filling Satation Capacity per Region**

Region	Capacity (MT)
Sumatra	720
Java-Bali	4,560
Kalimantan	2,360
Sulawesi	400
Others	810
<b>Total</b>	<b>8,850</b>

Source DG of Oil and Gas, MEMR

LPG Bulk Filling Station (SPBE) is an extension of PT. (Persero) which functions to distribute LPG (Liquid Petroleum Gas) to the public. SPBE conducts LPG receiving activities from supply points appointed by Pertamina, storage, and filling of LPG into Non PSO LPG cylinders or other packaging in accordance with the rules of Pertamina. LPG into Non PSO LPG cylinders or other packaging in accordance with Pertamina's regulations.

**Number of Household Connection Installed (SR)**



From 2009 to 2022, a natural gas distribution network for households has been built. That was built from the APBN and Non APBN with an accumulation of 871 thousand house connections (SR). The development has reached 17 provinces in Indonesia. East Java is the region with the most gas infrastructure.

**LPG Depot Capacity**

Business Entity	Province	Capacity (MT)
PT. Pertamina (Persero)	All Indonesia	433,712
PT. Maspion Energy Mitratama	East Java	10,000
PT. Optima Sinergi Cornvestama (OPSICO)	East Java	10,000
PT. Agrabudi Gas Utama	South Kalimantan	1,600
PT. Boswa Duta Energasindo	South Sulawesi	10,000
PT. Misi Mulia Petronusa	East Java	10,000
PT. Pertamina Patra Niaga	West Nusa Tenggara	3,000
PT. Elnusa Petrofin	North Sulawesi	2,000
PT. Patra Trading	Riau	250
PT. Gemilang Asia Sejahtera	West Kalimantan	1,500
<b>TOTAL</b>		<b>482,062</b>

Source DG of Oil and Gas, MEMR

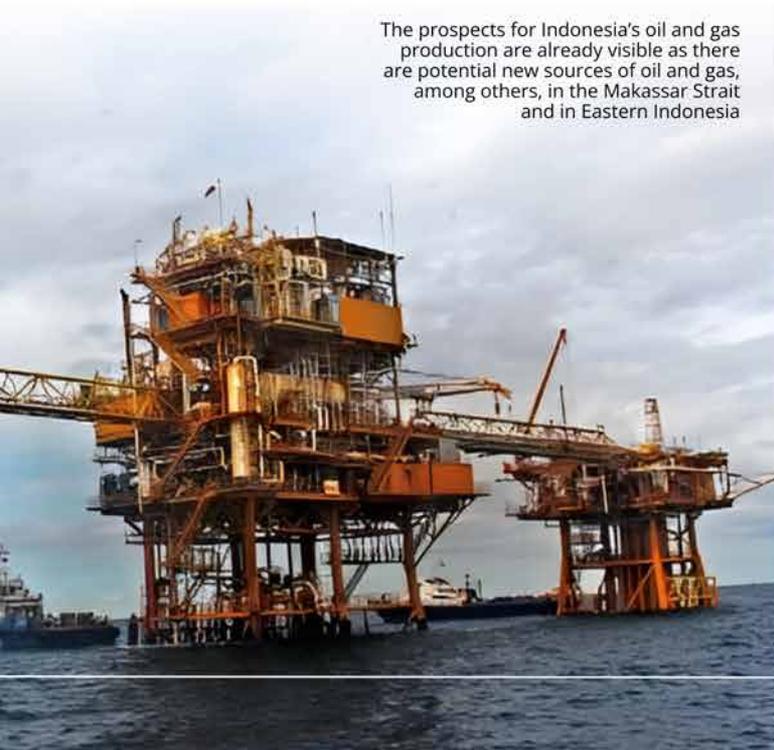
The majority of LPG depots are owned by PT Pertamina (Persero) about 90% (as of May 1, 2020) of the total national LPG depot capacity of 482,062 metric tons capacity of 482,062 metric tons.<sup>28</sup>

**Natural Gas field under development in Indonesia.<sup>29</sup>**

Field name	Consti-tuententity	Operator	Participants	Status	Start year	Natural gas production in 2023 (mmcf/d)
Geng North	Makassar Strait	Eni North Ganai	PT. Agra Energi Indonesia, Eni	Announced	2027	137,114
Asap-Kido-Merah Complex	Papua	Genting Oil Kasuri	Genting	Announced	2026	27,952
Tuna	Natuna Sea	Premier Oil Tuna	Zarubezhneft Harbour Energy	Announced	2026	14,743
Jambu Aye Utara (JAU)	Aceh	Eni	korea Gas; Eni	Announced	2026	12,819
Lofin	Maluku	CITIC Seram Energy	PT GHI seram Indonesia; PT Petro Indonesia Mandiri; Gulf Petroleum Investment; Lion Energy; CITIC Group	Announced	2025	12,812
Marakes East	Makassar Strait	Eni East Sepinggan	Eni	Announced	2025	12,467
Kali Berau Dalam	South Sumatra	Repsol Sakakemang	Petroleum Nasional; Repsol; Mitsui	Announced	2028	10,401
Mako	South China Sea	West Natuna Exploration	Empyrean Energy; Coro Energy; Conrad Petroleum	Announced	2025	10,200
Sinomar	West Sumatra	PT Rizki Bukit Barisan Energi	PT Wisesa Inspirasi Sumatera; PT Inti Energy Sejahtera	Announced	2025	6,638
Gendalo-Gehem	East Kalimantan	Eni	Eni; China Petrochemical	Announced	2028	5,596

Source: Global Data Oil & Gas Intelligence Center

The prospects for Indonesia's oil and gas production are already visible as there are potential new sources of oil and gas, among others, in the Makassar Strait and in Eastern Indonesia



## Oil

Indonesia has Major refineries with a daily capacity of 1.15 million barrels

Extensive pipeline network for crude oil and refined products distribution Indonesia's oil production has been on a decline, reaching approximately 30.7 million tons in 2022, a significant drop from a peak of 70 million tons in 2000. The decline is attributed to the depletion of major oil fields and insufficient investment in new exploration and production projects.<sup>30</sup>

Extensive pipeline network for crude oil and refined products distribution.<sup>31</sup>

### Indonesia Oil Refinery Capacity 2022

Oil Refinery	Capacity (Thousand BPH)
Dumai	177.0
Musi	127.3
Cilacap	328.0
Balikpapan	260.0
Balongan	150.0
Cepu	3.8
Kasim	10.0
Tuban (TPPI)	100.0
<b>Total Capacity</b>	<b>1,176.1</b>
<b>Total Operating Capacity</b>	<b>1,176.1</b>

Source HEESE, 2022

Until 2022, the installed refinery capacity is 1.17 million bpd (barrels per day).<sup>32</sup>

Government data shows that Indonesia is home to a total of 128 basins. The country's oil and gas production comes out of 20 basins. Indonesia has eight drilled basins, but they have yet to produce oil and gas. Nineteen basins show signs of hydrocarbon — a chemical compound commonly found in crude oil and natural gas.<sup>33</sup>

Most of the accessible oil in Indonesia is in the western half of the archipelago, mainly Sumatra, the Java Sea, East Kalimantan, and Natuna.<sup>34</sup>



The Energy and Mineral Resources Ministry of Indonesia has set a target for oil and gas production for 2025, aiming around 1.6 million barrels of oil equivalents per day (BOEPD)

## Gas

Indonesia has 11 LNG receiving terminals and over 8,400 km of gas transmission pipelines.<sup>35</sup>

### Indonesia LPG Refinery Capacity 2022

LNG Refinery	Capacity (MMTPA)
<b>LPG Refinery (Oil Refinery)</b>	<b>1,331.0</b>
PT Pertamina (Dumai)	68.0
PT Pertamina (Plaju)	131.0
PT Pertamina (Cilacap)	318.0
PT Pertamina (Balikpapan)	91.0
PT Pertamina (Balongan)	548.0
PT TPPI	175.0
<b>Upstream LPG Refinery</b>	<b>2,342.0</b>
PT Badak NGL	1,000.0
PT Chevron*	90.0
PT Petrogas	14.0
PT Petrochina	600.0
PT Conoco Phillips*	525.0
PT Saka Indonesia	113.0
<b>Downstream LPG Refinery</b>	<b>1,067.3</b>
PT Pertamina (P.Brandan)*	44.0
PT Maruta Bumi Prima*	17.0
PT Medco LPG Kaji*	73.0
PT Pertamina (Mundu)	37.0
PT Titis Sampurna	72.0
PT Sumber Daya Kelola (tugu Barat)*	7.0
PT Bina Bangun Wibawa Mukti	55.0
PT Surya Esa Perkasa	82.0
PT Yudhistira Haka Perkasa*	44.0
PT Wahana Insannugraha	37.0
PT Media Karya Sentosa Phase I*	58.0
PT Media Karya Sentosa Phase II*	84.0
PT Yudhistira Energy	58.0
PT Gasuma Federal Indonesia	26.0
PT Pertasambatan Gas	259.0
PT Sumber Daya Kelola (Losarang)*	3.8
PT Arsynergy Resources	109.5
<b>Total Capacity</b>	<b>4,740.3</b>
<b>Total Operating Capacity</b>	<b>3,878.5</b>

Note: (\*) Stop operating

Source: Oil and Gas Statistics Semester I 2022

Until 2022, Indonesia has an LPG refinery with a capacity of 4.7 million tons. By 2022, only 3.9 million tons of this capacity will be in operation.<sup>36</sup>

### Indonesia LNG Refinery Capacity 2022

LNG Refinery	Capacity (MMTPA)
PT Badak	21.6
PT BP	7.6
PT Donggi Senoro	2
<b>Total Capacity</b>	<b>31.2</b>

Source: Oil and Gas Statistics Semester I 2021



### The Largest Oil Refinery in Indonesia

Riau is the largest oil-producing region in Indonesia. Most of the oil is produced from the Natuna Islands which has several mining blocks including Rokan, Malacca Strait, Long Strait, Siak, Mountain Front Kuantan, Coastal Plains and Pekanbaru. Quoting from the website of the Indonesian Ministry of Energy and Mineral Resources, the Rokan Block managed by PT Pertamina Hulu Rokan (PHR) is now the largest oil producer in Indonesia with oil production ranging from 162-165 thousand barrels of oil per day.

Picture : Kumparan

## Other Energy Sources

The government has set ambitious targets for renewable energy development, aiming for a substantial increase in capacity by 2029. However, the implementation of these plans has faced challenges, including regulatory hurdles, financing issues, and the need for improved infrastructure to support renewable energy generation and distribution.<sup>37</sup>

The government aims to increase the share of renewables in the energy mix, which currently includes hydropower, geothermal, solar, and biomass. As of recent reports, renewable energy accounts for a small fraction of total energy consumption, with hydropower being the most significant contributor among renewables.<sup>38</sup>

Geothermal power plants with a capacity of 2.13 GW. Here are the seven geothermal operators in Indonesia:

- **PERTAMINA GEOTHERMAL ENERGY:** a) 235 MW Kamojang Unit 1, 2, 3, 4, 5 in West Java (Note: Supplying steam to Units 1, 2, and 3 operated by PLN); b) 120 MW Lahendong Unit 1, 2, 3, 4, 5, 6 in Sulawesi; c) 5 MW Lahendong Binary in Sulawesi; d) 110 MW Ulubelu Unit 1 and 2 in Lampung Sumatra (Note: Supplying steam to PLN); e) 110 MW Ulubelu Unit 3 and 4 in Lampung Sumatra;

f) 55 MW Lumut Balai Unit 1 in South Sumatra; g) 30 MW Karaha Bodas in West Java; i) 12 MW Sibayak Unit 1, 2 and 3 in North Sumatra

- **STAR ENERGY GEOTHERMAL:** a) Salak plant (337 MW) in West Java – Acquired from Chevron in 2017; b) Darajat plant (270 MW) in West Java – Acquired from Chevron in 2017; c) Wayang Windu (227 MW) in West Java – Acquired from Magma Nusantara Limited in 2004
- **PT GEO DIPA ENERGY:** a) 70 MW Dieng Unit 1 power plant located in Central Java; b) 55 MW Patuha Unit 1 power plant located in West Java.
- **KS ORKA RENEWABLES PTE LTD:** a) 140 MW Sorik Marapi Unit 1, 2, and 3 power stations in North Sumatra; b) 5 MW Sokoria geothermal plants in Flores.
- **PT SUPREME ENERGY:** a) The 45.6 MW Unit 1 and 45.6 MW Unit 2 stations in the Rantau Dedap work area in South Sumatra; b) The 85 MW Muara Laboh Unit 1 power plant in West Sumatra.
- **PLN GAS AND GEOTHERMAL:** a) 110 MW Ulubelu Unit 1 and Unit 2 – Steam supplied by Pertamina Geothermal Energy; b) Kamojang Unit 1 (30 MW), Unit 2 (55 MW), and Unit 3 (55 MW) – Steam supplied by Pertamina Geothermal Energy; c) 10 MW Ulumbu Unit 1,2,3,4 in Flores; d) 2.5 MW Mataloko in Flores.<sup>39</sup>

Solar power installations with a capacity of 0.18 GW. Hosting Southeast Asia's largest floating PV installation, the Cirata Floating PV Installation covers 225 hectares of water, boasting a capacity of 192 MW. This success opens dialogues for expansion plans between the state-owned electricity company PLN and Abu Dhabi-based renewable energy company Masdar. Phase II of Cirata solar plant development aims to increase its total installed capacity to 500 MW.<sup>40</sup>

### NRE Power Plant Installed Capacity 2013-2022



Source: HEESI, 2022

# Oil

Since oil production is declining, The government has initiated various projects to attract foreign investment and enhance exploration activities. They also focus on improving the regulatory framework to facilitate investment and streamline operations in the oil sector.

The Forel Bronang project aims to increase oil production in the Natuna Sea region, which is known for its hydrocarbon potential. The development of this project is part of Medco's strategy to increase oil production and contribute to Indonesia's overall energy production target. This project is significant not only for Medco but also for Indonesia's energy landscape, as it helps meet domestic energy needs and supports Indonesia's efforts to maintain energy security.

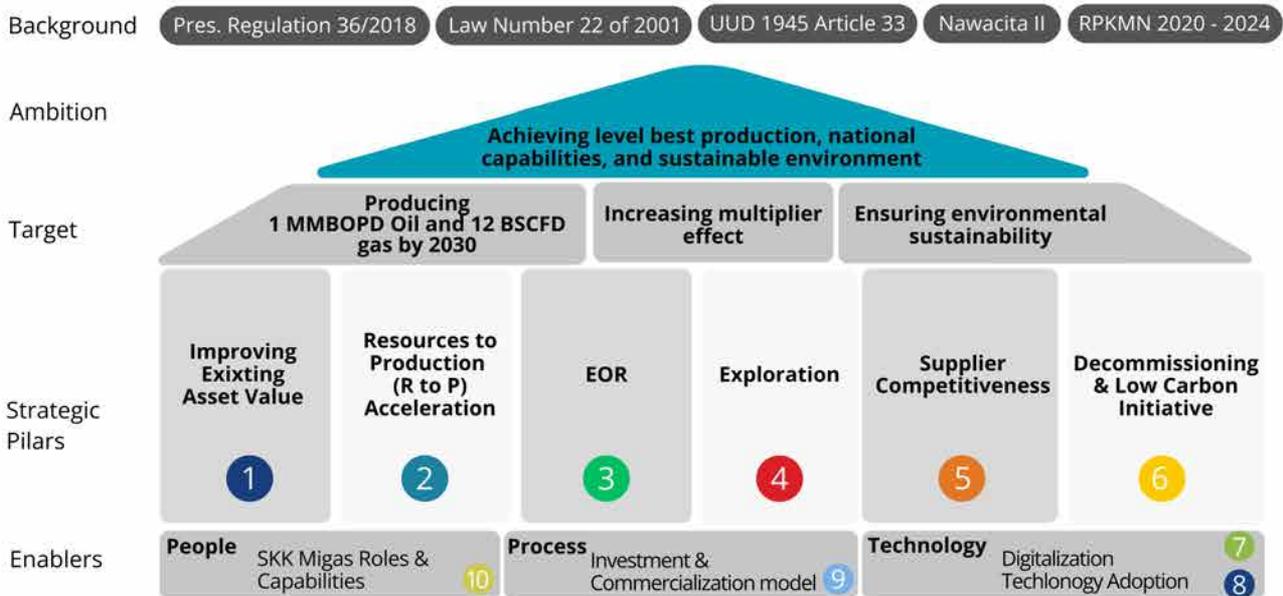
In June 2024, Indonesia (Pertamina Hulu Energi) and China (Sinopec & PetroChina) strengthened their cooperation by designating the Button Area and Timor Area as joint study areas to apply technology and efforts to increase production in five Pertamina oil and gas field candidates.

Through PT Pertamina Hulu Energi, Indonesia is working with PETRONAS Masela to acquire Shell Upstream Overseas Services' interest. The sale and purchase agreement was signed on July 25, 2023. Under the partnership, Pertamina Hulu Energi will manage 20% of the ownership and PETRONAS Masela will manage 15%.<sup>41</sup>

OPL E-Main Project by PHE ONWJ executed in June 2024. The project is expected to produce oil with a capacity of 0.128 MMBOPD.

In April 2024, PT Pertamina Hulu Energi Komerling, carried out onstream in the ASDJ-116X Flowline project. This project is expected to produce a production capacity of 0.094 MMBOPD.<sup>42</sup>

During 2024-2026, Exxonmobil Company conducted drilling campaigns in the Cepu Block. The drilling campaign was conducted between the existing production wells in the Banyu Urip field. Through this project, it is expected that 20,000-30,000 barrels per day will be produced through 7 drilling points.<sup>43</sup>



To support the development of the oil and gas sector in Indonesia, SKK Migas has a strategic plan called IOG 4.0 which has three main targets: increased production, multiplier effect and environmental sustainability which will be achieved through the implementation of 10 Pillars and Enablers and 25 Program Charters.<sup>44</sup>

Indonesia also will start the oil operation in 2024 ahead such as:

- a. SP Puspa Asri Project by Pertamina EP which will be operated in October 2024. This project is

projected to have a production capacity of 0.6 MMBOPD.

- b. Hidayah Project by Petronas Carigali Madura which will be operated in 2027. This project is projected to have a production capacity of 25.276 MMBOPD.
- c. The government has planned a National Strategic Project (PSN) which includes the Masela Abadi Project. The project is expected to come onstream in 2029 after the 2027 onstream plan failed due to Shell's exit from the project. The project is expected to increase Indonesia's oil production to 843,000 bopd.

## Gas

The government is also promoting the use of liquefied natural gas (LNG) for both domestic consumption and export. In 2023, Indonesia continued to leverage its position as a major LNG exporter, with ongoing investments in LNG facilities aimed at enhancing export capacity while addressing domestic demand.<sup>45</sup>

The development of the Karang Baru Field is significant as it contributes to Indonesia's national gas production target and helps meet domestic energy needs. The Karang Baru Field Project is an oil project managed by Pertamina EP, scheduled for production in April 2024. The project has a production capacity of 5 MMSCFD.

The SWPG Debottlenecking Project is one of the gas projects planned to be operational by March 2024. The project is managed by Pertamina Hulu Mahakam and has a production capacity of 8 MMSCFD (Million Standard Cubic Feet per Day). The objective of this debottlenecking project is to identify and address bottlenecks in the existing gas production system, so as to improve production efficiency and capacity.

On July 26, 2024, the Indonesian government through the Ministry of Energy and Mineral Resources began delivering natural gas to PT KCC Glass from South Korea located in Batang, Central Java. This project is a form of government efforts to meet domestic gas needs in the industrial, power generation and household sectors through the utilization of the Cisem gas pipeline infrastructure.<sup>45</sup>

Under the auspices of PT Pertamina EP CEPU, since 2020 Indonesia has carried out the Jamabaran Tiung Biru (JTB) Unitized Field Gas Development Project. This project is the first development project in Indonesia to use ACTIVE CIRP technology.<sup>46</sup>

In June 2024, SKK Migas and Medco E&P Grissik (MEPG) succeeded in accelerating the completion of the Dayung Facility Optimization project which was originally scheduled to be completed by the end of July 2024. This project is one of the efforts to optimize the Gas Turbine Compressor unit GTC-101 by increasing the compression level in it.<sup>47</sup>

In May 2024, Mubadala Energy discovered gas from the Tangkulo-1 deepwater exploration well in the South Andaman Block. In tests utilizing the latest Drill Stem Test (DST) design, the well successfully flowed 47 mmscf/d of quality gas and 1,300 barrels of condensate. However, if supported by adequate facilities, the well is expected to produce 80-100 mmscf/d and more than 2,000 barrels of condensate.<sup>48</sup>

The Upcoming Gas Lifting Project in Indonesia are:

- West Belut Project is a project under the joint venture of Medco E&P Natuna Ltd and PT Meindo Elang Indah (MEI). The project commenced operations in August 2024 with a focus on developing the Wes Belut field located offshore Block B of the South Natuna Sea.
- West Natuna Exploration has targeted production in the Mako area by 2026 with a projected production capacity of 120 MMSCFD.
- Merbau Compressor Project under PT Pertamina EP which is targeted to be onstream in November 2024. This project is projected to have a production capacity of 8 MMSCFD.
- Eni north Ganai moved in as operator in the Geng North project, Makassar. There are two participating companies in this project, PT Agra Indonesia and Eni. The project will start in 2027 with a production capacity of 137,114 MMSCFD.



### Advancing CCUS Implementation for Energy Sector in ASEAN

The Indonesian government has shown support for the development of CCUS/CCS in ASEAN by contributing to the development of regulations and studies on CO2 storage. During the ASEAN Chairmanship 2023, Director of Oil and Gas Engineering and Environment, Mirza Mahendra explained the Indonesian government's efforts in developing CCS/CCUS.

Picture: Kementerian ESDM Direktorat Jenderal Minyak dan Gas Bumi

**Mubadala Energy**  
Mubadala Energy discovered gas from the Tangkulo-1 deepwater exploration well in the South Andaman Block. In tests utilizing the latest Drill Stem Test (DST) design, the well successfully flowed 47 mmscf/d of quality gas and 1,300 barrels of condensate.

- The Asap Kido Merah Complex project in the Papua region is one of the gas development projects in Indonesia operated by Genting Oil Kasuri. The project has been announced to operate in 2026 with a production capacity of 27,952 MMCFD.
- Premier Oil Tuna, part of the Harbour Energy Group, is looking to expand its operations in Indonesia through the Tuna project located in the Natuna Sea. The project has two participants, Zarubezhneft and Harbour Energy. The project will commence in 2026 with a production capacity of 14,743 MMCFD.
- The Jambu Aye Utara (JAU) project is one of the projects that will be operated in 2026. The project is located in Aceh and operated by Eni. Participants in this project are Korea Gas and Eni. The project has a production capacity of 12,819 MMCFD.
- The Lofin project is one of the projects operated by CITIC Seram Energy and includes participants from PT GHJ Seram Indonesia, PT Petro Indo Mandiri, Gulf Petroleum Investment, Lion Energy, and CITIC Group. The project is located in Maluku with an operation target of 2025. The project has a production capacity of 12,812 MMCFD.
- Kali erau Dalam Project is a project that will be operational in the South Sumatra region in 2028. The project is brokered by Respol Sakakemang and has three participants, namely Petroliam Nasional, Repsol, and Mitsui. The project has a production capacity of 12,467 MMCFD.
- Sinamar Project is a project that will be operational in the West Sumatra region by 2025. The project is brokered by PT Rizki Bukit Barisan Energi and participated by two participants, PT Wisesa Inspirasi Sumatera and PT Inti Energi Sejahtera. The project has a production capacity of 6,638 MMCFD.
- The Gendalo-Gehem project is one of the upcoming gas development projects in Indonesia. The project, located in East Kalimantan, will be implemented in 2028. The project is brokered by Eni and has two participants, ENi and China Petrochemical. The project has a production capacity of 5,596 MMCFD.<sup>49</sup>

## Other Energy Sources

Currently, the Indonesian government is developing the Renewable Energy Skills Development (RESK) project with the Renewable Energy Institute and the Swiss government. The cooperation is aimed at accelerating the energy transition process by creating a competent workforce in the renewable energy sector, particularly in solar energy and hydropower. The project deliberately involves the active role of the younger generation in order to encourage a sustainable energy transition process.<sup>50</sup>

In 2023, PT PLN (Persero) through the PLN Nusantara Power subholding inaugurated the first Green Hydrogen Plant (GHP) in Indonesia, located in the Petrokimia Nusantara Power area. It is located in the Steam Gas Power Plant (PLTGU) area, Muara Karang, Pluit, Jakarta. Muara Karang, Pluit, Jakarta. This GHP is 100 percent sourced from solar energy and is capable of producing 51 tons of hydrogen per year. Of the total production, 43 tons can be utilized for 147 cars that can travel 100 km every day.<sup>51</sup>

On 24 November 2023, the Government of Indonesia undertook the development of the Ubadari Carbon Capture, Utilization, and Storage (CCUS) project. This project is part of the Tangguh Project's commitment to the nation's energy security to achieve Net Zero Emission (NZE) by 2060. The project is the first CCS Hub project in Indonesia with a potential CO<sub>2</sub> storage capacity of up to 1.8 Gts, and can also generate additional gas production for Indonesia.<sup>52</sup>

Geothermal expansion opportunities with PLN Gas and Geothermal.<sup>53</sup>

- 20 MW Tulehu in Central Maluku
- 10 MW Atadel in East Nusa Tenggara, as a model for sustainable development in an area with limited energy resources.
- 10 MW Songa Wayaua in North Maluku, The geothermal site can be integrated with eco-tourism initiatives.
- 20 MW Tangkuban Perahu in West Java, which is located near urban centers.

## Ministries

**Kementerian Energi dan Sumber Daya Mineral:** Responsible for policies and regulations in the energy and mineral resources sector in Indonesia, overseeing the energy sector, and managing natural.<sup>54</sup>

**Kementerian Keuangan:** Plays a crucial role in financing energy projects and implementing fiscal policies related to energy investments.<sup>55</sup>

**Badan Perencanaan Pembangunan Nasional (Bappenas):** Involved in planning and coordinating energy development projects within the broader national development framework.<sup>56</sup>

**Kementerian Lingkungan Hidup dan Kehutanan:** Responsible for ensuring that energy development aligns with environmental sustainability goals and regulations.<sup>57</sup>

**Kementerian Investasi atau Badan Koordinasi Penanaman Modal (BKPM):** Facilitates investment in the energy sector, promoting foreign and domestic investment opportunities.<sup>58</sup>

## Agencies

**Perusahaan Listrik Negara (PLN):** The state-owned enterprise responsible for electricity generation, transmission, and distribution across Indonesia.<sup>59</sup>

**PT Pertamina:** The state-owned oil and gas corporation, involved in upstream and downstream activities.<sup>60</sup>



KEMENTERIAN LINGKUNGAN HIDUP  
DAN KEHUTANAN



KEMENTERIAN INVESTASI/  
BKPM



### PLTGU Jawa-1. The largest gas power plant in Southeast Asia

PLTGU Jawa-1 is the largest gas-fired power plant in Southeast Asia. It has a capacity of 1,760 Mega Watts (MW). PPLTGU Jawa-1 began construction in December 2018. The construction of this plant was carried out by PT Jawa Satu Power, which is a consortium of PT Pertamina Power Indonesia. PLTGU infrastructure construction consists of LNG / gas Gloating Storages Regasification Unit (FSRU) infrastructure and two gas turbines which are considered the most efficient and have the lowest emission levels.

Picture : Pertamina



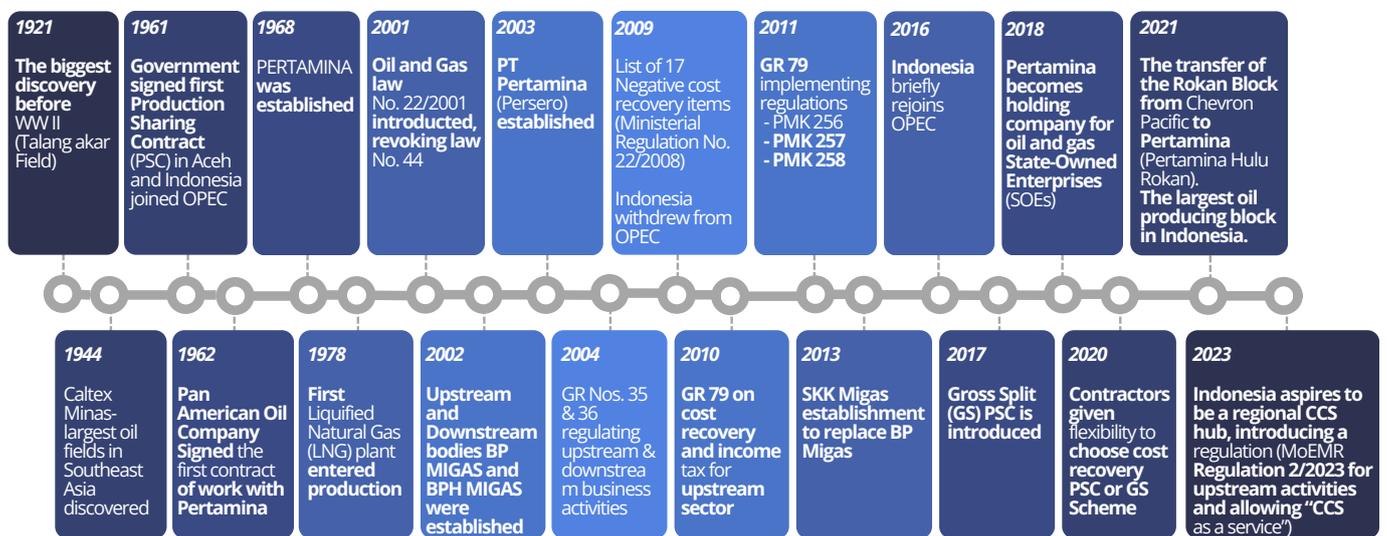
Indonesia is the headquarter of ASEAN Centre for Energy (ACE), an intergovernmental organization established to promote energy cooperation among the ASEAN member states. ACE facilitates collaboration, research, and capacity-building in areas such as renewable energy, energy efficiency, and energy infrastructure.<sup>61</sup>

The Just Energy Transition Partnership (JETP) for Indonesia was launched on November 15, 2022, at the G20 Leaders' Summit in Bali. This landmark agreement aims to mobilize an initial \$20 billion in public and private financing to decarbonize Indonesia's energy sector, supporting the country's efforts to combat climate change and transition to clean energy. The JETP agreement was formed between Indonesia and the International Partners Group (IPG), led by the United States and Japan, and including Canada, Denmark, the European Union, France, Germany, Italy, Norway, and the United Kingdom.<sup>62</sup>

In July 2020, the Indonesian government made a significant policy change, giving investors a choice between the old cost-recovery PSC scheme and the Gross Split (GS) system under Minister of Energy and Mineral Resources Regulation No. 12/2020. This flexible stance has successfully attracted investor interest in blocks in Indonesia. By 2021, 17 contractors were actively operating under the GS PSC system, marking an important development in Indonesia's oil and gas landscape.

The development of the oil and gas sector in Indonesia will always be related to several important events that occurred. One of them is the establishment of Pertamina, a state-owned enterprise, in 1968. With these beginnings, Indonesia's oil and gas sector is growing, until in 2023 Indonesia has aspirations as a regional CCS hub.

**Significant events in the history of Indonesia's oil and gas sector**



source: PwC

In an effort to become a regional center for CCS, Indonesia implemented Minister of Energy and Mineral Resources Regulation No. 2/2023, which covers cooperation in upstream oil and gas activities, introducing the “CCS as a service” business model.

## Key indicators - Indonesia’s Oil and Gas Industry Exploration Activities

		2022 Realisation	2023 Target	2023 Realisation	%2023 VS 2022	% of 2023 Target
2D Seismic	Km	1,950	934	25	1.3%	3%
Survey Full Tensor Gravity Gradiometry (FTG)	Km <sup>2</sup>	18,814	129,305	129,305	687%	100%
3D Seismic	Km <sup>2</sup>	3,790	2,282	1,432	38%	63%
Development Wells	Wells	760	919	799	105%	87%
Exploration Wells Drilling	Wells	30	57	38	127%	67%
Workover Wells	Wells	639	834	834	131%	100%
Well Service Activity	Activity	30,229	33,182	33,412	110.5%	101%

Source: PwC “SKK Migas, \*Press Conference - Upstream Oil and Gas Performance Achievement of Year 2023 and Target 2024”, Broadcast January 2024 on Youtube, SKK Migas, 2024”. Edited.

In 2022, Indonesia made a gradual recovery in upstream activities, and this positive trend continued in 2023. Exploration activities also showed improvement, increasing from 30 to 38 wells in 2022. In 2023, Indonesia achieved the highest number of wells drilled since 2017, with 38 wells. In addition, more development wells were developed in 2023, from 260 to 799 wells. Full Tensor Gravity (FTG) surveys achieved the 2023 target of 129,305 square kilometers (Km<sup>2</sup>). However, Exploration and exploitation activities in 2023 were constrained by drilling wells for development due to security concerns, rig availability, labor, and flooding at the site.<sup>63</sup>

To boost the national oil production, The Government needs to hire experts, equipment, and other supporting facilities to optimize oil production. The potential for exploration in existing areas such as in Rokan, he continued, reaches 128 locations that can be optimized. In terms of investment, the Government should consider partnership schemes for the experts and capitals, while raising the issue of cooperation with Abu Dhabi to build refineries to meet the target of crude oil production.<sup>64</sup>

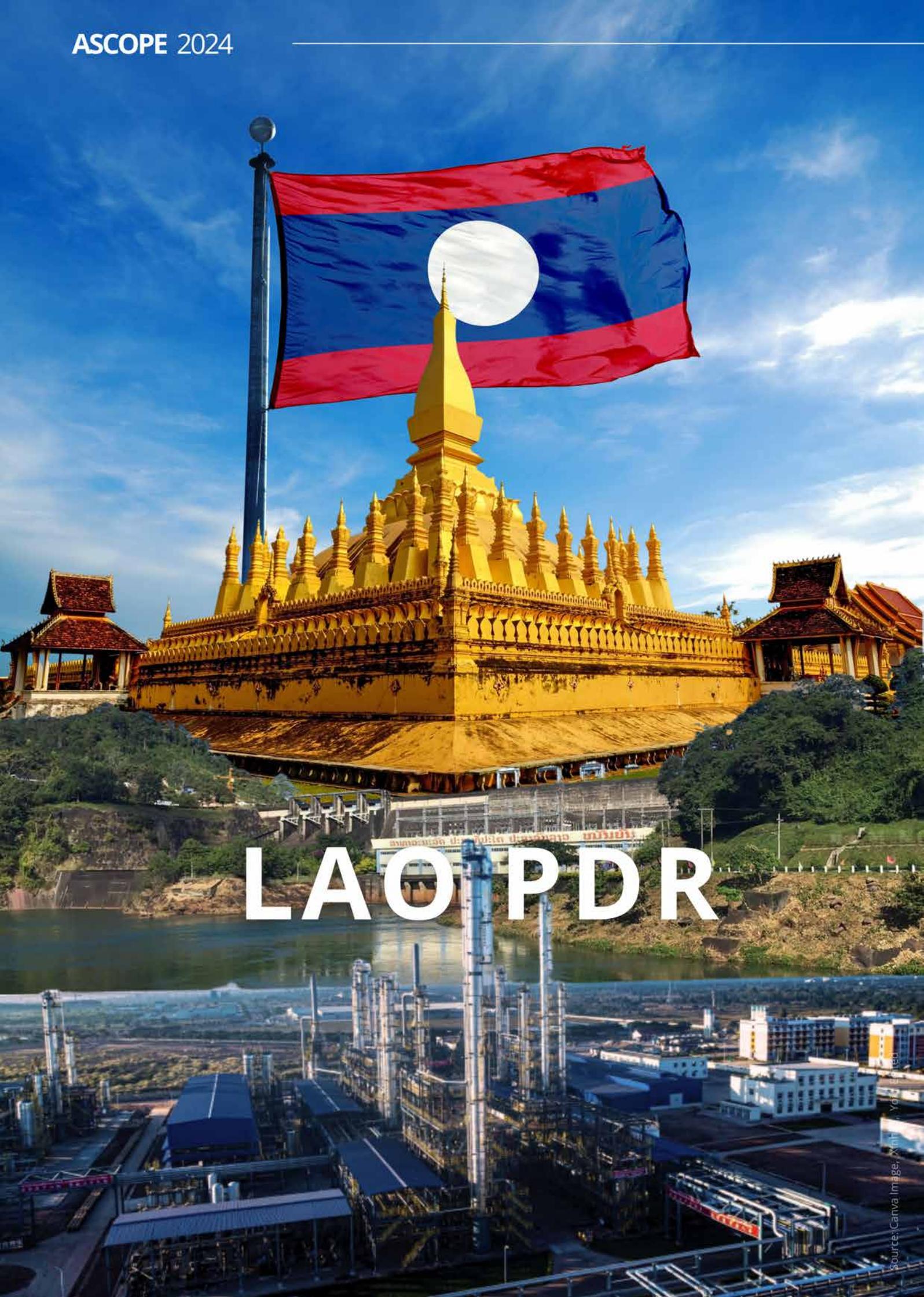
PT Pertamina EP discovered two new oil and gas sources in West Java. The first is the East Akasia Cinta (EAC)-001 Well in the Indramayu Regency, with an oil water rate of 30 barrels per day. Second, the East Pondok Aren (EPN)-001 Well in Bekasi Regency, West Java, with an oil production rate of 402 barrels per day. Gas is also produced from these two wells.<sup>65</sup>

To increase oil production in Indonesia, two things need to be the main strategy. The first is to halt the rate of decline in production in existing oil and gas wells. Second, we must find new oil and gas sources in greenfields, not brownfields, or around existing fields. Greenfield) is located in eastern Indonesia, in the deep sea. Everyone, including the government, already knows the truth. However, it requires a large investment and there is certainty about who wants to go there.<sup>66</sup>

In 2023, PHR implemented an investment strategy focused not only on operational equipment but also on technological development and human resources (HR), as well as investments in business development and non-business development.<sup>67</sup>

Picture: Doc.Pertamina EP (VOI)

PT Pertamina EP (PEP) Regional Java Subholding Upstream Pertamina has succeeded in proving additional hydrocarbon resources from drilling two exploration wells in West Java Province.



# LAO PDR

## Country Key Highlights

### Government/ Political System

Laos is a one-party socialist republic. It is governed by the Lao People's Revolutionary Party, in which the party leadership is dominated by military figures. The Socialist Republic of Vietnam and the Vietnam People's Army continue to have significant influence in Laos.<sup>1</sup>

### Demography

7,739,200 (2024) with 1.41% growth rate.<sup>2</sup>

### GDP and Percentage From O&G

GDP (current US\$) in Laos was reported at 15.85 Billion USD in 2023. The y-o-y growth rate is at 3.7%. Contribution of Oil and Gas in GDP is 0%.<sup>3</sup>

### GDP Per Capita

The Gross Domestic Product per capita in Laos was last recorded at 2659.72 US Dollars in 2023.<sup>4</sup>

### Reserves

Lao PDR has no proven oil or gas reserves.<sup>5</sup>

### Oil & Gas Production

As of 2019, Lao PDR did not produce crude oil. All oil products are imported.<sup>6</sup>

### Refining Capacity

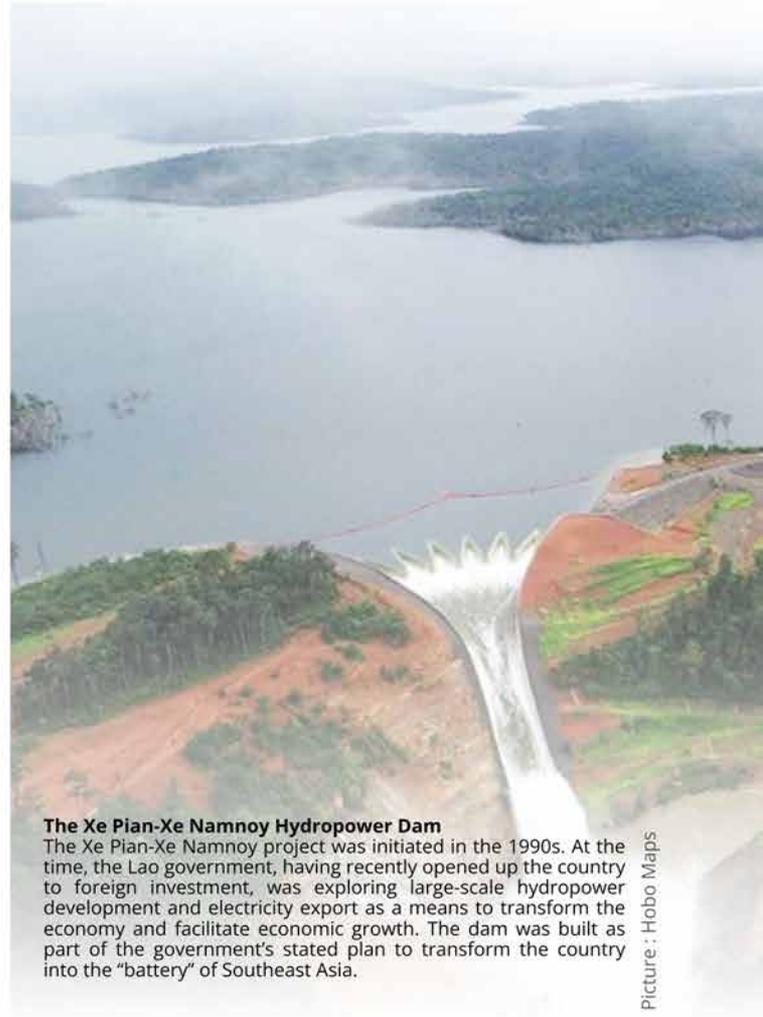
Expected: 3 Million Tonnes per year (approx. 52,000 b/d).<sup>7</sup>

### Domestic Demand

0.015 quadrillion Btu (approx. 2,638,986.629 barrels) in 2022.<sup>8</sup>

### Upstream Fiscal Term

Laos does not have laws and regulations to govern crude oil and gas extraction and production. Currently, the government of Laos applies a production sharing contract ("PSC") model similar to other countries.<sup>9</sup>



#### The Xe Pian-Xe Namnoy Hydropower Dam

The Xe Pian-Xe Namnoy project was initiated in the 1990s. At the time, the Lao government, having recently opened up the country to foreign investment, was exploring large-scale hydropower development and electricity export as a means to transform the economy and facilitate economic growth. The dam was built as part of the government's stated plan to transform the country into the "battery" of Southeast Asia.

Picture: Hobo Maps



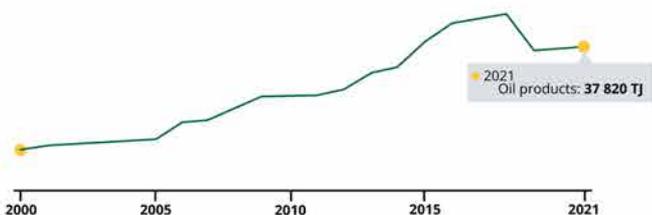
# Energy Demand

## Oil

The entire transport sector in Lao PDR depends on Oil.

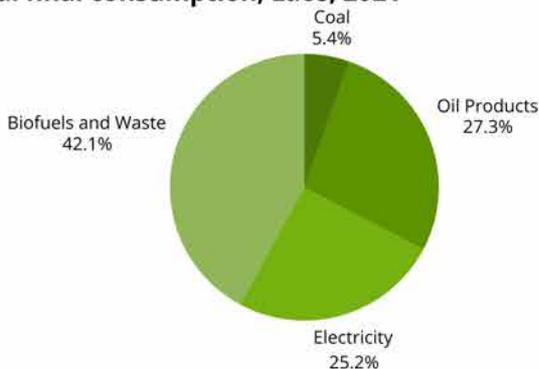
Oil demand will continue to grow in line with the increase in the number of passenger cars as the income level of the Lao PDR increases. The annual growth rate for oil demand will be 6.1% per year.<sup>10</sup>

Oil prices directly affect the country's socioeconomic development, especially the cost of living and doing business in the country.<sup>11</sup>



Total final energy consumption on oil products in Lao PDR in 2021. Oil is projected to increase at an average annual rate of 6.1% over 2015–2040.<sup>12</sup>

### Total final consumption, Laos, 2021



Source: International Energy ProjectAgency

In 2019, the country consumed 0.863 Mtoe of oil. While this is a decrease from 2018, demand is projected to increase from 0.863 Mtoe in 2019 to 3.56 Mtoe in 2050 (an AAGR of 4.7%), making it the third highest share.<sup>13</sup>

Fuel prices in Laos are controlled by the government. The Ministry of Industries and Commerce (MOIC) makes a decision on fuel (all types) price based on fluctuation of world oil prices. The Lao State Fuel Company is delegated by MOIC to adjust (increase or decrease) oil prices in form of writing and disseminate it to all oil companies throughout the country. In other words, very private oil companies, though import their product separately, to sell their goods at the designed price.<sup>14</sup>



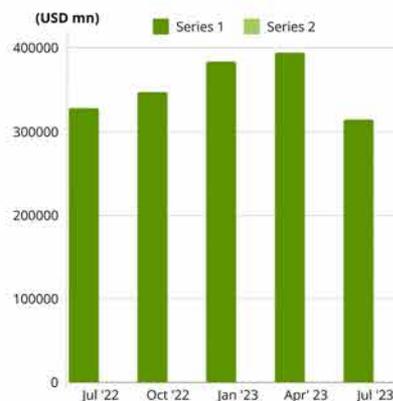
\* A long flat line means that the government fixes the prices.

source: Global Petrol Prices

The provinces with the highest energy consumption for transport were Vientiane; followed by Savannakhet; and Champasak Motorcycles accounted for the highest gasoline consumption, while Buses accounted for the largest share of diesel consumption for the transportation sector.<sup>15</sup>

In 2022, Refined Petroleum was the 1st most imported product in Laos. Laos imports Refined Petroleum primarily from: Thailand (\$1.11B), Vietnam (\$126M), China (\$2.4M), Singapore (\$1.83M), and South Korea (\$1M).<sup>16</sup>

Laos Imports: Crude Oil, Fuel, Lubricant and Others data was reported at 303.650 USD mn in Sep 2023. This records a decrease from the previous number of 314.950 USD mn for June 2023. Laos Imports: Crude Oil, Fuel, Lubricant and Others data is updated quarterly, averaging 224.375 USD mn from Dec 2018 (Median) to Sep 2023.<sup>17</sup>



### Laopec, Lao PDR First Refinery

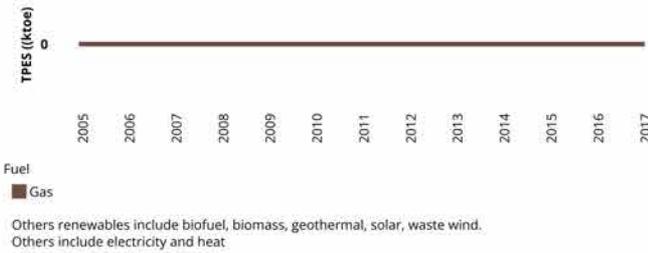
Lao Petroleum & Chemical Co. Ltd. (Laopec) 3 million tons per year refining project, located in Laos Vientiane Saysettha Development Zone. It is The first modern petroleum refinery in Laos. Laopec is a joint venture between the Yunnan Construction and Investment Holding Group and Lao State Fuel Co.



## Gas

Gas has not been a primary energy resource in Lao PDR. According to the report of ASEAN Center for Energy (ACE) in 2019.<sup>18</sup>

FOSSIL FUEL, 78,1%		RENEWABLE ENERGY, 55,2%		OTHER...
Coal, 52,4%	Oil, 15,7%	Hydro, 47,0%	Bio, 5,2%	Traditional Biomass, 14,1%



Source: ASEAN Climate Change and Energy Project

From 2015 to 2019, The slower growth of biomass supply indicates that there was a substitution from biomass for cooking in the residential sector to liquefied petroleum gas. In the future as household appliances become more efficient and households use LPG as an alternative. The residential sector share in the TFEC will decrease from 43% in 2015 to 18% in 2040.<sup>19</sup>

Even though the gas demand was not the priority of the country's demand, the government has stipulated the procedures of oil import in 2012. The Ministry of Industry and Commerce published its Decision On the Procedure for Import and Distribution of Gas in the Lao PDR No.0238/MOIC.DIMEX in Vientiane Capital on February 2, 2012.<sup>20</sup>



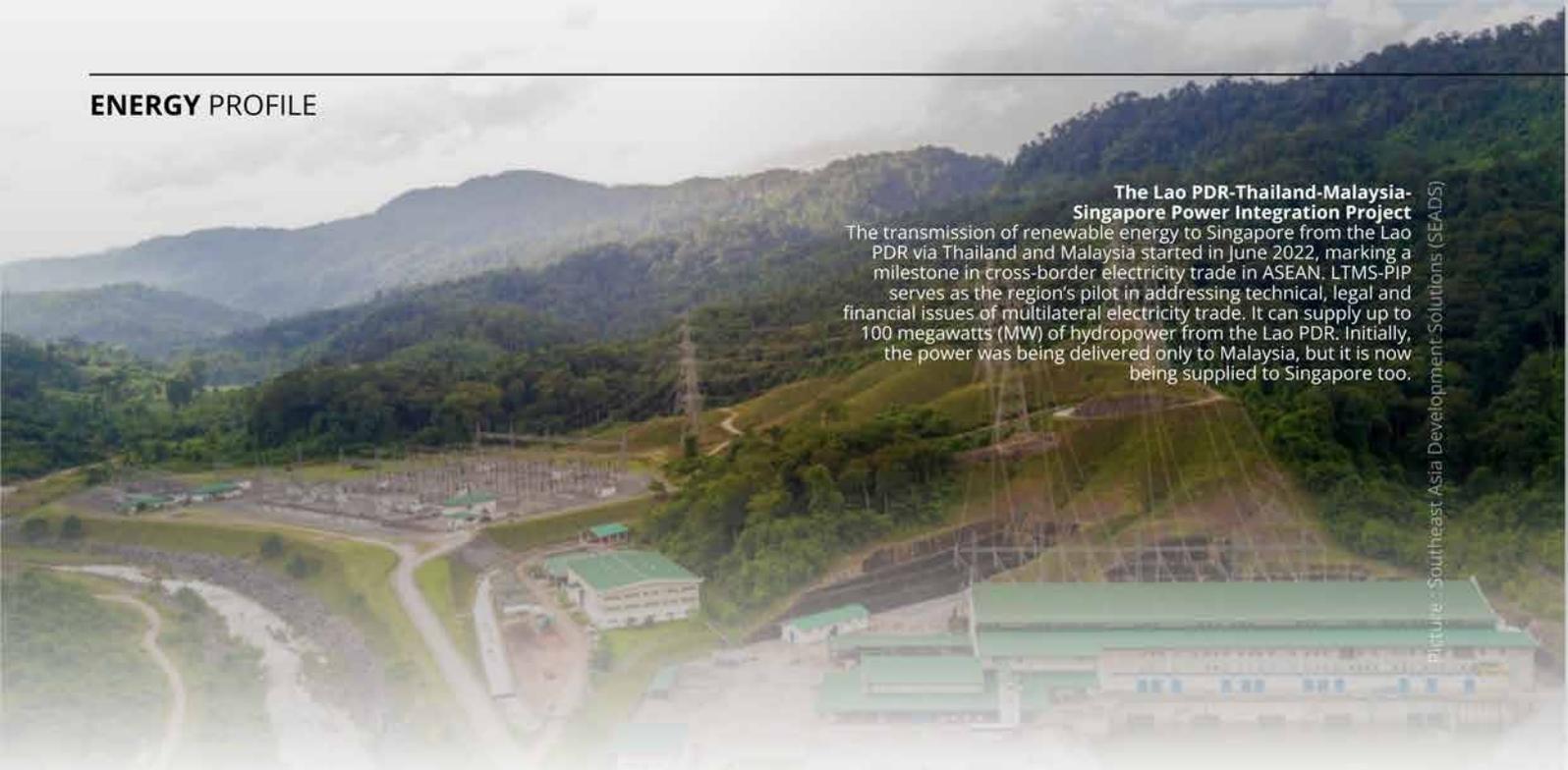
**Yodngeum Power Mix Fuel Processing Factory**  
Yodngeum Power Mix Fuel Processing Factory has a storage capacity of 2.4 million litres of oil, the factory can process 100 million litres of petroleum products per year by mixing finished diesel with semi finished oil and some chemical in ratios of 60%, 39% and 1% respectively.

Picture : Lao - Vietnamese Magazine)



**The Nam Theun 2 hydroelectric dam**  
The Nam Theun 2 hydroelectric dam in Laos. In 2022, Singapore announced it will be importing up to 100 megawatts of electricity from Laos through Malaysia and Thailand.

Picture : Eco Business



**The Lao PDR-Thailand-Malaysia-Singapore Power Integration Project**  
 The transmission of renewable energy to Singapore from the Lao PDR via Thailand and Malaysia started in June 2022, marking a milestone in cross-border electricity trade in ASEAN. LTMS-PIP serves as the region's pilot in addressing technical, legal and financial issues of multilateral electricity trade. It can supply up to 100 megawatts (MW) of hydropower from the Lao PDR. Initially, the power was being delivered only to Malaysia, but it is now being supplied to Singapore too.

Picture: Southeast Asia Development Solutions (SEADS)

## Energy Supply

### Oil & Gas

International oil firms conducted oil and gas explorations in 1993–1998 and 2006–2007. Two companies from VietNam and the United Kingdom recently carried out surveys for fuel oil and gas but the results have not been published at the time of writing.<sup>21</sup>

## Overall Energy Outlook

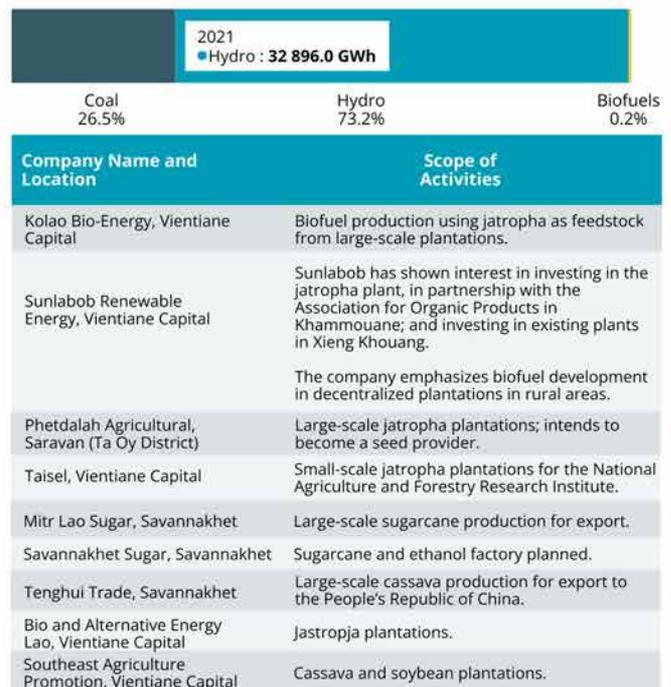
### Oil

Lao PDR provides most of the country's electricity from hydro electricity generation. On the other hand, the country is also experiencing an increasing demand for and reliance on imported fossil fuels for the transport and industry sectors.<sup>22</sup>

The petroleum products—gasoline, diesel fuel, boiler fuel, jet fuel, and lubricant are imported by State-owned and private companies. Of all imported products, diesel fuel has the largest share at around 73%, followed by gasoline at around 23%. Jet fuel is in fourth place after the boiler fuel.<sup>23</sup>

Electricity production will increase to 70 terawatt hours (TWh) by 2040 from 17 TWh in 2015 at an average rate of 5.8% per year. Around 53% of the electricity produced will be to meet the export target, particularly of Thailand. Hydropower sources will remain dominant in the country's power generation.<sup>24</sup>

As a major supply for power generation, hydropower sources will increase at an average rate of 8.7% per year over the projection period. Lao PDR's installed capacity reached 9.8 GW at the end of 2020 (+15% compared to 2019). Hydropower accounts for more than 70% of the capacity.<sup>25</sup>



Source: Asia Development Bank

Several potential biofuel investors are showing a growing interest in acquiring land and starting plantations with a view to producing fuel from energy crops in the Lao People's Democratic Republic (Lao PDR). Some initiatives contribute to the promotion and development of fuel crops as feedstocks for biodiesel and ethanol production; however most remain at the conceptualization stage and there has been little.<sup>26</sup>

## Oil & Gas

Lao PDR rely mostly on vertically integrated models and state-owned utilities. Since 2020, Lao PDR has had two oil refineries.<sup>27</sup>

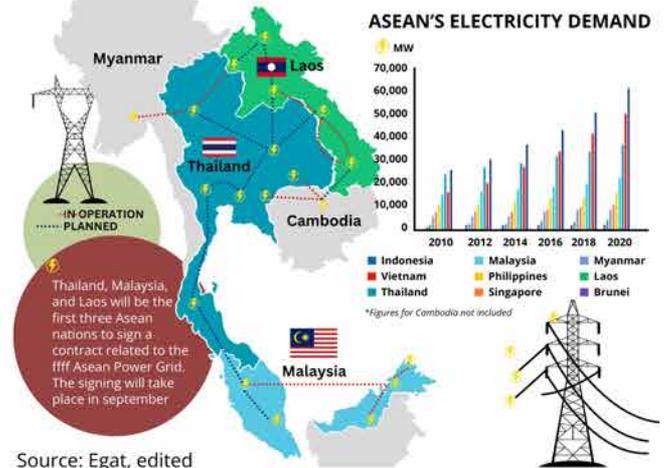
The first oil refinery commenced construction in 2015 at the Saysettha Development Zone in Vientiane Capital, over 280,000 square meters, and is valued at USD 179 million. Located in Saysettha Comprehensive Development Zone, 19 km away from Wattay International Airport, 1.5km from the China-Lao Railway Freight Station, and equipped with 16 oil tanks with a total storage capacity of 80 million litres in Vientiane Capital, Lao Petroleum & Chemical Co. Ltd (Laopec), a China-Laos joint venture, has launched the first phase production of its 3 million tons/year refinery project which includes gasoline, diesel, and other chemical products. Raw materials will be imported from Singapore, while domestic fuel production is expected to reduce Laos' reliance on fuel imports, with the added effect of reducing the domestic price of oil.<sup>28</sup>

Laos' new oil refinery in Xieng Khouang Province started processing crude oil in 2022. The refinery, located in Pek District, Xieng Khouang Province, has a storage capacity of 2,400,000 liters and will be able to produce 100 million liters of petroleum products per year.<sup>29</sup>

## Other Energy Sources

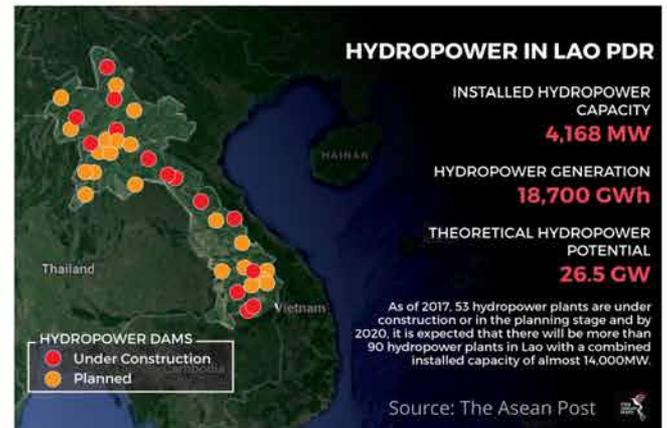
Lao PDR received a boost from the successful multilateral power trade between Lao PDR and Singapore, via Thailand and Malaysia. An expansion of the Lao PDR-Malaysia power trade, the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) is the flagship project of the APG, an aspirational vision of an interconnected regional power grid.<sup>30</sup>

### ASEAN POWER GRID

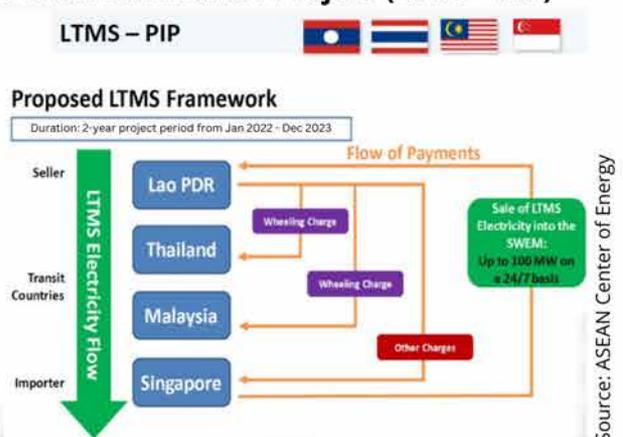


Source: Egat, edited

As of early 2023, Lao PDR produced power from 76 hydropower dams and had another 43 dams still under construction. Lao PDR's most recent National Socio Economic Development Plan (NSEDP9) furthers hydropower's role as the primary means to achieve its renewable energy goals. The plan reports Lao PDR aims to achieve "continuous quality, stable and sustainable economic growth" via 26 newly proposed dams.<sup>31</sup>



### Lao PDR-Thailand-Malaysia-Singapore Power Interconnection Project (LTMS - PIP)



LTMSPIP, the first multilateral cross-border electric trade involving four AMS, is transmitting up to 100 MW of hydropower-based electricity. The agreement runs till 2024, after which energy trade may be increased to 300 MW and the agreement's term extended from two to five years.<sup>32</sup>

## Oil & Gas

The State-owned and private companies own and operate product storage terminals nationwide. There are at least 72 terminals in the country and the combined storage capacity is 60,000 Kilolitres (KL). The Lao State Fuel Company (LSFC), a 100% state-owned company under the Ministry of Industry and Commerce (MOIC), owns 16 terminals with a storage capacity at 27,000 KL. Of the total of 72 terminals, 26 are located in Vientiane Capital and 3 are owned by LSFC.<sup>33</sup>

The Lao relevant ministries, including the Ministry of Industry and Trade, the Ministry of Energy and Mines, and the Ministry of Foreign Affairs discussed to diversify sources of the country's oil imports, which are largely reliant on imports from Thailand. Meanwhile, the Chinese Government has suggested to Laos to invest in building a logistics system utilizing the Lao-China high-speed railway to import oil from China, but according to the Lao Fuel and Gas Association, it may be challenging to make this feasible due to the high cost involved.<sup>34</sup>

## Other Energy Sources

The country, which is heavily reliant on hydropower, is experiencing power shortages during the dry season due to the low availability of hydropower and has to import electricity.

Therefore, Lao PDR plans to add 1,807 MW of capacity over 2021-2025, mostly from hydropower (57%), but also from coal (19%) and solar 24%). (The country's installed capacity is expected to increase by 5,559 MW in 2030: of the total, 78% will come from hydropower, and the rest from solar, wind, and coal. The country has a large solar and wind potential, with 10-15 GW and 100 GW respectively.<sup>35</sup>

Lao PDR leads electricity exports by far, accounting for 87% (35 TWh) by selling a considerable portion of its hydropower production to Thailand, Vietnam, and Cambodia.<sup>36</sup>

One option for the Lao PDR to reduce the import of petroleum products such as gasoline and diesel oil will be the use of electric vehicles (EVs). If EVs use electricity from hydropower in the Lao PDR, the country will be able to reduce the import of gasoline and diesel oil as well as saving the outflow of the Lao PDR's national wealth.<sup>37</sup>

The Government has set the overall directions for the development of logistic, define the collection and distribution points in each region that connect with the neighbouring countries, and the connection points to secure and facilitate 2 ways cargos which will focus on construction of international logistics Parks in 3 areas: Vientiane Capital City, Luang Namtha and Savannakhet and construction of 6 regional logistic parks along Laos -Vietnam and Laos - Thailand borders.<sup>38</sup>

### Nam Ngum 3-4 Dam

As part of the country's ambitious program to increase hydropower production, the Nam Ngum 3 dam is one of the highest in the world at 210 m high. The Nam Ngum 3 (480 MW capacity) and Nam Ngum 4 (240 MW capacity) projects exploit the potential of an affluent of the Mekong River. It's a large-scale project (30 km of hydraulic tunnels, 130 km of high-voltage lines, etc.), and technically very demanding.

Picture : Artelia Group)

## Ministries

### Senior Official on Energy Leader

Lao PDR

SOE Leader  
**Dr. Akhomdeth Vongsay**  
Director General of Department of Planning and Cooperation  
Ministry of Energy and Mines

Alternative SOE Leader  
**Ms. Santisouk Phimphachanh**  
Deputy Permanent Secretary  
Ministry of Energy and Mines

### Stakeholders

Ministry of Energy and Mines	Ministry of Planning and Investment	Ministry of Industry and Commerce
Ministry of Agriculture and Forestry	Ministry of Planning and Investment	Ministry of Finance
Ministry of Natural Resources and Environment	Ministry of Public Works and Transportations	

### Policies

Topic	Title	Year	Issuing Ministry
Energy	2021-2030 Power Development Plan Link to policy is unavailable, but a summary can be found.	2021	MEM
Energy	Policy on Sustainable Hydropower Development <a href="#">Decree No. 02/Gol. of 2015 (EN)</a>	2015	Government of Lao PDR, MEM
Energy, Finance	Renewable Energy Development Strategy <a href="#">RE Dev Strategy (EN)</a>	2011	Government of Lao PDR
Energy	Law on Electricity <a href="#">Law on Electricity (LO)</a>	2017	MPI
Energy	Law of Minerals <a href="#">Law No. 291/2017 (EN)</a>	2017	National Assembly
Energy	Decree of the Government on Biofuel <a href="#">Government Decree No. 410/GO of 2016 (LO)</a>	2016	Government of Lao PDR
Climate	Disaster Risk Management Law <a href="#">Disaster Risk Management Law (LO)</a>	2019	Government of Lao PDR
Climate	Decree on Climate Change <a href="#">Decree on Climate Change (EN)</a>	2019	Government of Lao PDR
Climate, Energy, Finance	<a href="#">National Green Growth Strategy to 2030 (EN)</a>	2019	Government of Lao PDR
Climate, Energy, Finance	9 <sup>th</sup> Five Year National Socioeconomic Development Plan 2021-2025 <a href="#">9<sup>th</sup> Five Year National Socioeconomic Development Plan (EN)</a>	2021	Government of Lao PDR
Climate, Finance	National Strategy on Climate Change <a href="#">National Strategy on Climate Change (2023.ed.) (LO)</a>	2010	Government of Lao PDR
Climate	Environmental Protection Law <a href="#">Law no. 29/NA of 2012 (2013.ed.) (EN unofficial)</a>	2012	Government of Lao PDR

The existing laws, regulations, policies, strategies, and development plans in Lao PDR:

**Law on Electricity:** The Law on Electricity was amended in 2011 and enacted on 20 December 2011. The Law on Electricity specifies the principles, rules, and measures on the organisation, operation, management, and inspection of electrical activities for the high effectiveness of electricity generation and business operation.

**Renewable Energy Development Strategy:** The strategy issued in October 2011. The strategy sets a target of increasing the share of RE in total energy consumption to 30% by 2025.

**Policy on Sustainable Hydropower Development in the Lao PDR:** The policy applies to all hydropower projects larger than 15 MW.

**Power Development Plan:** Article 9 of the Electricity Law states that the electricity enterprise shall prepare the electricity development plan. Électricité du Laos (EDL) prepares the Power Development Plan (PDP) every 3 to 5 years.

The Law on Electricity (enacted in 2011) stipulates that the responsible ministries and agencies establish, approve, and test the quality of domestically produced or imported electrical equipment in order to secure the safety and energy-saving capability of electric machinery and equipment.

## Agencies

There are currently about 16 companies (comprising Lao government subsidiaries of international oil companies, and local companies) that import petroleum products, and many of these also retail the products. The largest companies (in terms of the total sales) being; Lao State Fuel Company; Petroleum Trading Lao public Company; PTT (Lao) Co., Ltd; PV Oil Lao co., Ltd; and Petrolimex (Lao) Co., Ltd.

Other companies include; Lao Modern Petroleum Co., Ltd; Meuangluang Petroleum Co., Ltd; Dalachaleum Oil Co., Ltd; Lo Petroleum Co., Ltd; Lanexang Petroleum Co. Ltd.; Imperial Petroleum Co., Ltd; Bousavanh Energy Co., Ltd; Phetsamay Petroleum Co., Ltd; Vientiane Petroleum Co., Ltd.; and Dafi Petroleum Co., Ltd.

### Xayaburi Dam

Xayaburi Dam, completed in 2019, is the first of five planned dams on the Mekong mainstream in Laos, and stands around 130km downstream from Luang Prabang

Picture : Mongabay



Picture : Hobo Maps

**Nam Ngum 5 Dam**

Nam Ngum 5 Dam was developed by Sinohydro Corporation, Electricite du Laos. Sinohydro and Electricite du Laos are currently owning the project having ownership stake of 85% and 15% respectively. Most of the Nam Ting water is now diverted from the reservoir eastward to the powerhouse and only a small flow is allowed to continue through the dam structure into the Nam Ting riverbed which flows northward to eventually join with the Nam Ngum river.

Most fuel companies have their fleets for delivery to fuel stations country-wide. Internal transport, which is commonly used by LSFC, is operated by utilizing 8 KL loading capacity tank trucks to deliver fuel from terminals to fuel stations. Larger tank trucks with 35 KL loading capacity and a maximum loading capacity of 45 KL tank trucks are used to import fuel from Vietnam and Thailand respectively.<sup>39</sup>

Progress in ASEAN power trade has altogether been relatively slow, except for Lao PDR, which has significantly increased its electricity exports. Thus, the current decade marks a pivotal moment for further achievements regarding cross-border electricity trade in ASEAN.

A significant milestone was achieved in June 2022 with the transmission of 100 MW of hydropower from Lao PDR through Thailand and Malaysia to Singapore. This project, known as the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP), serves as a pilot to foster multilateral links and develop renewable power transmission.<sup>40</sup>

Power Integration Project (LTMS-PIP), serves as a pilot to foster multilateral links and develop renewable power transmission. The government also aims to increase the share of biofuels to meet 10% of the demand for transport fuels by 2025.

On the supply side, with approximately 80% of its electricity generation exported, Lao PDR has asserted its stance as a key power supplier. More recently, the country signed extended purchase agreements to export 9,000 MW of power to Thailand, 6,000 MW to Cambodia, and 5,000 MW to Vietnam by 2030.

Due to its geographical location and economic size, Thailand is poised to serve as a central hub for electricity trade between the northern and the southern regions of ASEAN. Greater flows should transit from Lao PDR or Vietnam to Indonesia and Singapore, by the end of the decade of 2030.<sup>41</sup>



Picture : Hobo Maps

# MALAYSIA



## Country Key Highlights

### Government/ Political System

Parliamentary Democracy with Constitutional Monarchy and His Majesty The King as the Paramount Ruler.<sup>1</sup>

### Demography

34,677,912 (July 2024) with 1.06% average growth.<sup>2</sup>

### GDP and Percentage From O&G

The Gross Domestic Product (GDP) in Malaysia was worth US\$ 399.65 billion in 2023. The y-o-y growth at 3.6%.

In 2022, the crude oil and condensate sector was estimated to contribute 3.6 percent to Malaysia's gross domestic product (GDP).<sup>3</sup>

### GDP Per Capita

GDP per Capita in Malaysia was US\$ 11,691 in 2023.<sup>4</sup>

### Reserves

As of end-2022, Malaysia had proved crude oil reserves standing at 490 Mt (Approx. 3592 barrels/day) and natural gas reserves standing at 2,056 bcm (Approx. 72.6069 TCF).<sup>5</sup>

### Oil & Gas Production

Crude oil and Natural Gas Liquid production reached 26 Mt (Approx. 264 barrels/day) and natural gas production stood at 76.4 bcm (Approx. 2.698 TCF) in 2022.<sup>6</sup>

### Refining Capacity

955,000 barrels/day (2022).<sup>7</sup>

### Domestic Demand

approximately 921,000 barrels/day (2022).<sup>8</sup>

### Upstream Fiscal Term

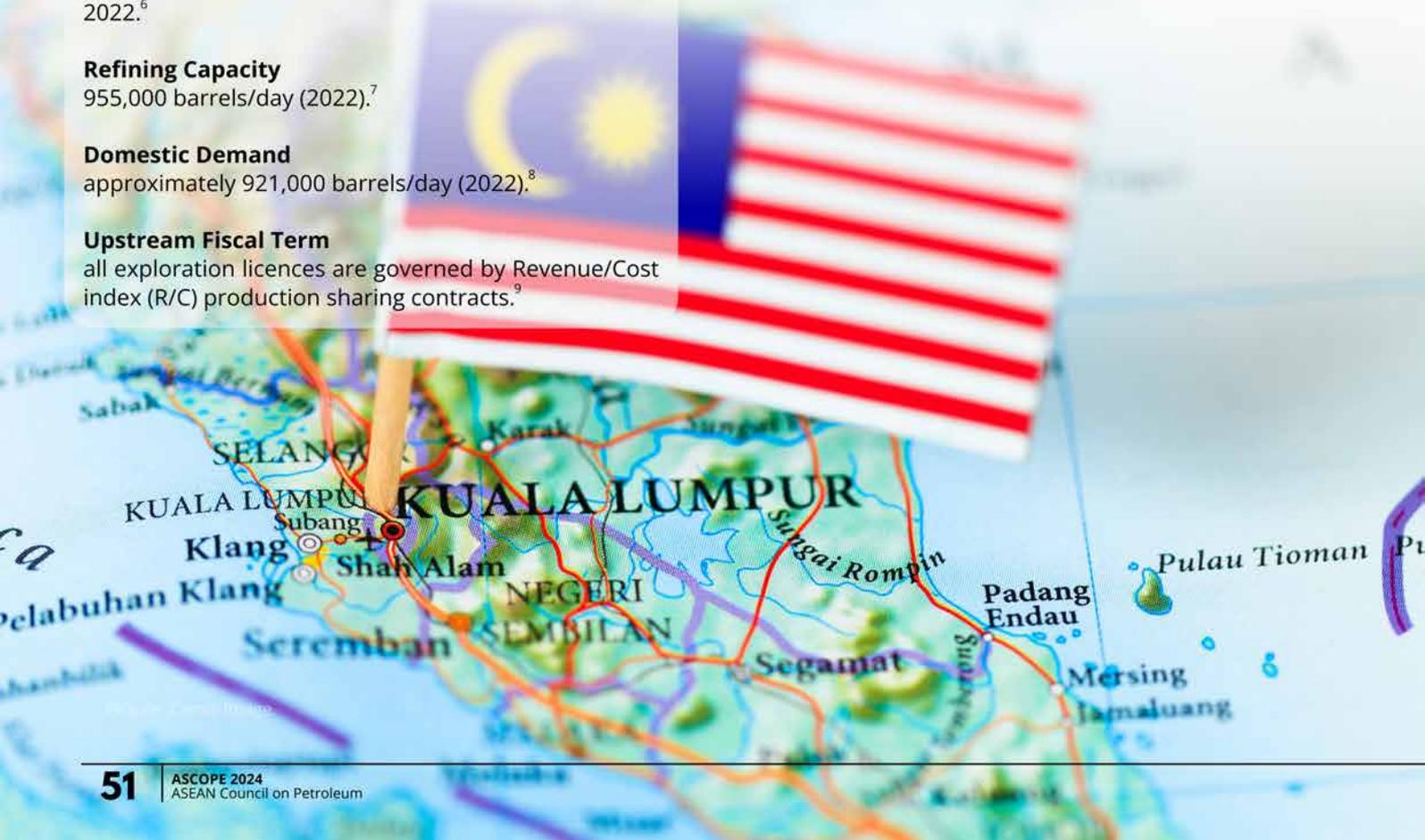
all exploration licences are governed by Revenue/Cost index (R/C) production sharing contracts.<sup>9</sup>



#### Malaysia Petronas

PETRONAS was founded in August 1974 and is now wholly owned by the Government of Malaysia. The corporation is entrusted with responsibility of developing the entire oil and gas reserves in Malaysia. Through its network of subsidiaries and joint ventures it does business in some 35 countries around the world. Fortune ranked Petronas as the 158th largest company in the world in 2019.

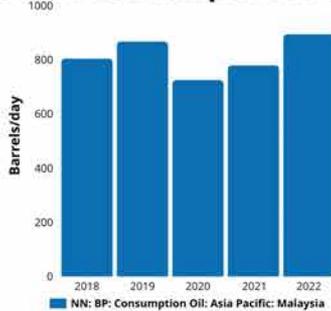
Picture: PETRONAS



# Energy Demand

## Oil

Malaysia's Oil Consumption 2018-2022<sup>10</sup>



Source: ceicdata

In 2023, Malaysia's Oil Consumption reached 930,000 b/d, which means the national demand increased approximately 11% from 2022.<sup>11</sup>

Oil products final consumption by sector, Malaysia, 2021



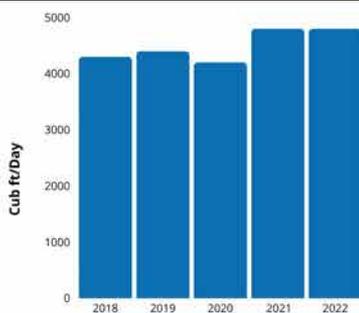
Source: International Energy Agency

According to the IEA's report in 2022, Transportation sectors demanded the highest oil products in Malaysia, such as Motor Gasoline (44%) and Gas/Diesel (38%). It is followed by the Industrial sector. The share of oil in electricity shared 0.6% of total power plants.<sup>12</sup>

Malaysia's fuel consumption is projected to grow at a much slower pace than anticipated.<sup>13</sup>

Malaysia's refined fuel consumption is projected to grow at a much slower pace than anticipated over the next 10 years, averaging at around 1.5 per cent through 2023 to 2032.<sup>14</sup>

## Gas

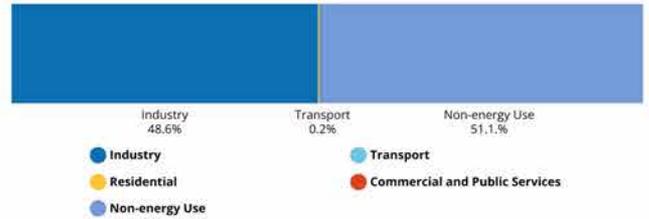


Source: ceicdata

Malaysia's Natural Gas Consumption 2018-2022.<sup>15</sup>

In 2023, Malaysia's Gas consumption was 41.6 bcm.<sup>16</sup>

Final consumption of gas by sector, Malaysia, 2021

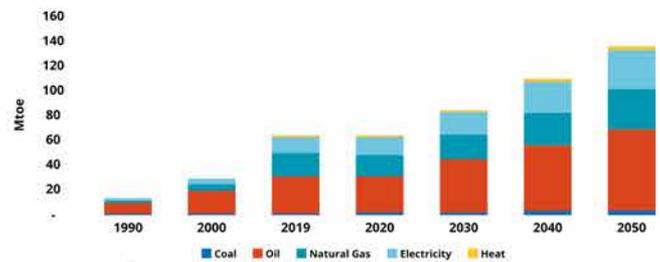


Source: International Energy Agency

In 2021, gas was mostly consumed by the industries. Gas supply for electricity shared 32.5% of total electricity generations.<sup>17</sup>

Forecast of Malaysia's energy consumption until 2050

Final Energy Consumption by Fuel, Business-As-Usual, 1990-2050 (Mtoe)<sup>18</sup>



Mtoe = millions tonnes of oil equivalent  
source: iea.org

Malaysia has an increasing demand for natural gas in the country and neighboring regions. Most countries want to reduce their carbon emissions to control the air quality in the environment, which has increased natural gas consumption in various end-user segments.<sup>19</sup>



### The Peninsular Gas Utilization

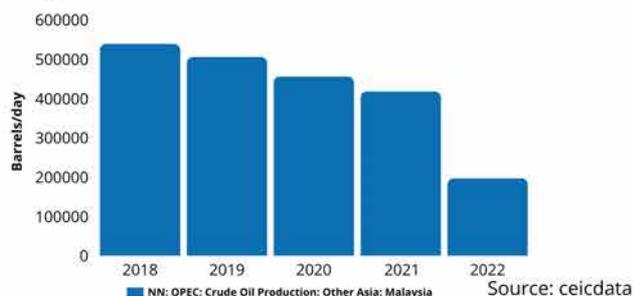
The Peninsular Gas Utilization (PGU) is the longest pipeline in Malaysia. The 2,623 km (1,630 mi) pipeline connects the Kerteh refinery in Terengganu to other areas of peninsula Malaysia. It is owned and operated by Petronas Gas Berhad on behalf of its holding company Petronas. The PGU project which commenced in 1984

Picture: PETRONAS

## Energy Production

### Oil

Malaysia's Crude Oil Production 2018-2022<sup>20</sup>



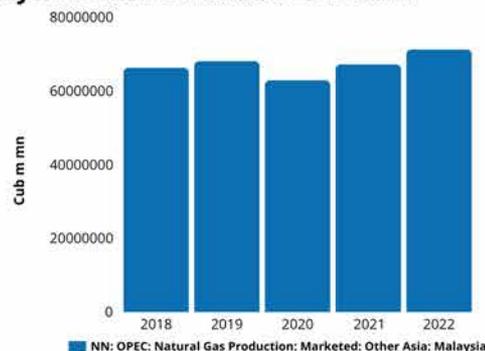
In 2023, oil production reached 565,000 b/d according to the report of the Energy Institute. It marked an increase in national production from 2022.<sup>21</sup>

In 2021, Oil supplied 27% of total energy supply in Malaysia. On one hand, 8.6% of the net crude oil was exported. This number has decreased significantly since the last 20 years. However, on the other hand, the export of oil products has increased 126% since 2000.<sup>22</sup>

For Malaysia's oil reserves, Sarawak constituted about 36% and the rest lies in Sabah and Peninsular Malaysia at 32% each. The ratio of current reserves over production in 2019 showed that Malaysia can sustain its crude oil production, including condensates, for the next 21 years.<sup>23</sup>

### Gas

Malaysia's Gas Production 2018-2022<sup>24</sup>



In 2023, the natural gas production reached 81.1 bcm according to the energy institute report. It marked a 2.1% decrease since 2022.<sup>25</sup>

In 2021, gas contributed 44.8% of the total energy supply in Malaysia. Approximately 29.5% of the total gas production was exported.<sup>26</sup>

The country's gas reserves are quite large (2 056 bcm by the end of 2023); they represent around 30 years of production. The oil reserves are more modest (490 Mt, i.e. 15 years of production).<sup>27</sup>

Malaysia's gas reserves 58% are found in Sarawak, 27% in Peninsular Malaysia, and the other 15% in Sabah. Total associated gas reserves stood at 9.901 Tscf, while non-associated gas reserves stood at 69.267 Tscf in 2019. Natural gas could be sustained for another 32 years.<sup>28</sup>

Satu Malaysia Terminal is an LNG terminal in Sarawak, Malaysia. It constitutes three LNG trains and has a capacity of 8.1 million metric tons per annum (MTPA). It is a part of the Malaysia LNG Complex, also known as the Petronas Bintulu LNG Complex.<sup>29</sup>

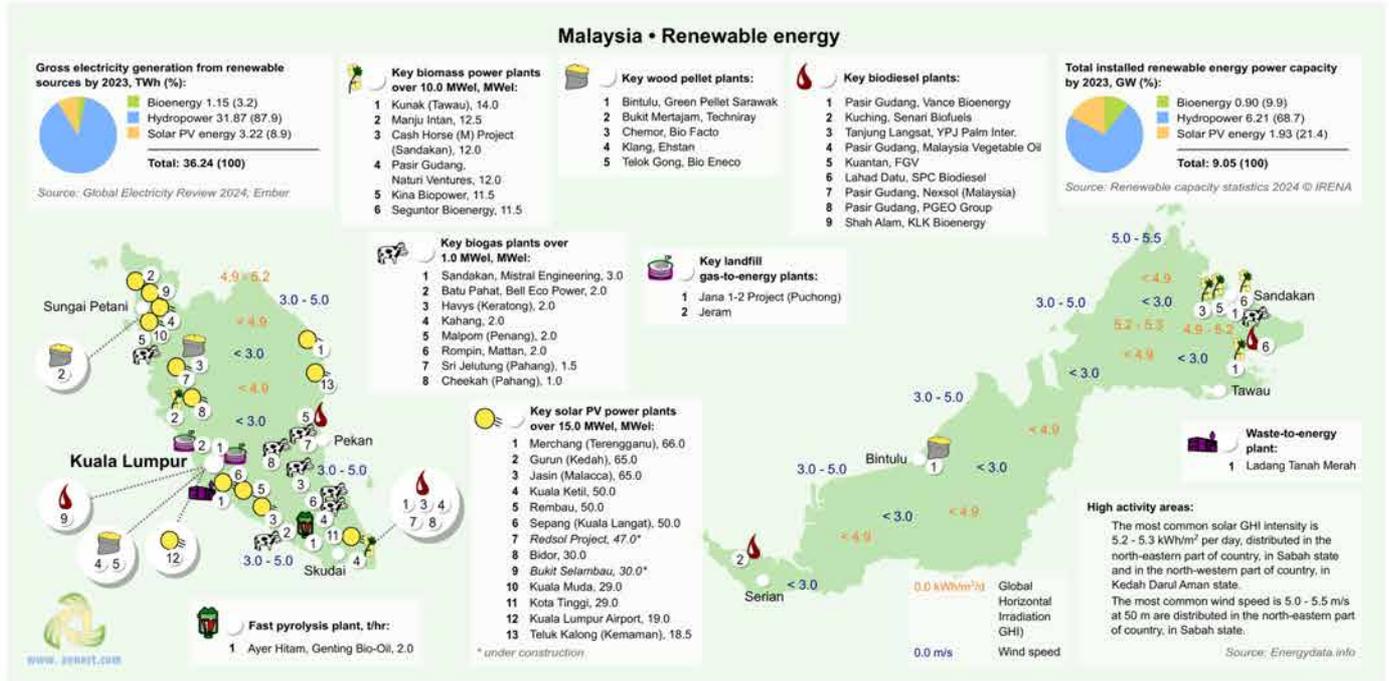
In March 2022, the Abu Dhabi-based Mubadala Petroleum began producing natural gas from the Pegaga offshore field in Malaysia. It has the capacity to produce about 550 million standard cubic feet of gas per day in addition to the condensate. Gas produced will be directed through a new 4-kilometer, 38-inch subsea pipeline tying into an existing offshore gas network and subsequently to the onshore Petronas LNG Complex in Bintulu.<sup>30</sup>

#### Pengerang Oil Refineries

Pengerang Oil Refineries PETRONAS' largest downstream greenfield development is on the verge of takeoff. Five years in the making, the USD27 billion, 6,303-acre Pengerang Integrated Complex (PIC) is anticipated to lead PETRONAS' charge towards its net zero carbon emissions (NZCE) 2050 aspirations upon its start up in 2021.

Picture: PETRONAS

Malaysia's renewable energy potentials<sup>31</sup>



Source : Advanced Energy Technology

## Overall Energy Outlook

Hydropower prevails in terms of installed renewable energy capacities (almost 89.2%), followed by bioenergy 9.4%, and solar photovoltaics (about 1.4%). Hydropower plays a significant role in Malaysia's power generation, contributing about 16% to all electricity produced in 2021. However, the country does not completely use its very high overall hydropower potential (414,000GWh per year).<sup>32</sup>

The Malaysian Biodiesel Association (MBA) has projected a potential upswing in the country's biodiesel production, estimating that it could reach 1.8 million metric tons in 2024. This optimistic outlook is contingent upon the government's extension of its 20% biodiesel mandatory program to encompass more regions across Malaysia.<sup>33</sup>

As part of its efforts to promote the use of sustainable fuels, Malaysia has already introduced the B20 program, requiring a 20% blend of palm-based biodiesel in diesel for the transportation sector. Currently, the implementation of this program is underway in phases, with the majority of regions in the country adopting a 10% blending level, referred to as the B10 program.<sup>34</sup>

On top of that, Malaysian palm biodiesel for transportation has been accepted by the Japan Automobile Manufacturers Association (JAMA) where it can be used up to 20% biodiesel blend.<sup>35</sup> Referring to the Malaysian Palm Oil Board (MPOB), local biodiesel demand increased to 529,000 tonnes in October 2019 and surpasses the initial estimation of 520,000 which is attributed to the enforcement of B10 biodiesel programme in February 2019 for the transportation sector, as well as B7 biodiesel for the industrial sector.

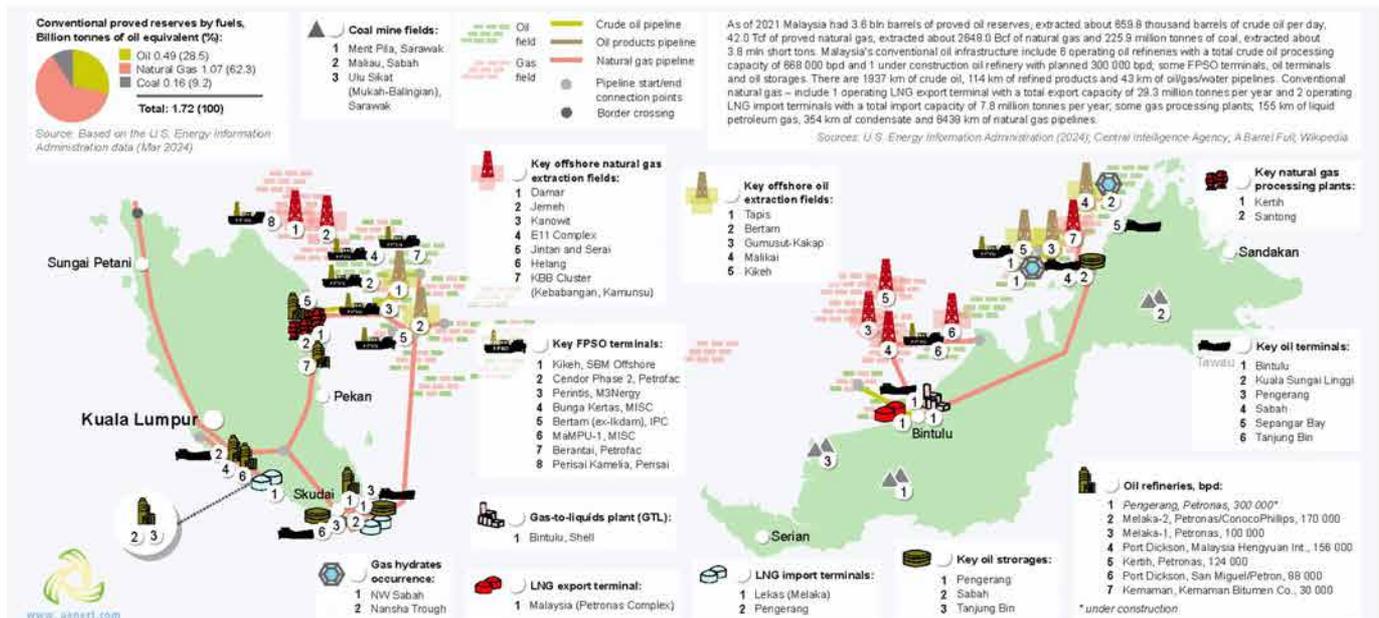
### Kikeh Field Project

The Kikeh Field Project was the first successfully developed deepwater oilfield in Malaysia, with two more deepwater fields under development in Gumusut/Kakap and Malikai. Kikeh firsts: First deepwater development offshore Malaysia; First spar constructed in Malaysia; First spar installed outside the Gulf of Mexico; First topsides floatover onto a spar; First turret-moored FPSO in conjunction with a spar; First use of a tender assisted drilling rig on a spar.

Picture: Murphy Sabah Oil Co

# Oil

## Malaysia's Fossil fuel infrastructures<sup>36</sup>



Source : Advanced Energy Technology

There are five oil refineries in Malaysia with a combined capacity of 492 000 barrels per day—used for both domestic consumption and export.<sup>37</sup>

### Downstream Infrastructures:

- In 2021, there are 7 refineries with a total capacity of 998,525 b/d.
- -2 hydrotreating investment (naphtha & diesel) at Petron's Port Dickson refinery.
- Construction on Petronas' PRefChem (formerly RAPID) project in Pengerang, Johor.<sup>38</sup>

### Refining Company:

- Keamanan-Keamanan Bitumen Company, Kertih
- PETRONAS, Melaka I
- PETRONAS, Melaka II
- PETRONAS, Pengerang (RAPID) – PETRONAS, Port Dickson
- Hengyuan Refining, Port Dickson
- Petron Corporation.<sup>39</sup>

Refined Distribution covers 130 Km, 16 inch Pipeline from refiners to Kuala Lumpur international airport.<sup>40</sup>

# Gas

Malaysia has two gas pipeline networks. The Peninsular Gas Utilisation (PGU) network now includes over 2500 km of pipelines linking most cities in Peninsular Malaysia and it has cross-border interconnections to Singapore and Songkhla, Thailand.<sup>41</sup> The PGU pipeline system incorporates six gas-processing plants with a combined capacity of 56.6 million cubic metres (2060 million standard cubic feet) per day, producing methane, ethane, butane and condensate.<sup>42</sup>

The system receives gas from offshore Peninsular Malaysia fields as well as imported gas from JDA, West Natuna and PM3 CAA fields.<sup>43</sup>

About half the PGU system gas is consumed by the power sector while the rest goes to non-power industries or is exported to Singapore.<sup>44</sup>

The second gas pipeline linking the states of Sabah and Sarawak is under construction. The Sabah Sarawak Gas Pipeline (SSGP) will be approximately 521 km in length, and will deliver natural gas from Kimanis in Sabah to an LNG facility in Bintulu, Sarawak.<sup>45</sup>

Sarawak's offshore gas mainly supplies the Bintulu LNG facility, with a small percentage supplying the local domestic market. The discovery of associated gas in several important deep sea oil discoveries, Kikeh, Kebabangan and Gumusut/Kakap. The Peninsular Gas Utilisation Project ultimately results in a pipeline network of 1,300 kilometers long.<sup>46</sup>

The Association of South East Asian Nations (ASEAN) has been promoting the development of a Trans-ASEAN Gas Pipeline system (TAGP), which aims to link ASEAN's major natural gas production and consumption centres through a comprehensive network of natural gas pipelines. Such large-scale prospects are expected to drive the pipeline industry to grow more, presenting a vital opportunity for market players in the future while enhancing regional energy security and fostering economic cooperation among member states. The TAGP is not just a project but a strategic initiative that could significantly impact energy dynamics across Southeast Asia.

## Other Energy Sources

According to the International Renewable Energy Agency, the installed capacity of renewable energy in the country increased significantly between 2018 and 2022. The growth rate during this period was recorded at more than 20%, signifying healthy growth of renewables in the region. For instance, in March 2023, the 10 MWAC Solar Project in Labuan, Sabah, Malaysia, achieved financial close through Solar PV Power Sdn Bhd (SPP). SPP is a joint venture between Jetama Energy Sdn Bhd (Jetama) and Symbior Solar Limited (Symbior).<sup>47</sup>

The oil palm industry is a leading contributor of biomass in Malaysia; hence, it has a great prospect to be commercialized for bioenergy production. To date, bioenergy, particularly palm biodiesel has emerged as a potential sustainable and eco-fuel in Malaysia. due to its resemblance with the conventional diesel with respect to chemical.<sup>48</sup>

Small-scale generation from mini-hydro, biomass, solar and wind are already in place, totalling 773.6 MW. Regarding this, 15.3% is currently grid connected while the rest is for self-generation in the industry sector. Over 90% is based on biomass power generation.<sup>49</sup>



### TNB's Manjung Power Plant

A floating solar installation at TNB's Manjung power plant in the Malaysian state of Perak. Hybrid floating solar plants have been identified as a flagship catalyst project under Malaysia's NETR.

Picture : Bernama

## Gas

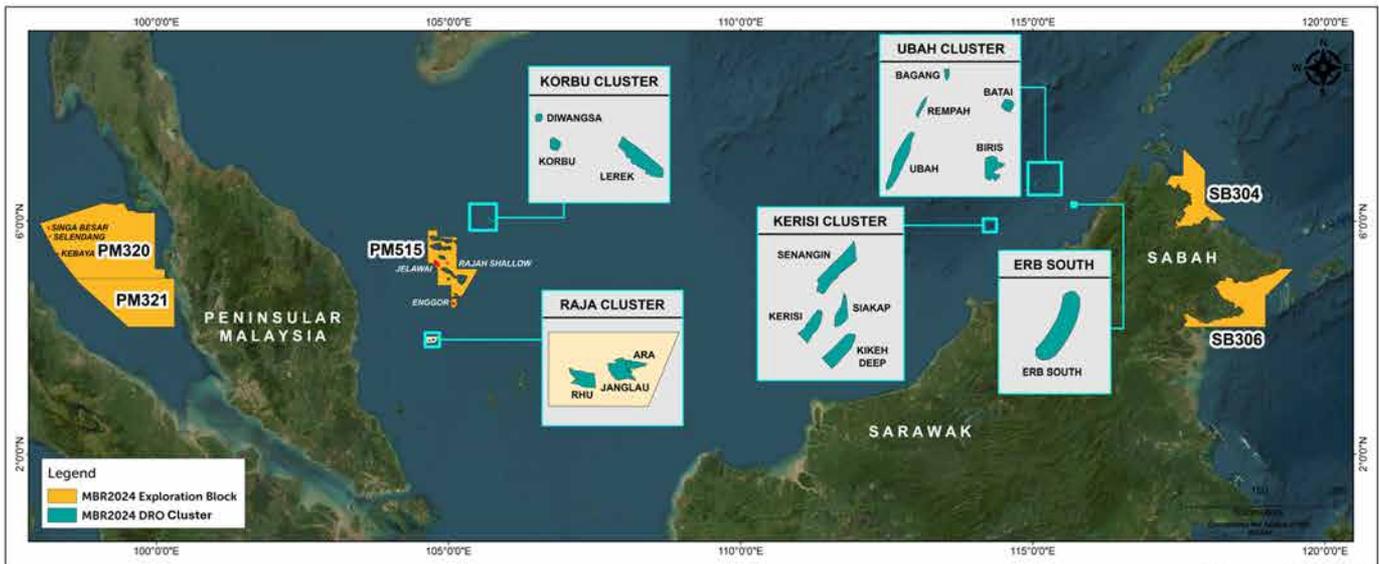
Petronas launched Malaysia Bid Round 2024 (MBR 2024), offering 5 exploration blocks and 5 Discovered Resource Opportunities (DRO) clusters. The winners of the bid round are expected to be announced in the third quarter of 2024.

Exploration blocks location:

- Langkasuka Basin in the Straits of Melaka
- Samporna and Sandakan Basins off the eastern coast of Sabah

Specific blocks:

- PM320, PM321, PM515 in Peninsular Malaysia
- SB304, SB306 in Sabah<sup>50</sup>



Petronas has commenced construction of its third floating LNG (FLNG) vessel, which is to be deployed at a nearshore location in Sabah. Once completed, FLNG facility will be moored at the Sipitang Oil and Gas Industrial Park (SOGIP). This FLNG vessel is designed to produce up to 2 million tonnes per annum of LNG and is targeted to begin commercial operation by the second half of 2027.<sup>51</sup>

BIGST Cluster, comprises of 5 undeveloped high CO<sub>2</sub> gas fields (Bujang, Inas, Guling, Sepat, Tujoh), is now set for development as Malaysia's first high CO<sub>2</sub> project incorporating CCS technology. The cluster was awarded to Petronas Carigali, and JX Nippon Oil & Gas Exploration, with 50% participating interest each. Production from the BIGST Cluster is set to start in 2029, peak in 2030, and continue until reaching its economic limit in 2052, based on current economic projections. This initiative aligns with Malaysia's efforts to enhance energy security while reducing carbon emissions through innovative technologies.<sup>52</sup>

The Tembakau Cluster was awarded to oil and gas exploration firm International Petroleum (IPC) Malaysia and IPC SEA with 905 and 10% shares, respectively. The cluster comprises two undeveloped gas fields and is estimated to have a recovery of 260 bcf. Production from the Tembakau Cluster gas project is expected to start in 2028 and to peak in 2019. Based on economic assumption, the production will continue until 2048.<sup>53</sup>

Malaysia is targeting stranded high CO<sub>2</sub> gas fields for development to support its national long-term natural gas production target. On top of the recently awarded BIGST cluster, which has five undeveloped high-CO<sub>2</sub> gas fields (Bujang, Inas, Guling, Sepat, and Tujoh), there are other significant gas fields such as the K5 gas field—located offshore Sarawak and discovered in 1970—estimated to contain 21 trillion cubic feet of gas and has a CO<sub>2</sub> content of approximately 50%. Additionally, these developments are crucial for enhancing energy security and meeting.<sup>54</sup>

## Oil

### Petronas Activity Outlook (2024-2026):

Over 2024-2026, Petronas plans to undertake 45 upstream projects, fabricate 4 central processing platforms, construct 3 on-shore facilities, and fabricate and install 1.130 km of pipelines. In 2024, 99 wells will be drilled under its development, appraisal and exploration drilling programme.

Petronas' long-term target is to sustain and grow Malaysia oil and gas production of 2 million barrels of oil equivalent per day by 2025 and beyond. The downstream business is increasingly focusing on cleaner energy initiatives, such as developing a greenfield biorefinery and co-processing plant to begin in 2026. It is also expanding LNG bunkering and enhancing Petronas Iona range, which offers automotive fluid solutions for EV and various thermal management applications.<sup>55</sup>

### Other Energy Sources

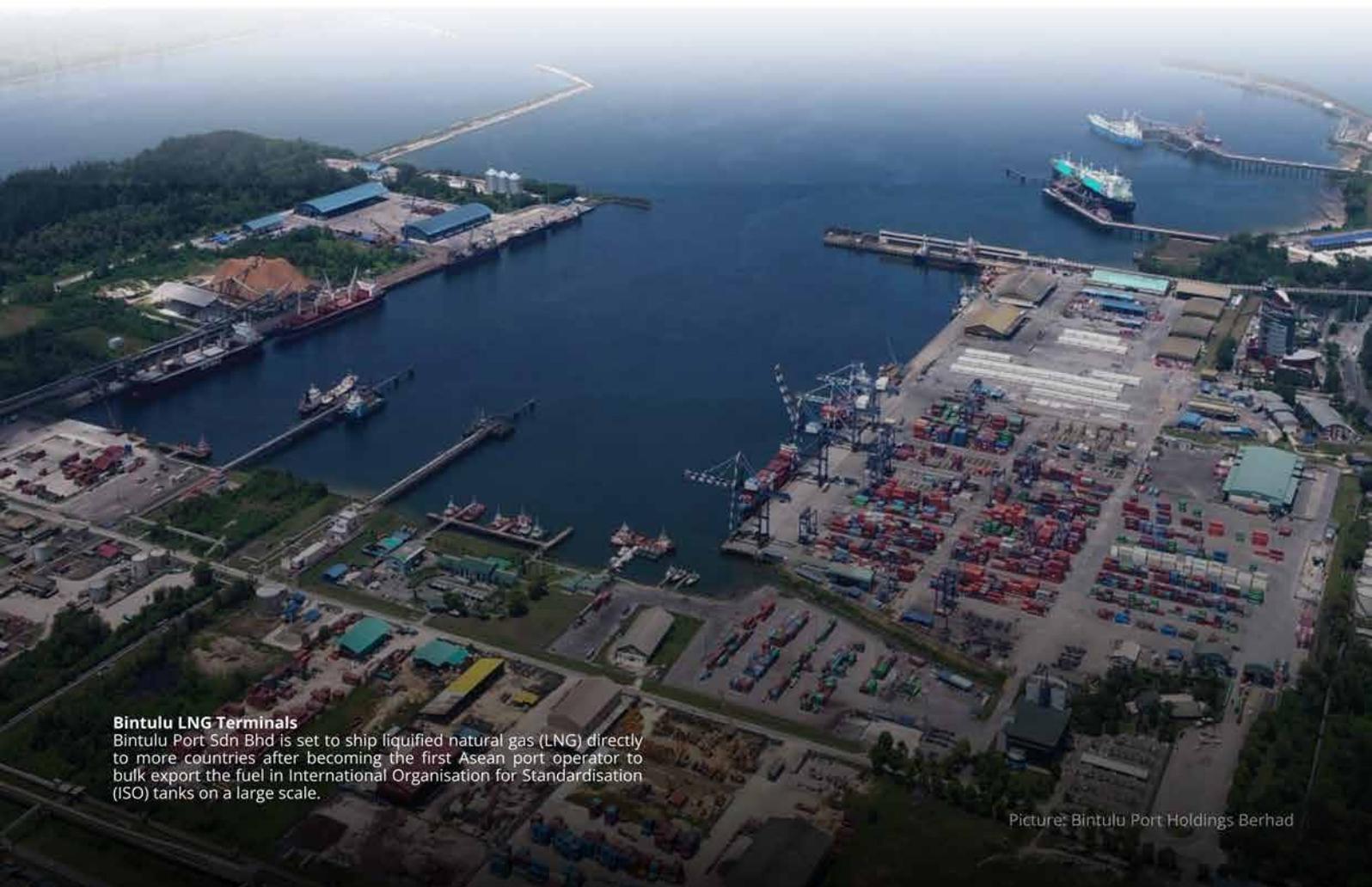
Malaysia's National Energy Transition Roadmap (NETR) aims to attract investments of RM 435 billion to RM 1.85 trillion (USD 92 billion to USD 392) by 2050.

The plan identified 10 flagship catalyst projects, including renewable energy, hydrogen, and carbon capture, expecting RM 25 billion in investments from these projects.<sup>56</sup>

Malaysia's energy roadmap plans for Sarawak to become a regional green hydrogen center through three integrated projects. A green hydrogen plant will be established in Kuching for domestic consumption by 2025 and two plants will be built in Bintulu, mainly for export.<sup>57</sup>

TNB plans to produce up to 2.5 GW of power through hybrid floating solar plants at hydro dam reservoirs – Hybrid Hydro-Floating Solar. The project will be developed in four phases from 2023 to 2040, with solar installations at TNB's Temenggor and Chenderoh hydro plants expected to be completed by 2025.<sup>58</sup>

Malaysia's Ministry of Energy Transition and Public Utilities, through the Sustainable Energy Development Authority (SEDA), has approved the development of 22 renewable energy projects from biogas and biomass, with a combined capacity of 36,534 MW. These initiatives are part of Malaysia's broader commitment to enhancing its renewable energy landscape, promoting sustainable practices, and reducing greenhouse gas emissions.<sup>59</sup>



#### Bintulu LNG Terminals

Bintulu Port Sdn Bhd is set to ship liquified natural gas (LNG) directly to more countries after becoming the first Asean port operator to bulk export the fuel in International Organisation for Standardisation (ISO) tanks on a large scale.

Picture: Bintulu Port Holdings Berhad

## Ministries

The Malaysian Investment Development Authority (MIDA) is the government's principal agency for the promotion of the manufacturing and services sectors in Malaysia. MIDA helps companies intending to invest in the Malaysian manufacturing and services sectors, and facilitates their projects implementation. MIDA services include providing information on investment opportunities and assisting companies seeking joint venture partners.

MIDA evaluates the following applications for projects in the manufacturing sector and selected services sub-sectors:

- Manufacturing licenses
- Tax incentives
- Expatriate posts
- Duty exemption on raw materials and components
- Duty exemption on machinery and equipment for the agricultural sector and any selected services sectors
- Regional establishment<sup>60</sup>

There are numbers of tax incentives available in Malaysia and are administered by MIDA or Ministry of Finance (MoF). There are at least 28 tax incentives are deemed relevant to oil and gas service and equipment sector.<sup>61</sup>

### Roles by relevant ministries and agencies:

Ministry / agency	Roles
 MOF <sup>(1&amp;2)</sup> MINISTRY OF FINANCE	<ul style="list-style-type: none"> <li>• Approver of incentives</li> <li>• Administers selected incentives</li> </ul>
 MITI <sup>(3)</sup> MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY	<ul style="list-style-type: none"> <li>• Via MIDA, administers incentives under promotion of investments Act (1986)</li> </ul>
 RMCD <sup>(4)</sup>	<ul style="list-style-type: none"> <li>• Administers indirect tax (i.e. import duty)</li> </ul>
 LHDN (IRB) <sup>(5)</sup>	<ul style="list-style-type: none"> <li>• Administers indirect</li> </ul>
1. ECERDC <sup>(6)</sup> 2. NCIA <sup>(7)</sup> 3. IRDA <sup>(8)</sup> 4. RECODA <sup>(9)</sup> 5. SEDIA <sup>(10)</sup>	<ul style="list-style-type: none"> <li>• Manage regional economic development areas, including vetting through application for tax incentives in each corresponding areas</li> </ul>

Notes : (1) Rethinking Investment Incentives (2017) (2) Companies granted Pioneer Status or Investment Tax Allowance approval as per Promotion of Investments Act (1986) (3) Ministry of International Trade and Industry (4) Royal Malaysian Customs Department (5) Lembaga Hasil Dalam Negeri / Inland Revenue Board of Malaysia (6) East Coast Economic Region Development Council (7) North Corridor Implementation Authority (8) Iskandar Region Development Authority (9) Regional Corridor Development Authority (Sarawak) (10) Sabar Economic Development and Investment Authority

## Agencies

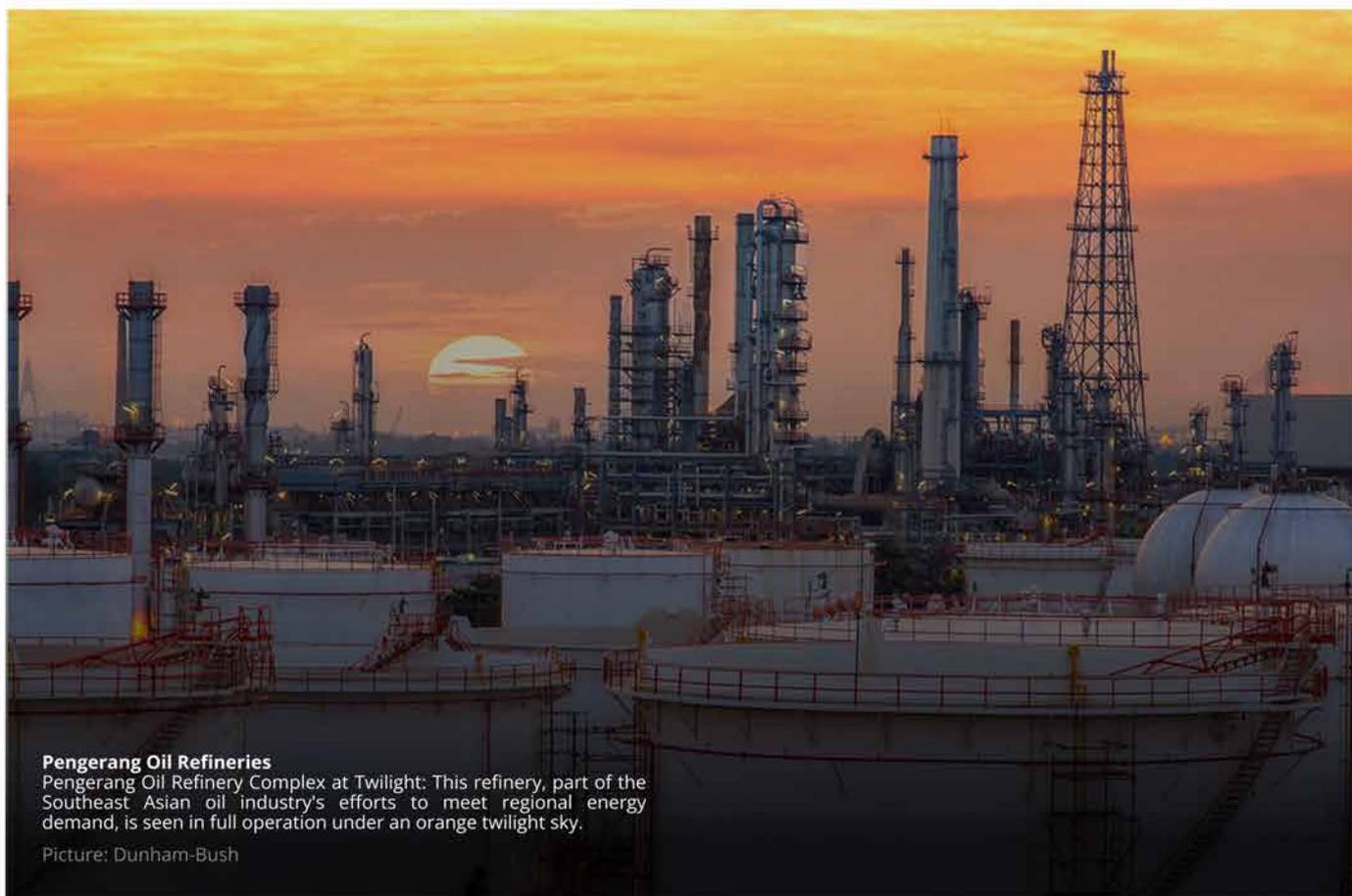
National Oil Company: Petroliaam Nasional Berhad (PETRONAS). PETRONAS' long-term target is to sustain and increase Malaysia's oil and gas production of 2 million barrels of oil equivalent per day (MMboe/d) by 2025 and beyond. This target will be supported by various oil and gas projects in the pipeline such as Kasawari, Jerun, Rosmari-Marjoram and Lang Lebah in Sarawak, Gumusut-Kakap Redev and Belud Clusters in Sabah, and Bekok Oil Redev, Tabu Redev and Seligi Redev in Peninsular Malaysia, amongst others.<sup>62</sup>

Malaysia oil and gas ecosystem comprises over 3,500 business in the manufacturing and services sectors, supporting both domestic and regional chains. Malaysia serves as a hub for numerous global machine and equipment (M&E) manufacturers, which work alongside local companies. In addition, there are also Malaysian companies specialize in crucial segment of the value chain, such as marine engineering, drilling, fabrication, offshore installation, and operation and maintenance.<sup>63</sup>



**The Kasawari Field Project**  
 Addressing the increasing domestic demand for gas, the Kasawari field, discovered in 2011, serves as a crucial feed source for both the Petronas LNG Complex in Bintulu.

Picture: PETRONAS



#### Pengerang Oil Refineries

Pengerang Oil Refinery Complex at Twilight: This refinery, part of the Southeast Asian oil industry's efforts to meet regional energy demand, is seen in full operation under an orange twilight sky.

Picture: Dunham-Bush

#### Regulations:

- The Petroleum Development Act, 1975 ("PDA"), the main legislation governing the oil and gas industry in Malaysia, was introduced in 1975 and vested PETRONAS with the entire ownership, and the exclusive rights, powers, liberties and privileges of exploring and exploiting petroleum resources, both onshore and offshore.<sup>64</sup>
- PETRONAS is provided with the right and power to issue licenses to the industry players for their participation in mainly the upstream activities in the oil & gas sector in Malaysia.
- The licenses take the form of a Petroleum Arrangement (PA) contract between PETRONAS and the investors (to be referred as PA Contractors), where one of the parties is designated as the operator. The vast majority of PA contracts applicable today is in the form the Production Sharing Contract (PSC).
- Malaysia Petroleum Management (MPM), an office under PETRONAS, will manage the tender bidding exercise for the overall management of Malaysia's petroleum resources throughout the lifecycle of upstream oil and gas assets.<sup>65</sup>



Offshore oil drilling and storage platforms, a symbol of energy cooperation in ASEAN, operate in the middle of the ocean to explore and sustainably utilize petroleum resources.

Picture: Petronas

## INSIGHT

Malaysia launched its National Oil & Gas, Services and Equipment (OGSE) Blueprint 2021-2030 in April 2021 with the key goals of diversification, upskilling, and consolidation. This blueprint outlines strategic initiatives to develop a robust, resilient, and globally competitive Malaysian OGSE sector.<sup>66</sup>



The launch of the National OGSE Industry Blueprint 2021-2030 and OGSE Development Grant  
(Source: The Edge Malaysia, 2021)

PETRONAS has reached final investment decision to construct an advanced chemical recycling plant in Pengerang, Johor, converting end-of-life plastics into pyrolysis oil for the production of circular plastics. The project is expected to be operational by 2026.<sup>67</sup>

Malaysia will require an estimated RM637bil in new investments until 2050 in its transition to renewable energy (RE).<sup>68</sup>



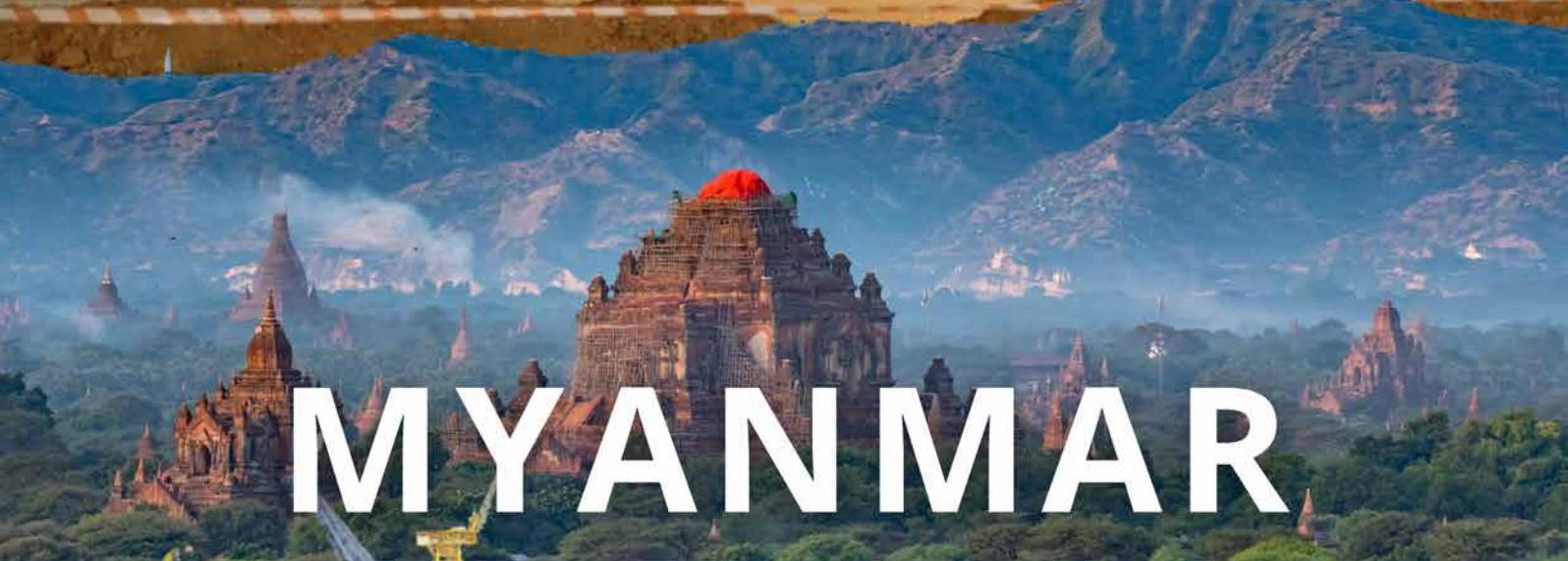
PCG to Construct Asia's Largest Advanced Chemical Recycling Plant, Petronas  
(Source: Petronas, 2023)



### The Old Grand Lady

The Old Grand Lady is located in Bukit Telaga Minyak, as Canada Hill is indeed Sarawak's and Malaysia's birthplace of the petroleum industry, the place where the first oil well was drilled. One of Canada Hill's famous attractions the Old Grand Lady, which is not a frail old woman: it is Miri Well N.1, the iconic derrick structure of Miri where the first well in the country first struck oil on December 1910 by Shell Company, milking for several decades to turn a poor country to a developed nation.

Picture: flickr, Alan Cressler



# MYANMAR



## Country Key Highlights

### Government/ Political System

Parliamentary Republic.<sup>1</sup>

### Demography

54,989,727 (2024) with 0.71% average growth.<sup>2</sup>

### GDP and Percentage From O&G

The Gross Domestic Product (GDP) in Myanmar was worth 64.82 billion US dollars in 2023. The y-o-y growth at 3.4%.

About 50% of Myanmar's foreign income derives from natural gas revenues. Several offshore gas fields operate in Myanmar's maritime territory, run by companies from Thailand, Japan, Malaysia, India and South Korea. But, Myanmar was forecast to earn 2,305 billion kyat (now about US\$1.4 billion) from oil and gas in the year to March 2022, according to a Myanmar budget document drawn up before the coup. This would be just over 10% of total government revenues this year – slightly lower than in 2021.<sup>3</sup>

### GDP Per Capita

GDP per Capita in Myanmar (with a population of 54,179,306 people) was \$1,347 in 2022.<sup>4</sup>

### Reserves

In March 2024, crude oil reserves for Myanmar was 7,03 thousand barrels/day. 17 bcm (approx. 0.60034 TCF) of proven natural gas reserves (2021). Natural gas is the most important source of export revenues in Myanmar.<sup>5</sup>

### Oil & Gas Production

Oil Production : 7,400 barrels/day (2022).<sup>6</sup>

Gas Production : 16,8 bcm (approx. 0.5932 TCF) (2022).<sup>7</sup>

### Refining Capacity

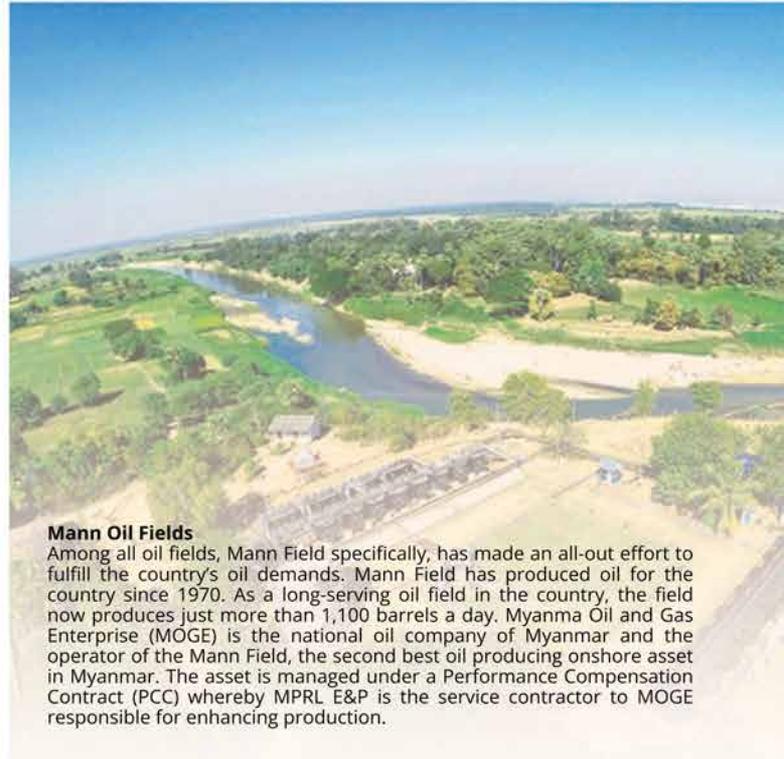
51,000 barrels/day (2021).<sup>8</sup>

### Domestic Demand

21,484 ktce (2022).<sup>9</sup>

### Upstream Fiscal Term

- Production Sharing Contracts (PSCs): for offshore and onshore projects;
- Performance Compensation Contracts (PCC): for onshore projects; and
- Improved Petroleum Recovery Contracts (IPRs): for onshore projects.<sup>10</sup>



#### Mann Oil Fields

Among all oil fields, Mann Field specifically, has made an all-out effort to fulfill the country's oil demands. Mann Field has produced oil for the country since 1970. As a long-serving oil field in the country, the field now produces just more than 1,100 barrels a day. Myanma Oil and Gas Enterprise (MOGE) is the national oil company of Myanmar and the operator of the Mann Field, the second best oil producing onshore asset in Myanmar. The asset is managed under a Performance Compensation Contract (PCC) whereby MPRL E&P is the service contractor to MOGE responsible for enhancing production.

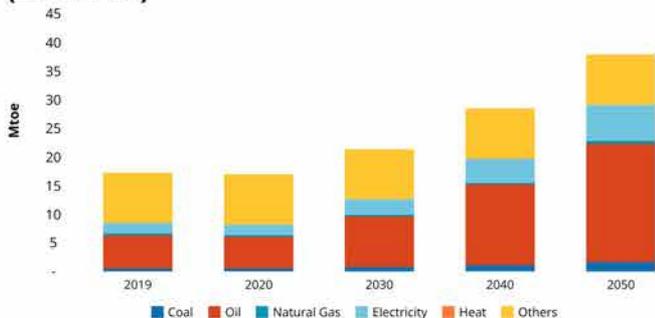
Picture : Myanmar Digital News



# Energy Demand

## Oil

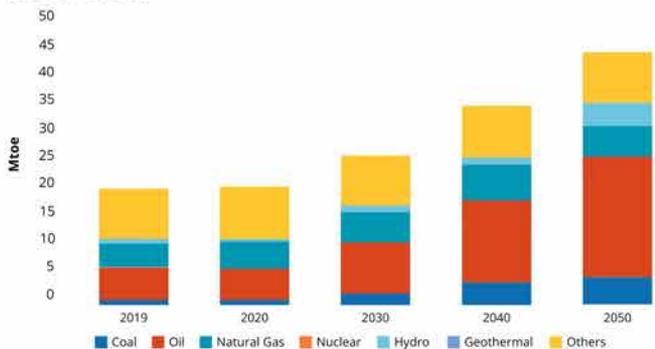
Myanmar's projected energy demand by fuel (2019-2050)



Mtoe = million tonnes of equivalent. Source: ERIA

Based on the data, oil has the highest growth rate of (4.2%) in each year during 2019-2050. Coal is projected to have an average annual growth rate of 3.2% during 2019-2050. Electricity demand will still grow the fastest at an average annual growth rate of 4.4% per year during the same period. Its share will increase from 9.6% in 2019 to 16.5% in 2050.<sup>11</sup>

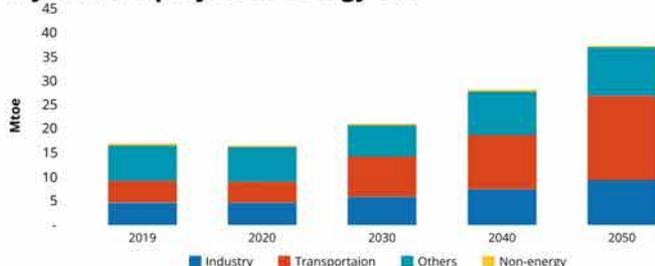
Myanmar's projected energy demand by source (2019-2050)



Mtoe = million tonnes of equivalent. Source: ERIA

Under the BAU scenario, Myanmar's primary energy is projected to increase at an annual average rate of 2.5%. Coal is projected to be the energy source experiencing the highest increase, at 5.8%. This is followed by oil which is projected to increase at an average rate of 4.2%. Hydro and natural gas are projected to increase at an average rate of 2.5%.<sup>12</sup>

Myanmar's projected energy use

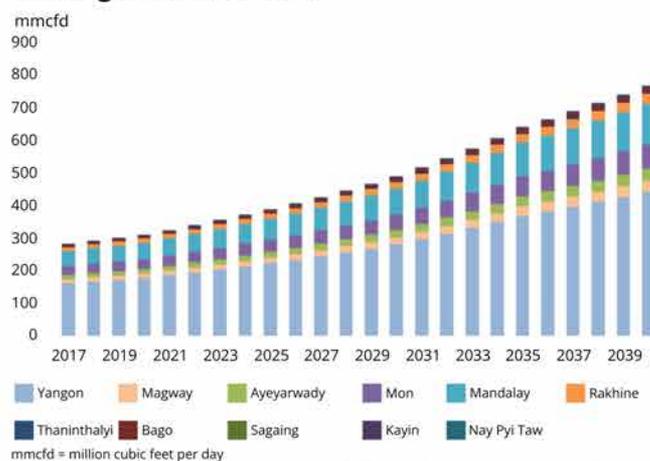


Mtoe = million tonnes of equivalent. Source: ERIA

Transport, industry, and non-energy will all continue to expand under the BAU scenario, which will raise their respective shares of final energy consumption. The "Others" sector share will decrease in the interim. Transportation is expected to account for 47.1% of the share in 2050, while industry will make up 25.7%. The "Others" would drop from 44.2% in 2019 to about 27.1%.<sup>13</sup>

## Gas

Power generation sector



mcmfd = million cubic feet per day. Source: Institute of Energy Economics, Japan Estimate

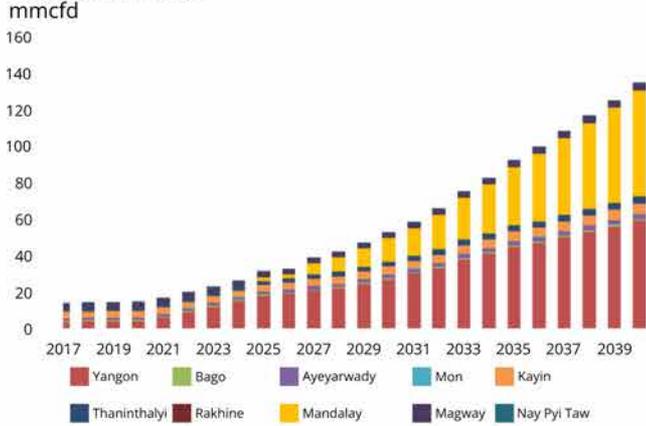
The power sector will remain the largest demand sector for natural gas in Myanmar. As electricity demand grows, the role and expectations for natural gas will also continue to increase, given the limited availability of alternative sources of electricity supply in Myanmar.

Natural gas-fired power plants are the last resort for establishing electricity supply for Myanmar due to the difficulty of developing hydropower, coal, and renewable energy. Thus, the demand for gas-fired power generation is bound to increase. Most of the increased demand will arise in Yangon and other regions in the south where several new gas-fired power plant development projects are expected.<sup>14</sup>



## ENERGY PROFILE

### Industrial Sector

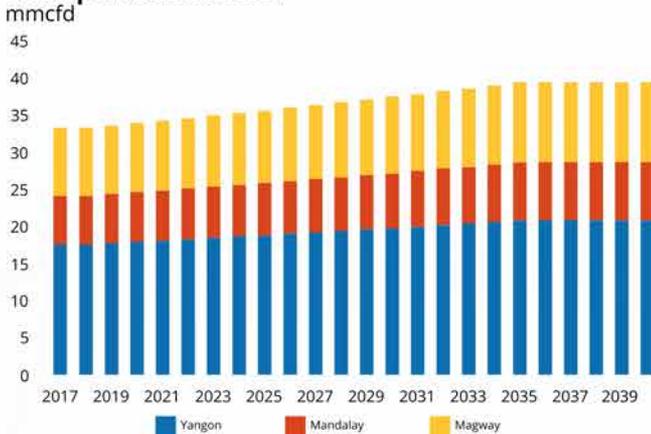


Source: Institute of Energy Economics, Japan Estimate

Most of the additional natural gas demand in Myanmar will be in the industrial sector. One such industrial zone is the Thilawa Special Economic Zone (SEZ). According to Yangon local government, this SEZ plans to build a 50 MW gas-fired power plant which will consume 21 mmcf of fuel.

In addition to the demand for power generation in Thilawa SEZ, several factories will use city gas for their manufacturing activities. Expected city gas demand. The expected city gas demand at this stage is estimated at 6.2 mmcf-7.0 mmcf, which will increase as the SEZ develops.<sup>15</sup>

### Transportation Sector

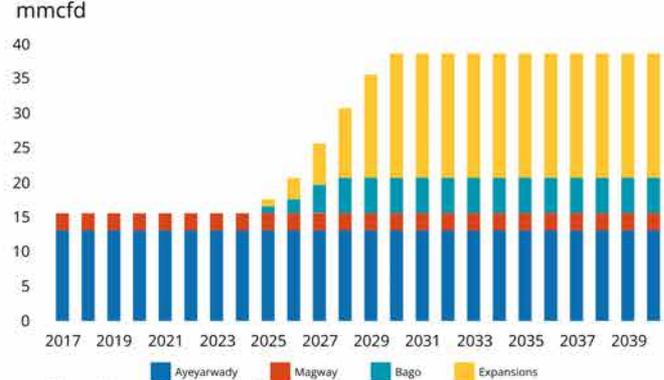


Source: Institute of Energy Economics, Japan Estimate

Myanmar has been using natural gas as a transportation fuel since the mid-2000s. More than 500 CNG vehicles are in use and there are 46 CNG refueling stations in the country.

Currently, expansion of supply capacity is not possible due to the anticipated shortage of natural gas supply in the future.<sup>16</sup>

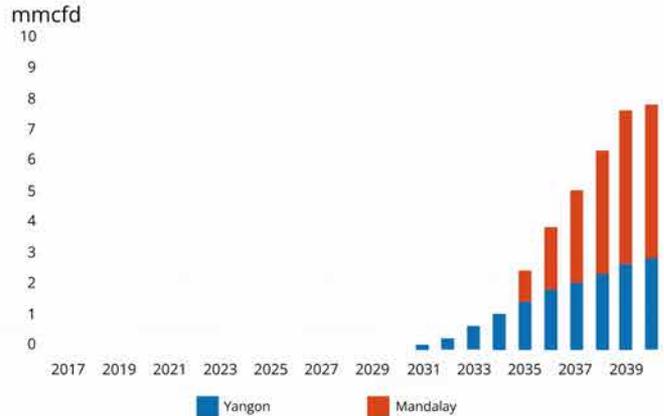
### Chemical feedstock



Source: Institute of Energy Economics, Japan Estimate

Natural gas consumption as a chemical feedstock for fertilizers is expected to increase moderately. According to the Ministry of Energy and Mineral Resources, three fertilizer plants consumed 16 mmcf of natural gas as feedstock in fiscal year 2017. As fertilizer is an essential ingredient for Myanmar's agricultural sector and its demand is very likely to continue to grow.<sup>17</sup>

### Residential and commercial sectors



Source: Institute of Energy Economics, Japan Estimate

Only Yangon and Mandalay, the two largest cities in Myanmar, will see increased demand for natural gas from the residential and commercial sectors. However, in this sector, gas usage is lower than in other sectors, despite increasing demand. As natural gas is scarce and pipeline construction is expensive, its use for residential and commercial purposes will be restricted.<sup>18</sup>

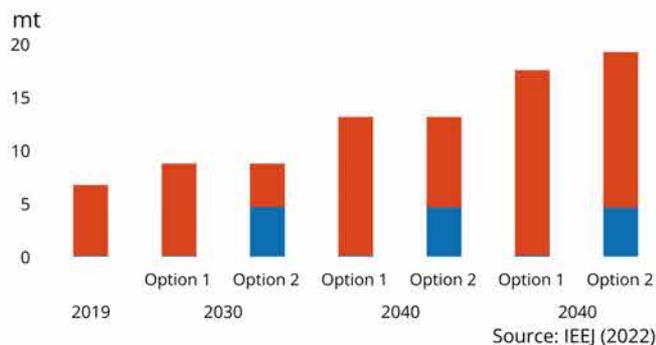


**Thilawa Special Economic Zone**  
2,500-hectare industrial area in Myanmar, developed through Japanese collaboration, aimed at boosting foreign investment and manufacturing.  
Picture: Marubeni

# Energy Production

## Oil

The data shows that domestic oil production is predicted to have a low percentage due to underutilization of refineries. As a result, Myanmar's oil imports are predicted to be higher.<sup>19</sup>



## Major oil disruption



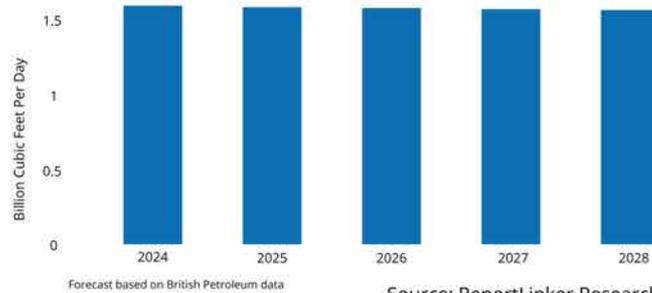
The continuous decline in oil production since the 2000s is inseparable from external distractions. The majority of disruptions are caused by revolutions, wars, or strikes in major oil-producing countries.<sup>20</sup>

In March 2024, crude oil reserves for Myanmar was 7.03 thousand barrels per day. Crude oil reserves of Myanmar fell gradually from 7.23 thousand barrels per day in April 2023 to 7.03 thousand barrels per day in March 2024.<sup>21</sup>

## Gas

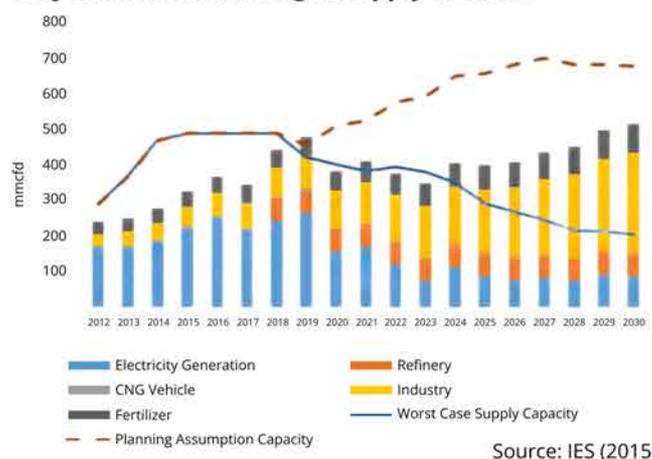
Myanmar's natural gas production is forecasted to decline due to the depletion of gas fields which has led to a decline in production. In response, two offshore and several onshore fields are under development. The projects are aimed at increasing domestic gas supply. However, they can only partially offset the decline in production from existing fields. At least, 75% of domestic production was exported to Thailand and China. As domestic production declines, the volume of export volumes will also need to be reduced. his strategic focus on new gas projects also presents opportunities for foreign investment and technological advancements in the energy sector, ultimately benefiting Myanmar's economy in the long run.<sup>22</sup>

## Myanmar's Gas production



Based on this data, gas production in Myanmar is predicted to decline every year. In 2024, total production is predicted to reach 1,605 bct/d. In 2025, it is estimated at 1.595 bct/d followed by 2026, which is estimated at 1.587 bct/d, 2027, which is estimated at 1.58 bct/day, and 2028, which is estimated at 1.575 bct/d.<sup>23</sup>

## Projection for natural gas supply-demand

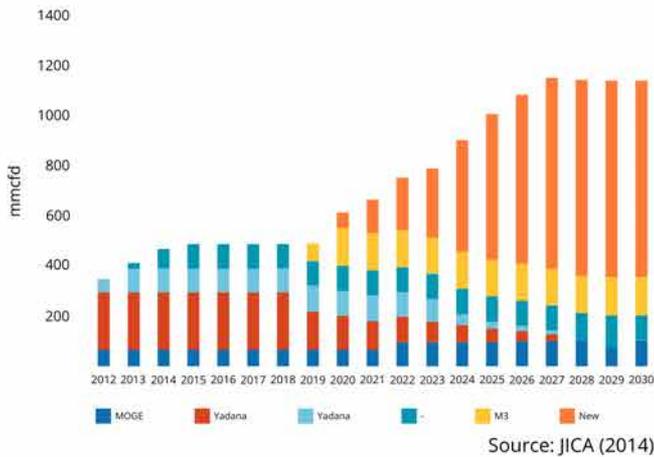


Gas supply-demand projections show that the outlook is tight. The projections illustrate that Myanmar requires an increase in oil supply. Thus, M3 gas fields will be needed to meet demand. If there is a delay in the development of the field, it will result in a continuous supply shortage from 2018.<sup>24</sup>

The temporary shutdown of power plants located in Thaketa, Thilawa, and Thanlyn with capacities of 400 MW, 300 MW, and 300 MW, respectively, led to an imbalance between gas supply and demand. The shutdowns were caused by soaring LNG prices and a weakening Kyat exchange rate.<sup>25</sup>



## ENERGY PROFILE



Based on these data, it appears that there is an opportunity to increase gas supply in Myanmar. This can be done by developing gas refineries and saving gas usage. Gas could be reserved for industry and the power sector. Other demands can be met in alternative ways, by maximizing other energy sources, such as hydropower.<sup>26</sup>

Several foreign companies suspended their exploration activities.<sup>27</sup>

Field Name	Constituent Entity	Production Start Year	Operator	Participants	Natural Gas Production in 2023 (mmcf)
Yadana Project	Gulf of Martaban	2000	PTTEP International	PTT Public; Myanmar Oil and Gas Enterprise	516
Shwe Complex	Bay of Bengal	2013	Posco International	Posco International; Oil and Natural Gas; Myanmar Oil and Gas Enterprise; Korea Gas	501
Zawtika Development Project	Gulf of Martaban	2014	PTTEP International	PTT Public; Myanmar Oil and Gas Enterprise	329
Nyaungdon	Ayeyarwady	2004	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	12
Maubin	Ayeyarwady	2007	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	4
Aphyauk	Yangon	1994	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	4
Kyaukkwet	Magway	2004	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	2
Ayadaw	Magway	2012	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	1
Peppi	Magway	2012	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	0
Thargyitaung	Magway	2002	Myanmar Oil and Gas Enterprise	Myanmar Oil and Gas Enterprise	0

Source: GlobalData Oil & Gas Intelligence Center



● **Shwe gas project**, operated by the South Korean's Posco. MOGE has a 15% stake in the project. Exports gas to China.

● **Zawtika project**, run by PTTEP and exports gas to Thailand. MOGE has a 20% stake.

● **Yadana project**, run by Thailand's PTTEP and exports gas to Thailand. MOGE has a 21.8% stake in Yadana.

● **Yetagun project**, formerly operated by Malaysia's Petronas, which is reportedly transferring operations to the Thai company, Gulf Petroleum Myanmar. MOGE has a 20.45% stake in Yetagun. It exports gas to Thailand.

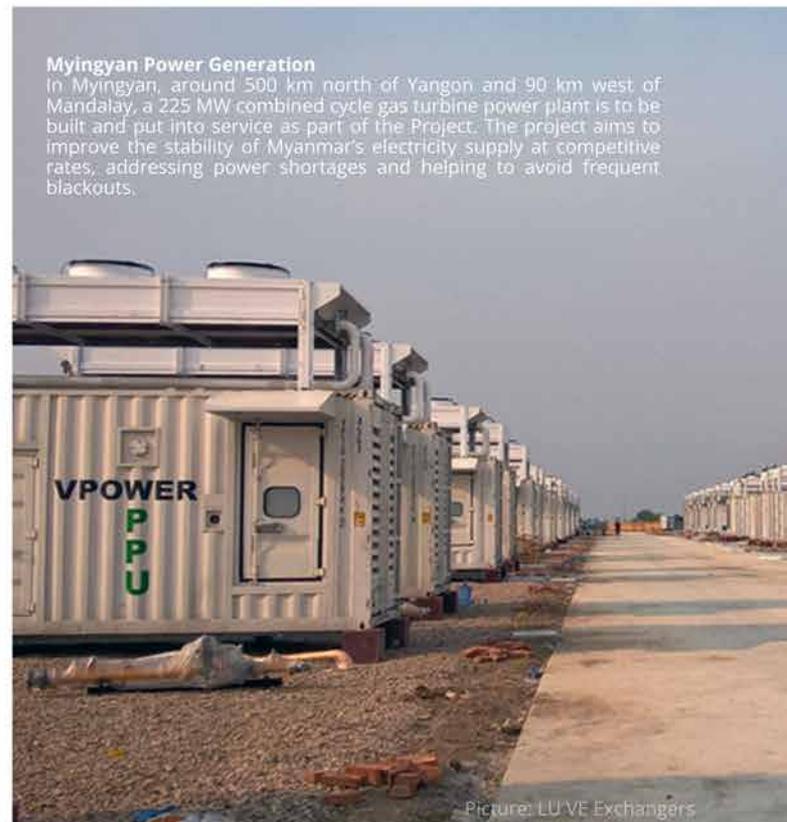
Source: World Bank

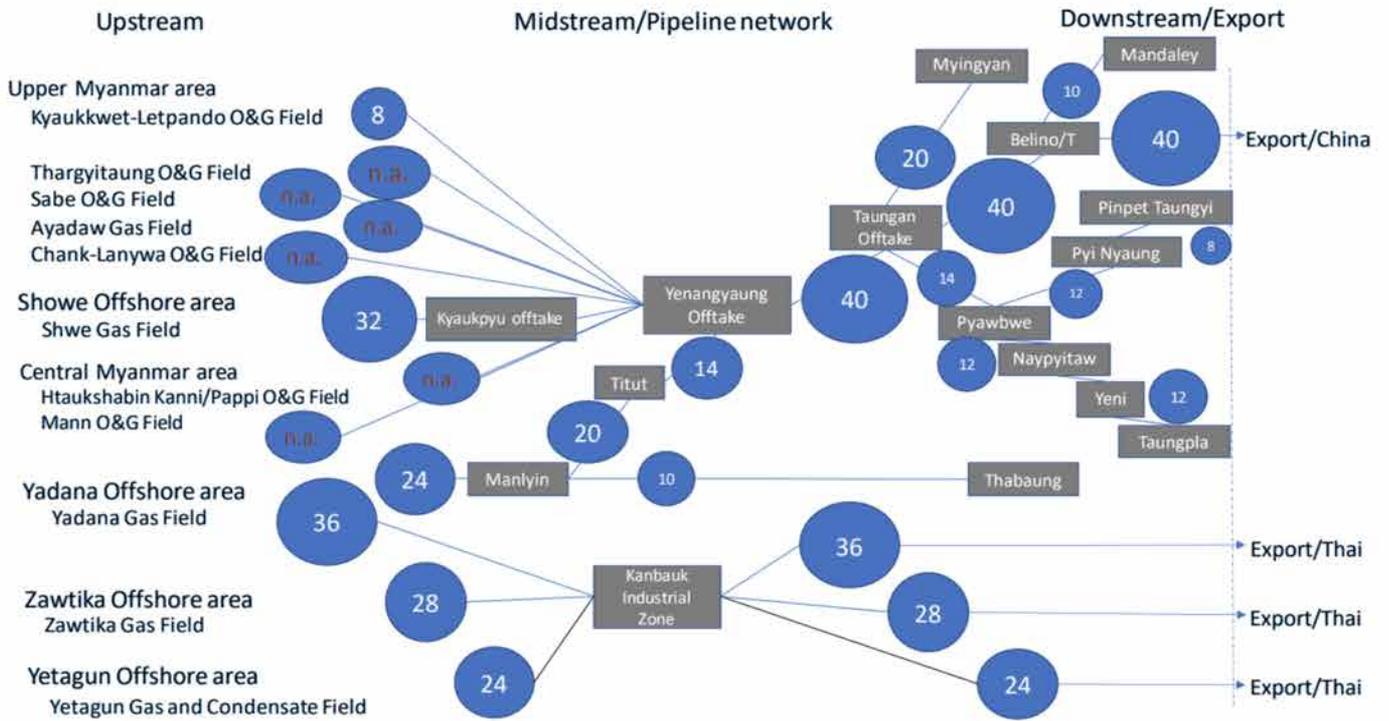
The country's major projects export gas to China and Thailand, with around 20% of the gas retained for domestic use. The major gas projects in which MOGE has significant shareholdings are run by the South Korean corporation Posco International, Thailand's PTTEP and Gulf Petroleum Myanmar, also from Thailand. Gulf Myanmar Petroleum, PTTEP and Posco were contacted for comment.<sup>28</sup>

Myanmar has 53 inland blocks in operation; 17 blocks are operated by 12 companies, mostly international companies. Offshore areas are divided into 51 blocks, of which 18 are in operation and 24 out of 51 are classified as deep sea. The existing major offshore gas projects are:

- Yadana Project: The daily production rate of the Yadana natural gas project is 910 million cubic feet (Mcf).
- Yetagun Project: and Yetagun produces over 250 Mcf.
- Shwe Project (exporting gas to China): Shwe produces around 500 Mcf.
- The Zawtika Project, with 75 percent of production exported to Thailand and China: Zawtika produces 360 Mcf.<sup>29</sup>

There are six deep rigs, nine medium rigs, and eleven shallow rigs. The total length of natural gas pipelines in the country is 2,200 miles. Myanmar has 45 compressed natural gas (CNG) filling stations and has over 27,000 CNG vehicles. The average domestic natural gas supply is 300 Mcf per day.<sup>30</sup>





Source: MOGE and IEEJ (2002)

The export of natural gas from Myanmar to neighbouring countries such as China and Thailand earned over \$800 million during the first 4 months of FY2022-23. Most of this gas is from the Yadana, Yetagun, Shwe, and Zawtika offshore gas fields.

Earlier in 2022, TotalEnergies and Chevron announced that they would pull out of the Yadana offshore gas field. Thailand’s PTT Exploration & Production (PTTEP) was reported to have taken over TotalEnergies’ stake in the field. PTTEP produces and exports natural gas to western Thailand, from the Yadana, Yetagun, and Zawtika fields.<sup>31</sup>

**Yangon Oil Terminal**

Yangon oil terminal is the main oil terminal in Myanmar. This terminal is located in an area that is the center of energy development in the Myanmar region. Currently, the Myanmar government is developing a storage terminal in Yangon with an area of 1,053 hectares.

Picture: The Democratic Voice of Burma (DVB)

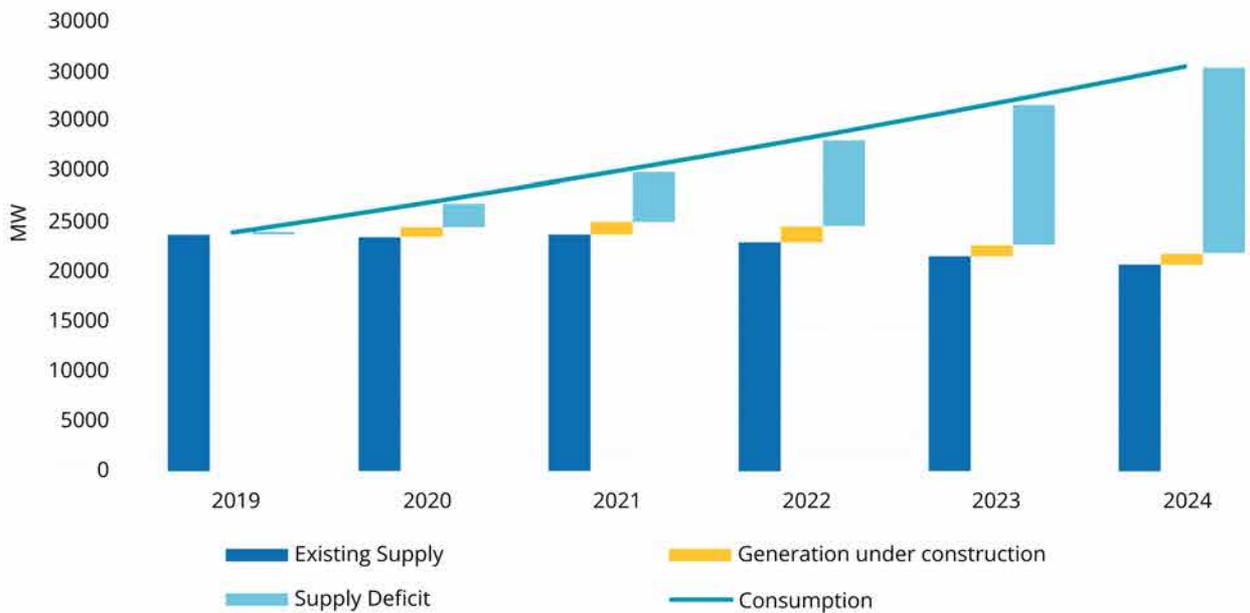




**Yadana Fields Pipelines**

The Yadana Gas Pipeline Project consists of a pipeline, some 355 kilometers in length, bringing natural gas from the Yadana Gas Field in the Andaman Sea offshore from Myanmar to Ratchaburi in Thailand. The estimated final capacity of the 42" gas pipeline is some 525 million cubic feet per day.

## Overall Energy Outlook



Source: MoEE

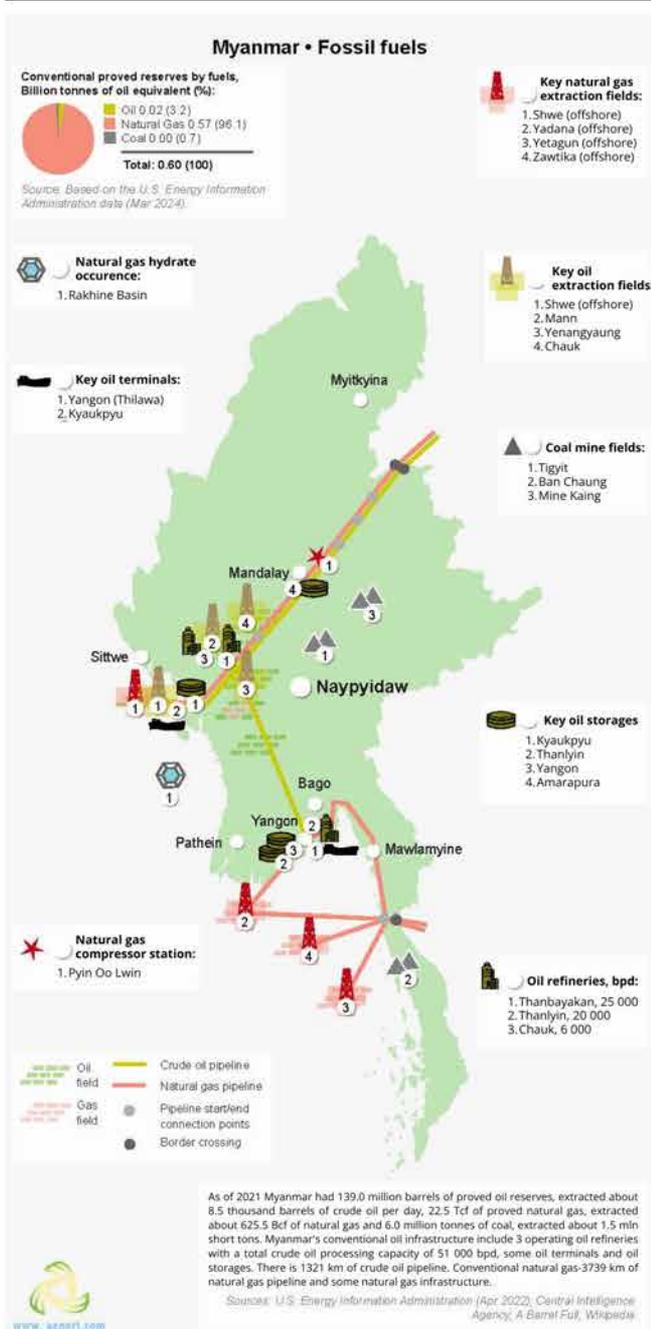
Based on this data, Myanmar is experiencing a gap between energy demand and energy supply. The graph shows that energy demand is expected to continue to increase as Myanmar's economy and population grow. Meanwhile, limitations in the development of infrastructure and energy resources mean that existing energy sources cannot meet the growing demand.<sup>32</sup>



**Thaketa Power Plants**

The plant has a capacity of approximately 135 megawatts and plays a crucial role in addressing Myanmar's growing electricity demand. The facility is part of broader efforts to modernize the country's energy infrastructure and promote sustainable energy solutions.

## Oil



Source: Advanced Energy Technologies

Based on this data, infrastructure in oil energy is focused on the provision of terminals, extraction fields, key oil storages, oil refineries, and crude oil pipelines. Here are the details of Myanmar's infrastructure in oil energy.<sup>33</sup>

### • Key Oil Terminals

Oil terminal is one of the existing energy infrastructures in Myanmar, used to store crude oil. These terminals can be accessed via pipeline and sea. Thus, facilitating oil transportation. Myanmar has two key oil terminals in Yangon (Thilawa) and Kyaukpyu.

### • Key Oil Extraction Fields

In the oil production process, the extraction process is the main thing. In pursuit of oil production, Myanmar has four key oil extraction fields that have their own methods of extraction, there are located in Shwe (offshore), Mann, Yenangyaung, and Chauk

### • Key Oil Storages

Oil storages provide a secure environment for holding various types of oil and refined products. Myanmar has four key oil storages in Myanmar, there are in Kyaukpyu, Thanlyin, Yangon, and Amarapura.

### • Crude Oil Pipeline

Pipelines are the primary means of transporting crude oil and refined products over long distances. They are designed to move large volumes of oil efficiently and safely from production sites to refineries and distribution centers.

Myanmar Petroleum Enterprise (MPE), a state-owned refinery company, plans to build a new refinery with an annual production capacity of 5 to 10 million tonnes (100,000– 200,000 barrels a day). When the new refinery goes into operation, it will compete with petroleum products imported by private oil companies.<sup>34</sup>

## Gas

As one of the oldest gas producers in Southeast Asia, Myanmar has a well-established natural gas infrastructure, which is essential to support gas development in Myanmar. Below are key points regarding natural gas infrastructure in Myanmar:

### • Domestic Pipelines

Myanmar has a national natural gas pipeline network that spans approximately 4,100 kilometers. This network connects major demand centers across the country and is primarily operated by the state-owned Myanma Oil and Gas Enterprise (MOGE). The largest domestic pipeline is the Yangon-Magway pipeline, which transports offshore gas from the southern region to the interior of the country. However, as of September 2018, parts of this pipeline were not fully operational due to technical issues, including gas leaks caused by corrosion.<sup>35</sup>

The Yangon-Magway pipeline is a key component of Myanmar's natural gas infrastructure, facilitating the transport of offshore gas from the southern region to the interior, particularly to the central part of the country. The pipeline stretches from Yangon, Myanmar's largest city and economic hub, to Magway, a crucial point for distribution in the interior.

- **Export Pipelines**

Myanmar has two major export pipelines: one to Thailand and another to China. The pipeline to Thailand has been in operation since 2000 and was responsible for exporting 1,106 million cubic feet per day of natural gas. Meanwhile, the pipeline from Myanmar to China is relatively new, starting operations in 2014.

The pipeline runs from west to east and ends at the Chinese border. The exported gas is then transported to Yunnan Province and finally to Chongqing City in China. To cope with rapidly increasing domestic natural gas demand rapidly, China considers the import pipeline from Myanmar as an important part of its natural gas import infrastructure.<sup>36</sup>

- **Natural Gas Compressor Station**

A natural gas compressor station is the essential infrastructure for maintaining the flow and pressure of gas in pipelines and ensuring the efficient transportation of natural gas over long distances. The natural gas compressor station is located in Pyin li Lwin.<sup>37</sup>

- **Key Natural Gas Extraction Fields**

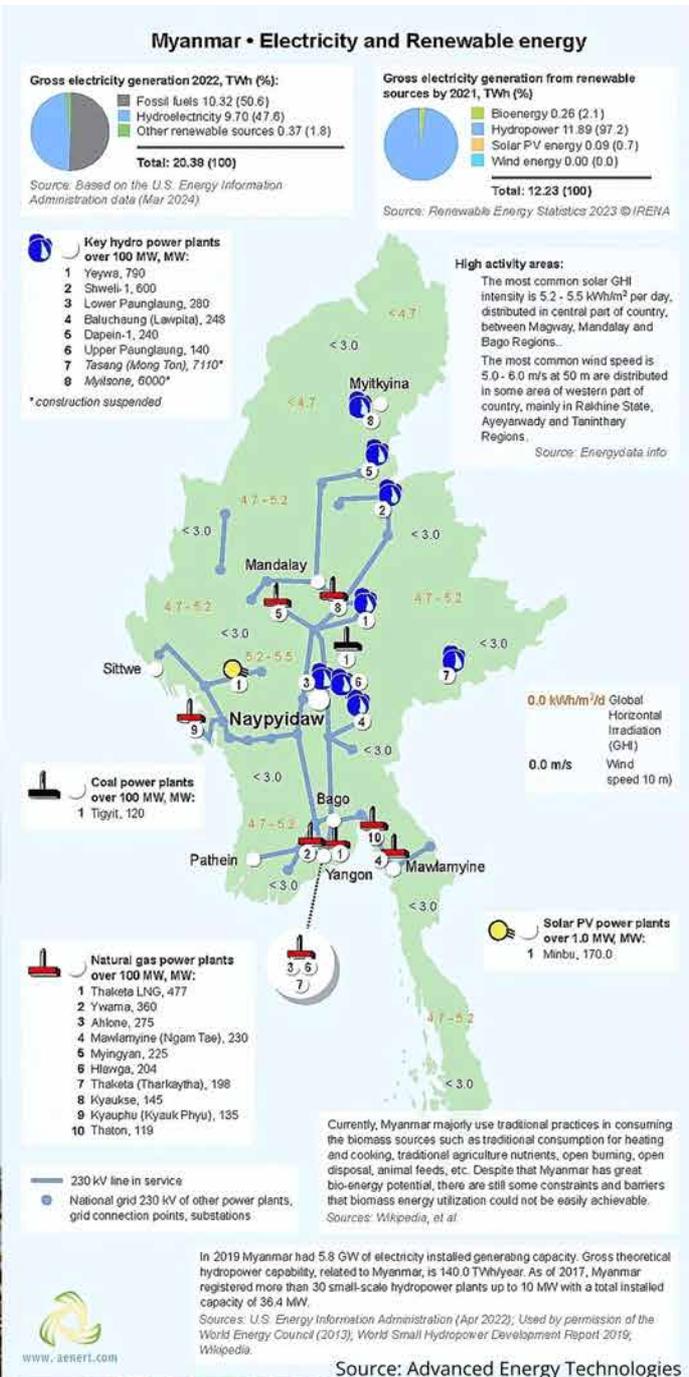
Key natural gas extraction fields are located in Shwe, Yadana, Yetagun, and Zawtika. The four natural gas extraction fields are referred to as key due to their significant production capacities, contributions to domestic energy supply, and export revenues.<sup>38</sup>



**Block A-6**

Block A-6, covering nearly 10,000 km<sup>2</sup> from the shore to more than 2,400 m water depth, only had some 1,330 km of old vintage 2D seismic data when MPRL E&P signed the production sharing contract in January 2007. Pyi Thar-1, the first well drilled in the block which resulted in a gas discovery, was drilled in March 2012 in 200 m water depth. The well successfully identified a new petroleum play system consisting of sands deposited by what is believed to be ancient Ayeyarwady submarine river course.

Picture: MPRL E&P



Not only focusing on oil and gas infrastructure development, Myanmar is also developing infrastructure in the renewable energy sector. A snapshot of Myanmar's infrastructure is shown in the available roadmap. Looking at all renewable energy sources, by 2020, hydropower dominates the volume of electricity generated (over 97%), followed by bioenergy (2%) and solar photovoltaics (around 0.6%). The Minbu Solar Power Plant in Mgway Region is considered one of the largest solar power plants in Southeast Asia. Based on the roadmap, the development of renewable energy infrastructure in Myanmar is focused on hydropower development.<sup>39</sup>



**Zawtika Project**  
 The Zawtika Project is a gas field development project undertaken in 2012 located in Moattama Bay, Myanmar. The field is located on the coast of Myanmar, roughly 300km south of Yangon and 290 km west of Tavoy.

Picture: Orient (Tianjin) Corrosion Engineering Ltd.



**Yetagan Gas Field**

The Yetagan gas field was discovered in December 1992 and entered into commercial production in May 2000. Production from the Yetagan North gas field commenced in October 2014. The gas field was estimated to contain three trillion cubic feet of gas and 80 million barrels of condensate. The Yetagan gas field is located in the Taninthayi area in the southern Andaman Sea, approximately 230km off the coast of Myanmar. The field is spread over three offshore blocks M12, M13 and M14.

Picture: Journal of Petroleum Technology

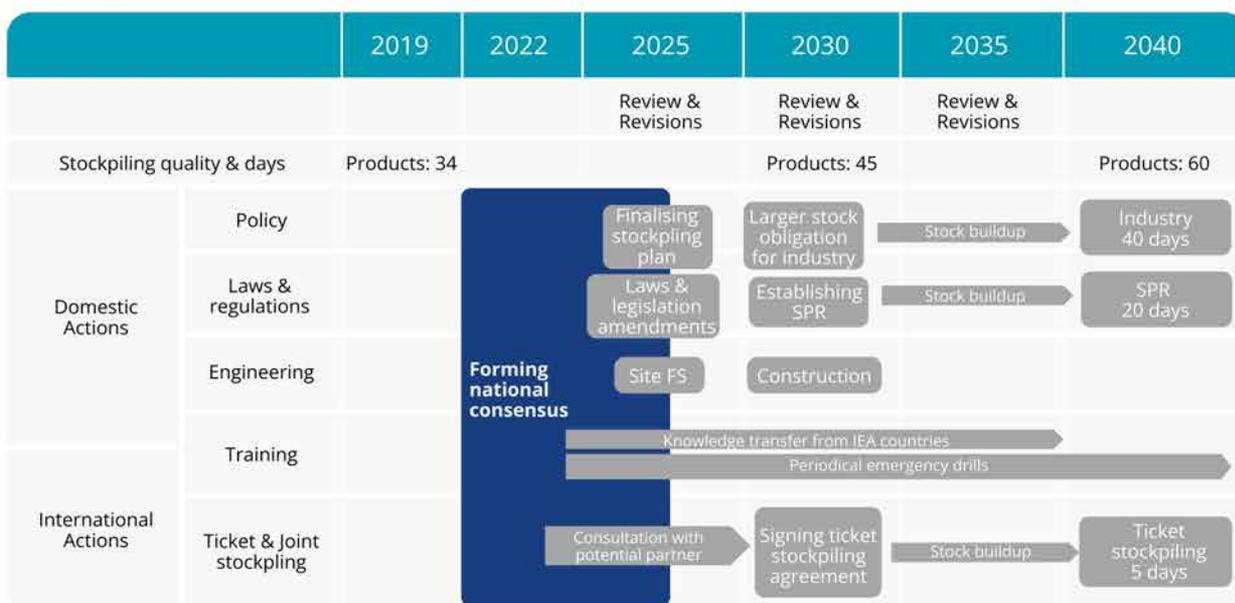
# Oil

The Ministry of Energy is pursuing the development of two oil refineries with a refining unit capacity of 5Mt/th (100 kb/d) projected to be operational by 2028.<sup>40</sup>

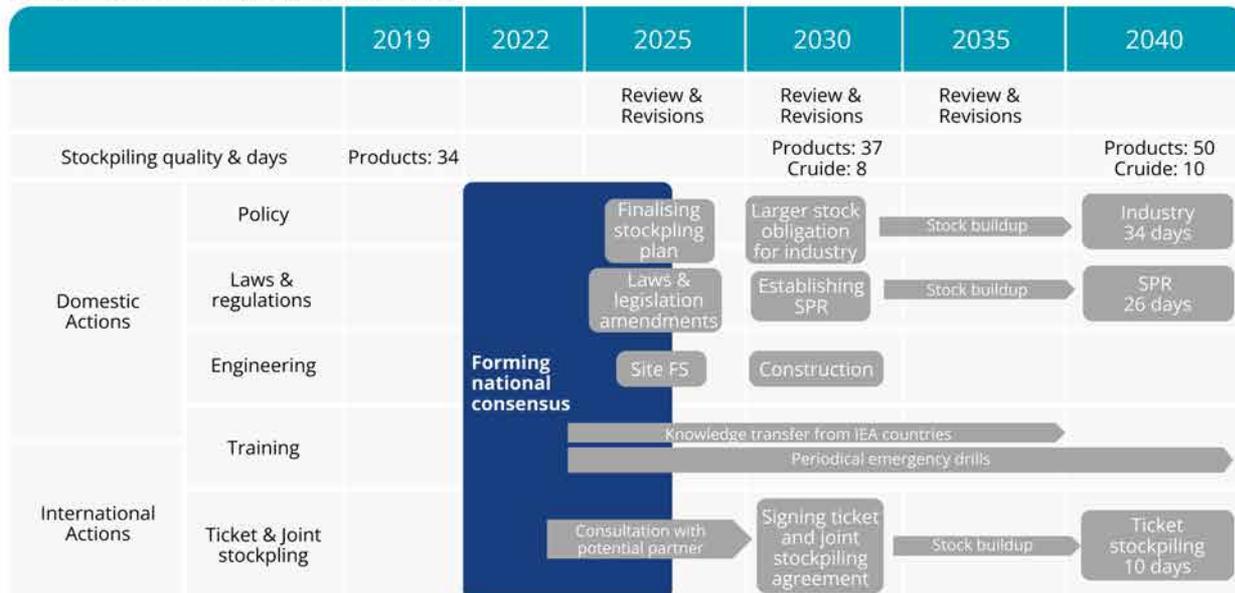
Due to low production, the government is trying to secure oil supplies by hoarding oil. The government established a stockpiling policy that regulates the size of oil stockpiles, stockpiling entities, the roles of government and industry, and incentives for industry. In the draft, the government should provide adequate incentives to oil companies for tax exemptions, subsidies, and soft loans for infrastructure development. One of the objectives of the draft is to maximize the Kyaukpyu Terminal.

Planning for the establishment of a Strategic Petroleum Reserve (SPR) can be targeted around 2030 so that stocks can be built up throughout the 2030s. SPR is a government-managed stockpile of crude oil and petroleum products that is maintained to provide a buffer against potential supply disruptions.<sup>41</sup>

## Oil Stockpiling



Remarks: Ticket Stockpiling 5 days is a part of SPR



Remarks: Ticket and joint Stockpiling 10 days is a part of SPR

Source: ERIA

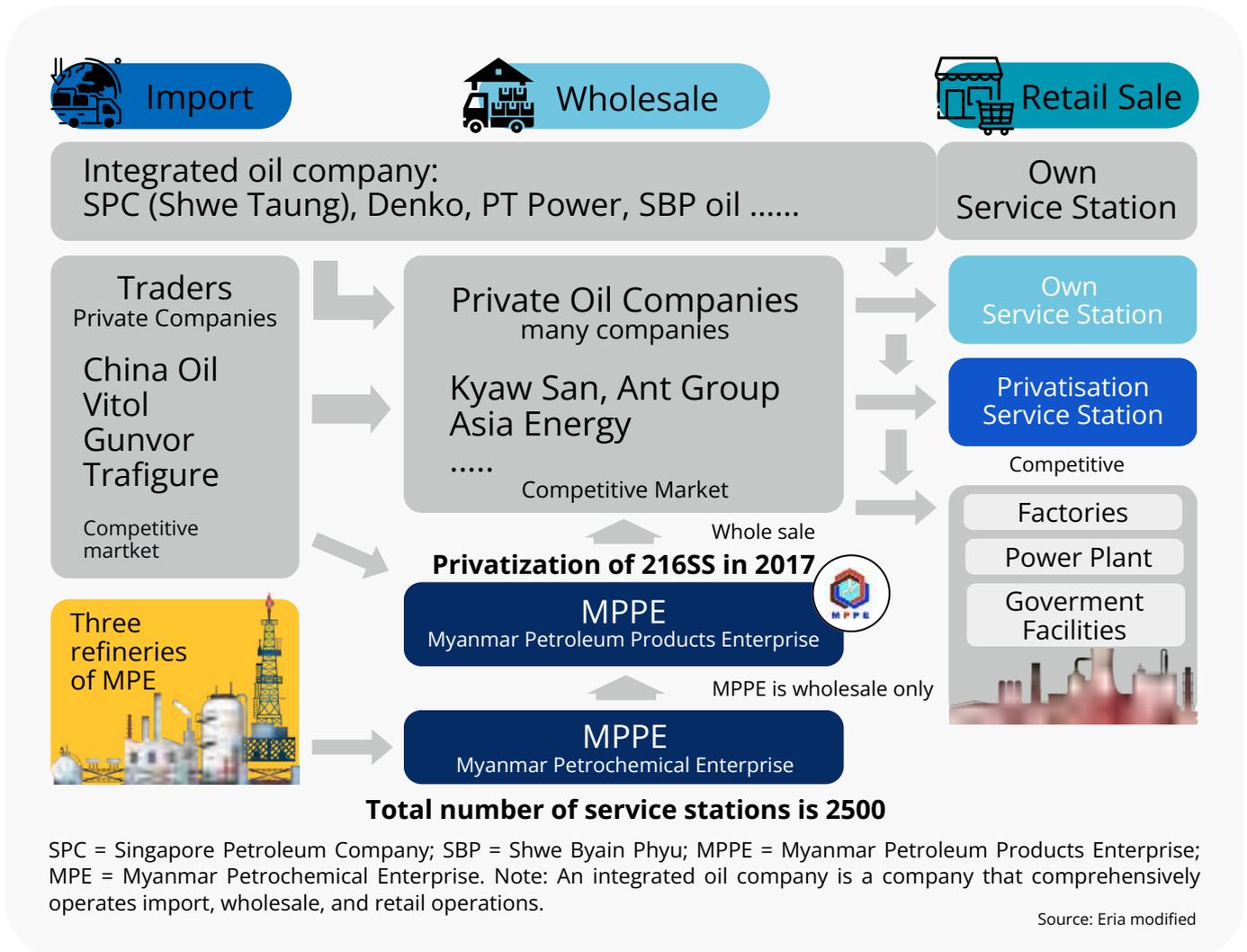
Developing oil power generation strategy targeted for completion in 2031. In this project, the government has set several strategies :

- Accelerating the process of exploration and development of oil fields and increasing foreign investment in the gas sector.
- Accelerating the development of newly discovered oil reserves.
- Deregulating the oil sector and accelerating the process of privatization of entities involved in the commercial process.<sup>42</sup>

When a new refinery enters the petroleum market, it will require efficient logistics according to the location of the refinery:

- Oil-importing companies transport existing petroleum products to the new refinery.
- The new refinery itself transports petroleum products to their destinations.<sup>43</sup>

In 2020, Medium oil refineries were planned to be built in Myanmar's central region through China-Myanmar crude oil pipeline and a new



The Structure of the Oil Industry in Myanmar. Amongst the oil importers, there are integrated companies that own storage tanks, tank trucks, and service stations and also act as wholesalers; others serve only one of these functions.

The state-owned Myanmar Petroleum Products Enterprise (MPPE) also procures petroleum products from MPE and foreign oil traders, and wholesales them to oil dealers and service stations.

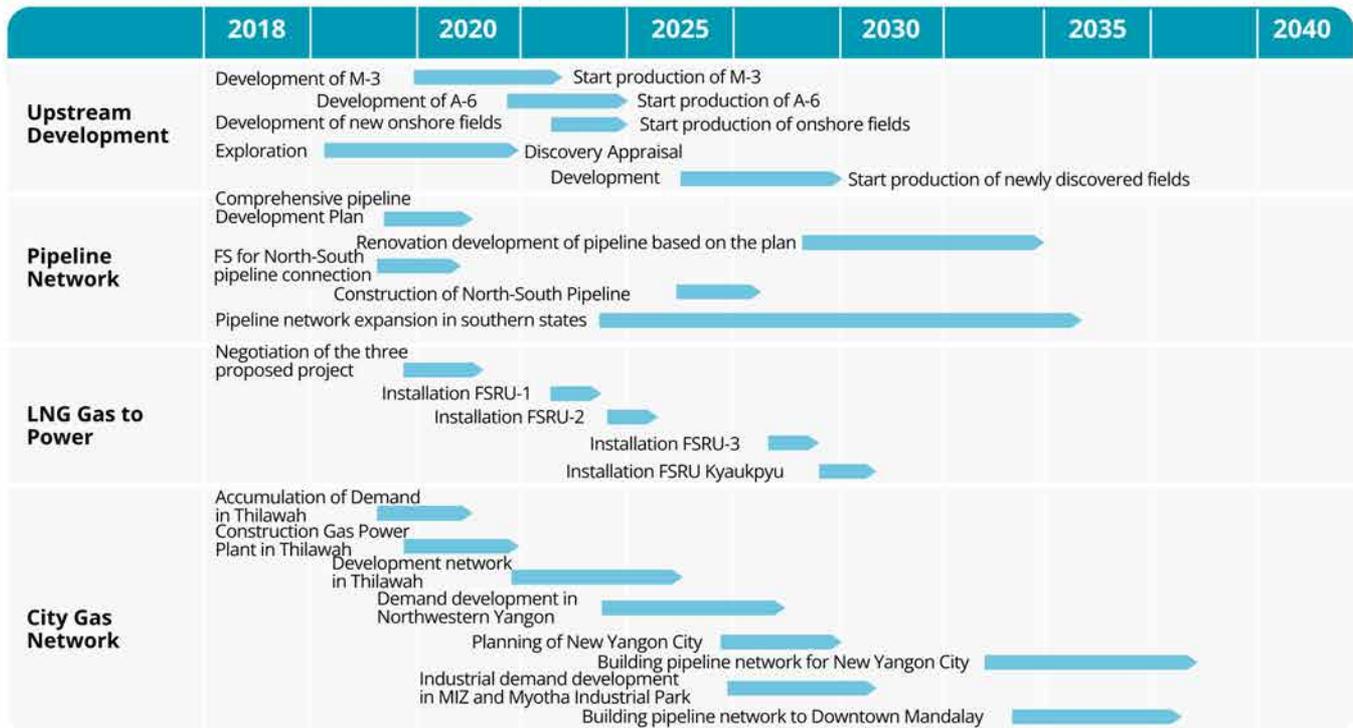
Integrated Refinery and Petrochemical Complex will be constructed near Yangon region under joint venture (JV) and public-private partnership (PPP) system.

Plans are underway to provide technical assistance and issue temporary licenses to the current operating mini oil refineries with daily production of 3,000 to 30,000 gallons of crude oil for the production of high-quality oil products. The ministry has already issued operating licenses to 170 private businessmen and also allowed 521 oil refineries to operate.<sup>44</sup>

## Gas

Myanmar is renovating the pipeline and it is targeted to be completed by 2025. This project was undertaken to address the problem of gas energy development in Myanmar, namely pipeline leakage.<sup>45</sup>

**Roadmap for the Development of Myanmar’s Natural Gas Market**



FS= Feasibility study; FSRU= Floating Storage and Regasification Unit; LNG= Liquefied Natural Gas; MIZ= Mandalay Industrial Zone  
Source: Eria, Modified.

The Government of Myanmar plans to increase the share of natural gas, coal, hydro, and other renewables in the total generation mix and decrease oil share. On this basis, the Myanmar government has prepared a plan in the Myanmar Energy Master Plan 2015 that sets out three scenarios, namely Domestic Energy Consumption, Least Cost, and Power Resources Balance.<sup>46</sup>

- Accelerating the development of newly discovered natural gas reserves
- Deregulating the gas sector and accelerating the process of privatization of entities involved in the commercial process.
- Deregulating LPG prices and encouraging the use of compressed natural gas (CNG)<sup>47</sup>

No	Energy Resource	Scenario 1 (Domestic Energy Consumption)		Scenario 2 (Least Cost)		Scenario 3 (Power Resources Balance)	
		Installed Capacity		Installed Capacity		Installed Capacity	
		MW	%	MW	%	MW	%
1	Hydro (large)	12147	42	12147	43	1412	6
2	Hydro (Small & Medium)	6891	24	6891	24	7484	32
3	Gas	4986	17	2484	9	4758	20
4	Coal	2760	10	5030	18	7940	34
5	Renewable	2000	7	2000	7	2000	8
<b>Total</b>		<b>28784</b>		<b>28552</b>		<b>23594</b>	

Developing a new gas power generation strategy targeted for completion in 2031. In this project, the government has set several strategies:

- Accelerating the process of exploration and development of gas fields and increasing foreign investment in the gas sector



Yangon is the largest consumer of gas in Myanmar. Gas demand in Yangon can reach 22 mmcf/d every year. The majority of these needs are needed for the transportation sector. Even so, demand for the industrial sector is projected to continue to increase.<sup>48</sup>

## Other Energy Sources

The government has prepared a set of reform programs aiming to transform Myanmar to a modern, democratic, and developed nation by 2030.<sup>49</sup>

### Energy development in hydropower

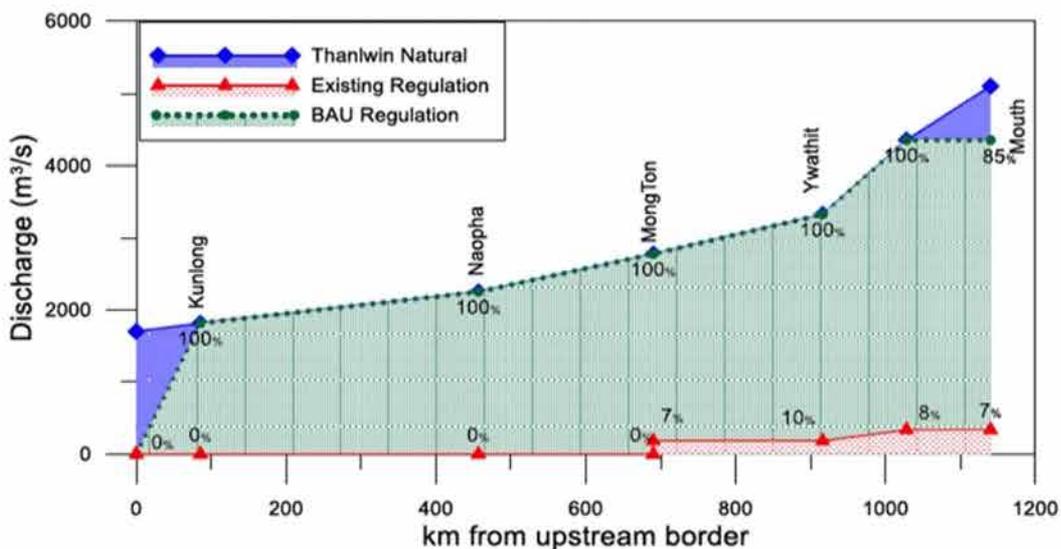
Hydropower stations under construction in Myanmar

Sequence number	Power station	Estimated installed capacity (MW)
1	Upper Yeywa	280
2	Deedoke	60
3	Upper Kengtawng	51
4	Upper Baluchaug	30,4
5	Middle Paunglaung	152
6	Thahtay	111
7	Shweli (3)	1050
	<b>Total</b>	<b>1734,4</b>

Source: jurnal

In an effort to achieve the goal of 100% electrification in Myanmar, the government is stepping up its efforts by developing hydropower plants. The effort is also expected to help Myanmar meet its target of expanding its energy capacity fivefold by 2030.<sup>50</sup>

### Business-as-usual of sustainability



Source: Netherlands Commission for Environmental Assessment (NCEA)

Expand the BAU hydropower plant to maximize available water capacity. BAU development can provide a 'best estimate' development scenario that indicates the likely scale and distribution of projects that are likely to be built.

BAU development will result in The Ayeyarwady and Thanlwin basins would have 28,000 MW (53%) and 21,000 MW (40%) of total capacity, respectively, with the other six basins respectively, with the other six basins adding a further 3,134 MW of capacity, ranging from 20-1,220 MW of total capacity per basin.

The main development will consist of one large project on the Ayeyarwady and Chindwin rivers, and five major projects on the Thanlwin River.<sup>51</sup>

The Myanmar Energy Master Plan was initiated by Myanmar's National Energy Management Committee (NEMC) in conjunction with the National Electrification Plan (NEP). The Government of Myanmar's goal is to achieve universal electrification by 2030. The plan includes a focus on off-grid solutions, 500,000 small-scale, subsidized solar home projects, as well as an additional 35,000 mini-grid solar developments.<sup>52</sup>

### The Ayeyarwady River

The largest river in Myanmar, extending approximately 2,170 kilometers (1,350 miles) from its source in the Himalayan glaciers to its delta at the Andaman Sea.



Picture: Heritage Line

## Ministries

### Ministry of National Electric Energy

In 2016, Myanmar established a new ministry, the Ministry of Electricity and Energy (MOEE). The ministry is the result of a merger of the existing Ministry of Electric Power and Ministry of Energy. In this regard, MOEE is tasked with setting National Energy Policy. For Myanmar National Energy Policy, nine policies are set as a framework and these policies have been prepared based on the current situation to cover all kinds of energy. In addition, national energy policy will be reviewed and revised annually to harmonize with the new situation and create a secure energy system. A secure energy system will tend to be characterized by:

- An energy system that allows for switching energy sources and fuels when necessary.
- An energy system that establishes multiple suppliers of energy suppliers to reduce over-reliance on imported supplies that are at risk of out-of-control disruptions.
- An energy system capable of establishing diverse import supply routes to avoid over-reliance on specific supply corridors.
- An energy system capable of reducing energy intensity through energy efficiency and conservation measures so that excessive energy demand can be decoupled from GDP growth.
- An energy system capable of implementing effective management and efficient operation of infrastructure to minimize losses in the transition period.
- An energy system capable of formulating pricing policies that reflect long-term economics for consumers and suppliers.<sup>53</sup>

Under the umbrella of the Ministry of Electricity and Energy (MoEE), the four state owned enterprises:

- The Oil and Gas Planning Department (OGPD): OGPD plans long-term and short-term strategies in energy sector development and supervises implementation projects.
- The Myanma Oil and Gas Enterprise (MOGE): MOGE is the oil operator, service provider and regulator of the oil and gas sector. It oversees the two other state-owned enterprises MPE and MPPE.
- The Myanmar Petrochemical Enterprise (MPE) & The Myanma Petroleum Products Enterprise (MPPE) are responsible for issuing tenders to foreign companies: MPE is responsible for oil and gas exploration, production and domestic gas transmission and MPPE manages retail and wholesale distribution of petroleum products through four main fuel terminals, 24 sub-fuel

storage facilities and 12 oil stations across the country.<sup>54</sup>

Regulation from MOEE for foreign investment:

- Pursuant to Notification 15/2017 oil and gas exploration is listed among economic activities which are permitted in accordance with the approval of the relevant Ministry.
- To date foreign oil and gas companies have been required to work in cooperation with local companies. Pursuant to Rule 22 of Notification 35/2017, foreign capital should not exceed 80% of the total capital of joint-venture companies engaged in economic activities which are prohibited or restricted such as oil and gas exploration. This restriction does not expressly apply to joint ventures between a foreign investor and the state.<sup>55</sup>



## Agencies

### Myanmar Petroleum Exploration & Production

MPRL E&P, is an independent overseas listed oil and gas exploration and production company. MPRL E&P is a leader in the upstream energy sector in Myanmar's onshore and offshore areas. Since its establishment in 1996, MPRL E&P has accumulated over a decade of experience and a strong proven track record in the oil and gas sector. MPRL E&P plays a key role in the exploration and production process in Myanmar. MPRL E&P's efforts in increasing oil production have supplied the country with more cost effective domestic oil consumption.<sup>56</sup>

### Myanmar Oil and Gas Enterprise (MOGE)

Myanmar Oil and Gas Enterprise (MOGE) is Myanmar's national oil and gas company which was established in 1963. MOGE's main objective is to explore for and produce oil and gas onshore for self-sufficiency and oversee production sharing contracts offshore. MOGE has a list of Myanmar's major onshore and offshore oil and gas fields and concessions.<sup>57</sup>

Energy system planning in Myanmar has special challenges due to the three agricultural zones and three fuel zones that exist in Myanmar. Thus, the government needs to establish energy governance that can address this diversity.

Under the conditions of Myanmar's small energy system, the system is imbalanced due to a very large load center in the Yangon region.

The energy system with the individual economic sector model is the most appropriate model for Myanmar at this time.

In 2022 the electricity supply situation is worse due to higher gas prices as well as damaged power lines, leading to more disruptions. Some gas-fired power plants briefly stopped operations due to higher fuel costs. MOEE was forced to impose a countrywide blackout schedule in March and the crisis worsened after April. Available power generation capacity decreased from 3,711 MW in October 2021 to 2,665 MW in March 2022, and daily production fell from 73,137 MWh to 51,776 MWh.<sup>58</sup>

Myanmar's energy demand and supply situation indicates that Myanmar should shift to coal and hydropower.<sup>59</sup>

Approach	Space	Sector	Time	Examples	Suitability for developing countries
Top down simulation	Global, national	Macro-economy, Energy	Long term (20+ years)	AIM, SGM2, I/O models	4
Bottom up optimization	National	Energy	Long term (20+ years)	MARKAL / TIMES	3
Bottom up accounting	National, regional	Energy	Long term (20+ years)	LEAP	2
Bottom up optimization / accounting	National, regional, local	Energy	Medium term (20 years), short term	Sector models (e.g. agriculture, transport, industry, household, etc)	1

#### Yadana Gas Field

The Yadana gas field is an offshore gas field in the Andaman Sea. It is located about 60 kilometres (37 mi) offshore to the nearest landfall in Myanmar. The project has been developed in partnership with local communities and western oil companies with the objective of involving local communities and protecting the environment.

Picture: Finance Uncovered



# PHILIPPINES

## Country Key Highlights

### Government/ Political System

Republic with a presidential form of government<sup>1</sup>

### Demography

115,972,366 (2024)<sup>2</sup>

### GDP and Percentage From O&G

The Gross Domestic Product (GDP) in Philippine was worth USD 437.15 billion (2023)

0.19% from oil (2018)<sup>3</sup>

### GDP Per Capita

GDP per Capita in Philippine (with a population of 119,149,749 people) USD 3,623.316 (Dec, 2022)<sup>4</sup>

### Reserves

3.74 MMB of oil; 273 BCF of gas (0.273 TCF); and 6.5 MMB of condensate 9 (Dec, 2022)<sup>5</sup>

### Oil & Gas Production

Oil Production: 14,200 barrels/day (2021)

Gas Production: 380 MMCF/day (2021)<sup>6</sup>

### Refining Capacity

180,000 barrels/day (2024)<sup>7</sup>

### Domestic Demand

471,000 barrels/day (2023)<sup>8</sup>

### Upstream Fiscal Term

Upstream licences are awarded via licensing rounds under what is effectively a simple Production Sharing Contract (PSC), despite being referred to as a Service Contract (SC). The fiscal terms include a fixed cost recovery ceiling and fixed production share. Depending on the level of participation of Filipino companies, contractors can recover up to an additional 7.5% of gross revenues as an incentive. The fiscal terms are fixed and agreed before each licensing round is launched. Corporate income tax is paid on behalf of the contractor by the Government.<sup>9</sup>

### Galoc Oil Field

The Galoc Oil Field is situated approximately 65 kilometers northwest of Palawan Island in the Philippines. The field is operated by Galoc Production Company WLL (GPC), a subsidiary of Nido Petroleum Limited.

The field utilizes a Floating Production Storage and Offloading (FPSO) vessel, the "Galoc Production Company," which processes and stores the crude oil before offloading to tankers for transport.

The field has estimated recoverable reserves of around 12.4 million barrels of oil. Production began in 2008, with initial output averaging around 15,000 barrels of oil per day.



Picture :Upstream/ NIDO PETROLEUM

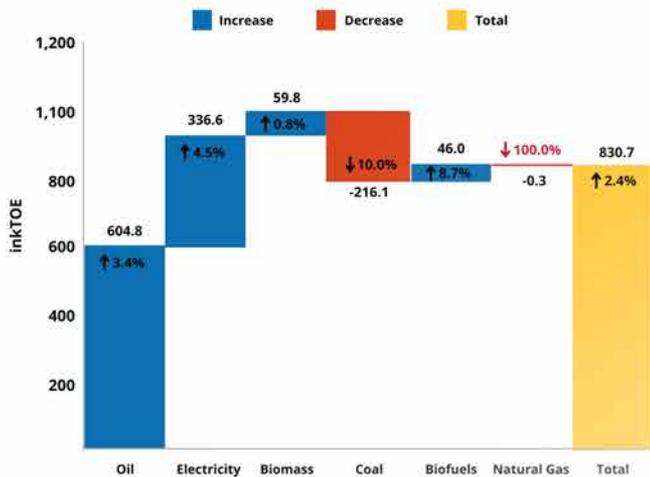


# Energy Demand

## Oil

The country's dependence on oil and petroleum products persisted, with their combined levels reaching 18.3 MTOE, accounting for 50.9% of total final energy consumption (TFEC) in 2022. This marks a 3.4% increase from 17.7 MTOE in 2021. Gasoline and diesel, making up 75.4% of total oil consumption, remained the most utilized oil products.<sup>10</sup>

### Changes in Energy Consumption, by Fuel in kTOE, 2022



Source: Philippine Situationer Energy 2022

Crude oil imports in the Philippines surged by 46% in 2022, comprising 27.4% of the total oil import volume for the year. This increase was driven by enhanced operations at Petron's Bataan refinery.<sup>11</sup>

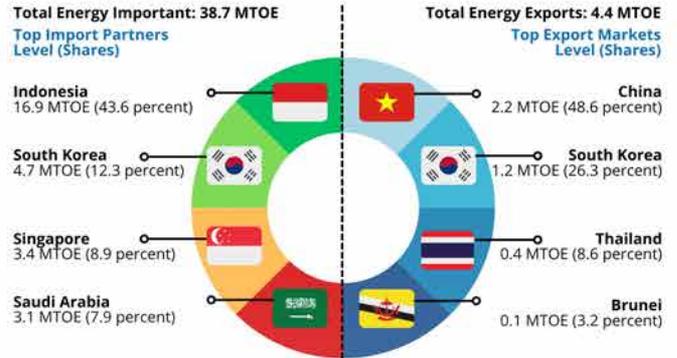
The Department of Energy (DOE) reported that the country imported around 471,403 barrels per day in 2023, marking an increase from the previous year's 451,100 barrels per day.<sup>12</sup>

The relatively slower rise in international gasoline prices compared to diesel, coupled with increased demand from the aviation industry, spurred a 5.1% increase in imports of finished petroleum products to 15.4 MTOE in 2022, up from 14.7 MTOE the previous year.<sup>13</sup>

The import landscape for the Philippines remained stable, with South Korea, Singapore, and China

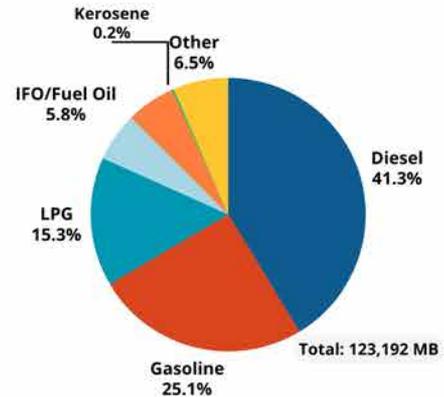
maintaining their positions as top sources of finished oil products. Meanwhile, the Middle East supplied all of the country's imported crude oil requirements.<sup>14</sup>

### Top 4 Countries as Important Source and Export Destinations for 2022<sup>15</sup>



Source: Philippine Situationer Energy 2022

### Petroleum Products Importation, by Fuel Type 2022<sup>16</sup>



Source: Philippine Situationer Energy 2022

The uptrend in the country's transport sector demand for petroleum products contributed to the 22.9% increase in bioethanol imports from its 2021 level of 125.9 kTOE to 154.7 in 2022.<sup>17</sup>

### Petroleum Products Consumption, by Sector



The Philippines presents significant opportunities for local and-foreign investments in floating LNG projects, given the country's growing energy needs and commitment to transitioning to cleaner energy.

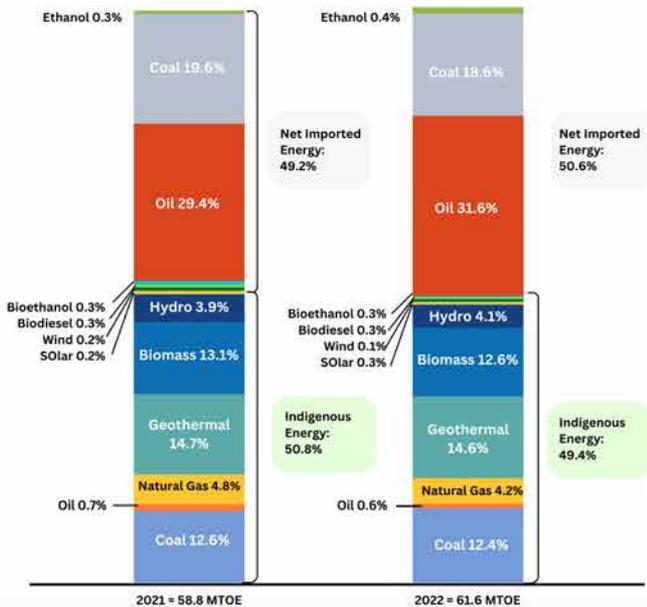
Picture : Offshore

# Energy Supply

## Oil

Oil reclaimed its position as the primary energy source in Philippines, comprising 32.2% of the total primary energy supply in 2022. Its volume increased by 12.3% to 19.8 MTOE, primarily due to higher net oil imports as domestic production remained limited.<sup>18</sup>

### Total Primary Energy Mix, by Fuel (% Shares), 2021 VS 2022



Source: Philippine Situationer Energy 2022

The nation's total oil production, including condensate, fell by 8.7% from its 2021 level to 357.6 kTOE in 2022, accounting for 1.2% of the overall indigenous energy supply, down from the previous year's 391.5 kTOE.<sup>19</sup>

The remaining active oil fields in the nation, Galoc and Alegria, saw their crude oil production decline by 11.6% and 32.7%, respectively. Similarly, condensate output weakened in 2022, decreasing by 7.8%, largely due to the declining viability of the Malampaya gas field.<sup>20</sup>

## Gas

The Philippines ranks as the 37th largest producer of natural gas globally, but its output declined by 40% in 2023 compared to 2022. The country's contribution to global production stands at 0.04%, while major producers include the US, Russia, and Iran.<sup>21</sup>

Natural gas accounted a minimal contribution at 4.2% share in total primary energy supply due to its 6.2% reduction as fuel input for power generation in 2022, as renewable energy sources are added to power mix.<sup>22</sup>

Natural gas production continued its decline, decreasing by 7.4% in 2022 to 2.6 MTOE (112.2 billion standard cubic feet, BSCF), accounting for a 4.2% share of total domestic energy production. The implementation of Malampaya gas supply restrictions on the Ilijan and San Gabriel Power plants along with the expiration of the Ilijan Power plant's Gas Sales and Purchase Agreement (GSPA) led to reduced supply levels throughout the year.<sup>23</sup>

### Pagudpud Wind Farm

The Pagudpud Wind Farm, located in Ilocos Norte, Philippines, is a notable renewable energy project operated by AC Energy. The Pagudpud Wind Farm comprises 32 Siemens Gamesa turbines, each generating 5 MW of electricity. Strategically positioned in coastal villages abundant in wind resources, it maximizes energy output. Upon completion, the wind farm contributes to Luzon's renewable energy capacity, addressing rising energy needs and advancing the nation's clean energy objectives.

Picture | Power Philippines

**Malampaya Gas Field**

The Malampaya gas field, situated offshore Northwest Palawan in the Philippines, is a key project in the nation's energy sector. It commenced commercial operations in January 2002. Located about 50-80 kilometers off Palawan Island, the field operates at a depth of 820 meters, with wells extending down to 2,990 meters below sea level. The project is managed by Shell Philippines Exploration B.V. (SPEX) in collaboration with Chevron Malampaya LLC and the Philippine National Oil Company-Exploration Corporation. The Malampaya gas field has been a significant contributor to Philippines energy, having produced 1.94 trillion cubic feet of gas and 75 million barrels of condensate to date, supplying 3,200 megawatts to power plants in Luzon (20% of Luzon's electricity needs). The field produces approximately 429 million cubic feet of gas per day and about 15,000 barrels of condensate daily.

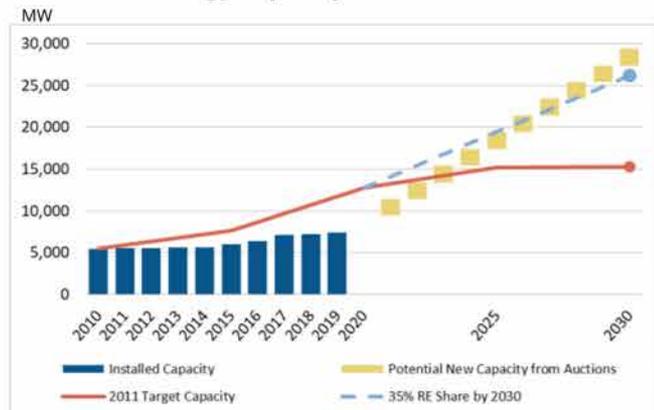
Picture : Offshore

## Overall Energy Outlook

The current administration is actively implementing measures established by the 2008 Renewable Energy Act aimed at boosting renewables capacity and enhancing consumer choices, such as the Renewable Portfolio Standard, the Green Energy Option Program, net metering, and the Green Energy Auction Program.<sup>24</sup>

In pursuit of a sustainable and integrated energy-environment approach, the DOE sets forth a comprehensive roadmap for expanding RE capacity, aiming for at least 35% share in the power generation mix by 2030, 50% by 2040, and more than 50% by 2050.<sup>25</sup>

**Philippines targets vs existing condition of renewable energy capacity<sup>26</sup>**



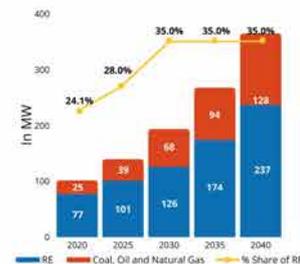
Source: Targets are from 2011-2030 NREP, DOE Statistics, IEEFA

The Philippines has great potential for offshore wind energy generation, estimated by the World Bank at 178 GW. The World Bank study also revealed that the Philippines has the potential to install 21GW in the high growth potential offshore wind power by 2040.<sup>27</sup>

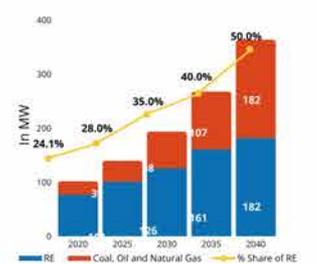
The Philippines aims to increase the share of renewable energy in its power generation. Solar energy is expected to double from 2.4% in 2024 to 5.6% by 2030, while wind energy is expected to triple from 3.1% to 11.7%. However, the share of hydropower is set to fall from 10% to 9.1%, and geothermal from 9.9% to 7.7%.<sup>28</sup>

The Power Development Plan 2020 to 2040 emphasizes on the country's efforts to transition to clean and sustainable energy use in its power generation.<sup>29</sup>

**Power generation mix, 2020-2040 RE-35 Scenario**



**Power generation mix, 2020-2-40 RE-50 Scenario**



Source: KPMG

The Department of Energy's Philippine Energy Plan has identified LNG as crucial for the country's energy sustainability and security, aiming to boost natural gas's share in the power generation mix to 26% by 2040.<sup>30</sup>

## Oil

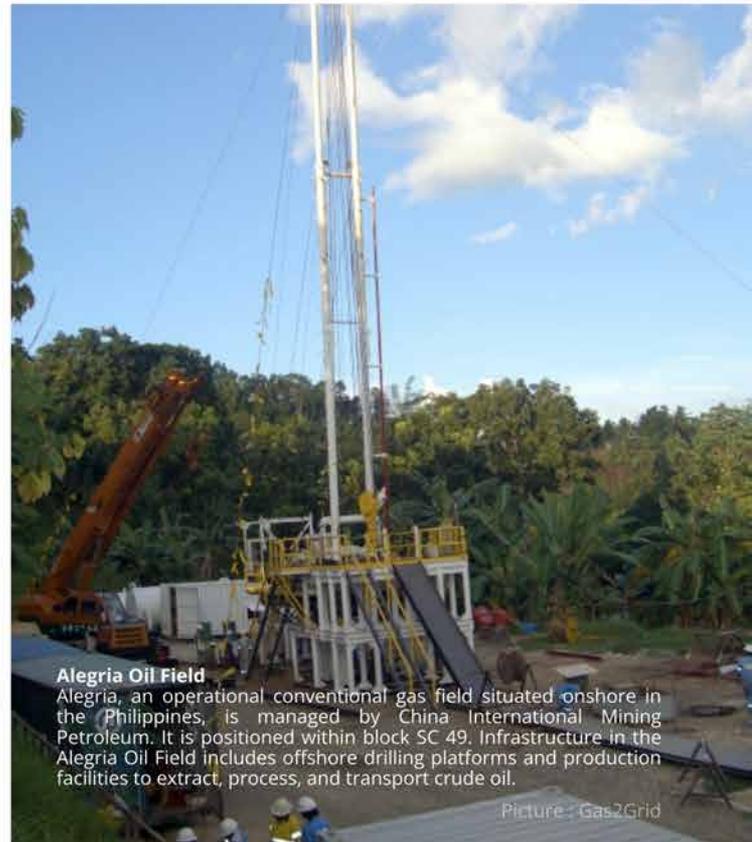
The Philippines' oil infrastructure has seen various updates and improvements in 2023-2024. According to the Department of Energy (DOE), the total crude oil imports increased by 23.7% from the previous year, reaching 3,476 million liters by June 2023. This crude oil was primarily sourced from the Middle East, with Saudi Arabia being the major supplier. Petroleum product imports, however, showed a slight decline, primarily due to reduced diesel and LPG imports. The DOE continues to enforce the Minimum Inventory Requirement to ensure a stable oil supply, especially during calamities. Additionally, ongoing investments in the Malampaya gas field aim to extend its operations, with significant investments planned until 2026. The DOE's partnership with Japan Oil, Gas and Metals National Corporation (JOGMEC) aims to enhance the National Oil Contingency Plan, ensuring energy security through strategic petroleum reserves.<sup>31</sup>

As of 2023, the Department of Energy (DOE) of the Philippines has been actively promoting offshore oil exploration and development to address energy security. Notable updates include the issuance of Offshore Wind Service Contracts, such as the recent approval for Nido Petroleum to resume production in the Cadlao oilfield off northwest Palawan, which is expected to produce 20,000 to 25,000 barrels of oil per day by 2024. Additionally, potential reserves have been identified in areas like the Sulu Sea Basin, estimated at 203 million barrels of oil equivalent (MMBOE).<sup>32</sup>

As of 2023, the Philippines' onshore oil infrastructure includes significant developments in regions such as the Alegria oil field in Cebu, which has an estimated 27.93 million barrels of oil and 9.42 billion cubic feet of natural gas. The DOE is also facilitating new projects in the Cagayan Valley and the Cotabato Basin to bolster onshore production. The infrastructure is supported by an extensive network of pipelines and transportation facilities that connect oil fields to refineries and distribution points across the country.<sup>33</sup>

The Philippines' oil refinery infrastructure has seen significant changes in the last few years. Petron Bataan Refinery (PBR) experienced two shutdowns: one in 2020 due to the COVID-19 pandemic and another in the first half of 2021 for a temporary "economic shutdown." It was then restarted in the second half of 2021. The Bataan refinery, with a capacity of 180,000 barrels per day (bpd), is a critical component of the country's refining capacity.

Meanwhile, Shell has converted its Tabangao refinery into an import facility, aligning with its shift towards renewable energy sources. This transformation allows Shell to better meet the fuel demands.<sup>34</sup>



## Gas

In 2023-2024, the Philippines made significant investments in its gas infrastructure, particularly focusing on the development of liquefied natural gas (LNG) facilities. The Department of Energy (DOE) approved several LNG terminal and regasification projects, with notable ones including facilities by Linseed Field Power and FGEN LNG, slated to start operations by mid-2024.<sup>35</sup>

Mindful of the anticipated depletion of the Malampaya gas field by 2027, the government introduced the importation of LNG and facilitated the establishment and operation of LNG receiving facilities in the country. The Philippine government is actively promoting the bid for the 2023 Philippine Offshore Licensing Round, with 11 areas available, including the Recto Bank, which is estimated to hold 2.7 trillion cubic feet of gas reserves. Additionally, the Department of Energy reported an increase in offshore oil and gas production capacity, targeting a production boost to 300 million cubic feet per day by 2025.<sup>36</sup>

The Philippines' onshore gas infrastructure has seen significant developments, with the Department of Energy reporting an increase in production capacity to approximately 1.2 billion cubic feet per day (bcf/d) from various fields, including the San Antonio gas field, which has an estimated reserve of 400 million cubic feet.<sup>37</sup>



## Other Energy Sources



The installation of 32 wind turbines that can each generate 5 megawatts (MW) of electricity is expected to be completed within the last quarter of 2022 in the coastal barangays of Caunayan and Balaoi in Pagudpud, Ilocos Norte

The Philippines has been expanding its renewable energy infrastructure significantly. The country now has over 7,000 MW of installed renewable energy capacity, including 1,932 MW from geothermal, 1,382 MW from solar, 443 MW from wind, 1,161 MW from hydropower, and 759 MW from biomass. Noteworthy projects include the 1,400 MW Ahunan pumped storage hydroelectric project and multiple solar farms like the 500 MW Clark Solar Project.<sup>39</sup>

Pagudpud Wind Farm is a wind power plant operated by ACEN with a total output of 160 MW. The installation comprises of 32 wind turbines that can each generate 5 megawatts (MW) of electricity. The wind power is located in the coastal barangays of Caunayan and Balaoi in Pagudpud, Ilocos Norte.<sup>40</sup>

There are other ACEN's wind power, namely long with the 52-MW North Wind Power project in Bangui town and the 81-MW North Luzon Renewables project which is also located in Pagudpud.<sup>41</sup>



### Cadiz Solar Power Plant (CSPC)

The Cadiz Solar Power Plant, also known as the Helios Solar Power Plant, is located in Cadiz City, Negros Occidental, Philippines. The Cadiz Solar PV Park was developed by Helios Solar Energy and is now owned by Equis, that is covering 176 hectares. The project produces 188,500 MWh of electricity annually, providing clean energy for 167,525 households and reducing CO2 emissions by 94,627 tons per year.

Picture: Boland Renewable Energy Powering a Greener Tomorrow

## Oil

In 2023-2024, the Philippines saw significant investments in its oil infrastructure aimed at improving distribution, storage, and refining capacities. The government has committed to maintaining high levels of infrastructure spending, targeting 5-6% of GDP annually. For the oil sector specifically, major projects include the expansion and modernization of existing facilities by key players like Petron Corporation and Pilipinas Shell. The Department of Energy (DOE) highlighted a substantial increase in infrastructure spending, with PHP 145.6 billion spent in the first two months of 2023, marking a 22% rise compared to the previous year.<sup>42</sup>

## Gas

Three energy companies in the Philippines – Meralco PowerGen (MGen), Aboitiz Power (AP), and San Miguel Global Power (SMGP) – have collaborated to establish the country's inaugural integrated LNG facility in Batangas. Valued at \$3.3 billion (184.74 billion pesos). The terminal will serve a pivotal role in the country's energy infrastructure, handling the reception, storage, and processing of LNG to supply power plants.<sup>43</sup>

The government aims to increase the capacity of gas-fired power plants to 24.3 gigawatts (GW) under its energy plan for 2020-2040. Infrastructure spending surged by 22% in early 2023, reaching PHP 145.6 billion, highlighting the government's commitment to enhancing energy infrastructure.<sup>44</sup>

The government has prioritized the enhancement of existing facilities and the construction of new

processing plants to meet rising energy demands, targeting a 30% increase in onshore production by 2025.<sup>45</sup>

## Other Energy Sources

The government has a program that is designed to continuously boost renewable energy use in the country called Green Energy Auction Program (GEAP). The first round of auction held in 2022 and was considered a success after successfully generating almost 2,000 MW of capacities that were committed to deliver energy from 2023 to 2025 at a competitive price lower than or equal to the Green Energy Auction Reserve or GEAR prices set by the Energy Regulatory Commission (ERC).<sup>46</sup>

By 2028, at least 10 offshore wind projects with a combined capacity of 6.72 gigawatts (GW) are anticipated to become online. As of November 2023, the DOE had awarded 82 offshore wind energy service contracts, totaling 63.36 GW in capacity. These projects are primarily situated in North Luzon, west of Metro Manila, and in various areas around Mindoro, Panay, and the Guimaras Strait.<sup>47</sup>

SM Investments Corp. (SMIC), through its subsidiary Philippine Geothermal Production Co. Inc. (PGPC), has pinpointed five new project sites in geothermal-rich zones across Luzon, specifically in Kalinga, Benguet, Cagayan, Camarines Norte, and Camarines Sur. These projects, scheduled for completion within five to seven years, intend to develop fully operational geothermal fields capable of generating up to 400 MW of additional renewable baseload power to bolster the Luzon grid.<sup>48</sup>



Picture: First Gen

**Natural gas-fired Power Plants Santa Rita**  
The Santa Rita plant, part of First Gen's Clean Energy Complex in Batangas City, is a 1,000-MW combined-cycle natural gas-fired facility operated by First Gas Power Corporation (FGPC), a subsidiary of First Gen. It began operating in August 2000 and primarily uses natural gas sourced from the Malampaya gas field off Northwest Palawan.

Picture : Offshore Technology

**Malampaya Gas Field**  
 More areas for gas reserves can be developed near existing Malampaya gas field



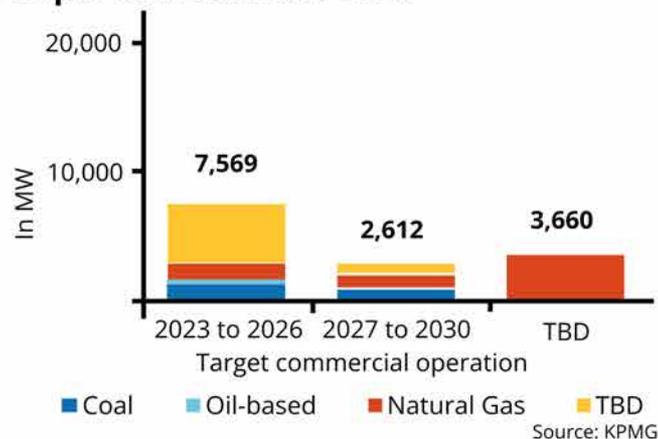
The Philippines will host a green energy auction in 2024. Corio Generation has announced plans to develop as many as five projects, totaling 3 GW in capacity, off the coasts of Cavite, Batangas-Mindoro, Iloilo, and Guimaras. These projects fall under wind energy service contracts that grant exclusive site rights, with a pipeline consisting of 2 GW of fixed-bottom and 1 GW of floating wind projects.<sup>49</sup>

The Hayes Solar Power Project, a 27MW solar PV facility, is planned for development in Northern Mindanao, Philippines. According to GlobalData, the project is currently in the permitting stage and will proceed in a single phase. Construction is projected to be completed by December 2024, after which the project is scheduled to be commissioned.<sup>50</sup>

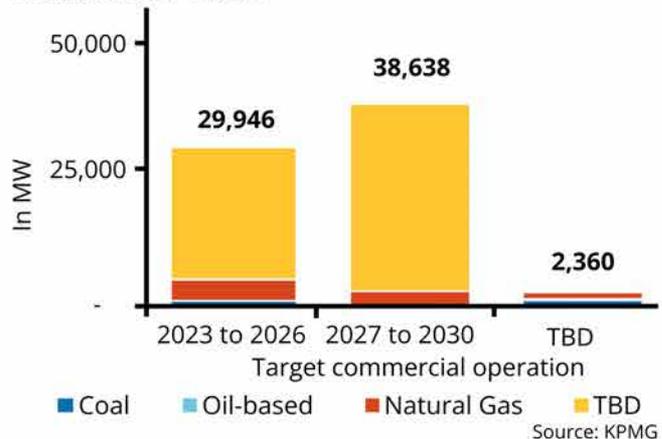
The Department of Energy initiate the second round of the Competitive Selection Process (CSP) for Microgrid System Providers (MGSP). The auction is scheduled to commence in the first week of August 2024. This initiative aims to provide electricity to 41 lots, covering 75 identified areas in the Philippines that currently lack adequate power supply.<sup>51</sup>

According to the DOE, as of 30 November 2023, the private sector has initiated 190 committed projects with 13.8 thousand MW additional capacity, and 369 indicative projects with 70.9 thousand MW additional capacity. In addition, there are currently three (3) public power generation projects initiated by National Economic and Development Authority.<sup>52</sup>

**Committed projects as of 30 November 2023**



**Indicative projects as of 30 November 2023**



## Ministries

### Oil

#### Department of Energy (DOE)

Renewable Energy Act 2008: The Act provides for the overall regulatory framework to promote accelerated advancement of renewable energy resources into useful forms of energy. The Act outlined policy mechanisms, including net metering, feed-in tariff (FIT) system, Renewable Portfolio Standards for on-grid and off-grid areas (RPS), the Green Energy Option Programme (GEOP) and the Renewable Energy Market (REM), among others.

The The Philippine Department of Energy is advancing the country's energy security and sustainability through sectoral energy roadmaps:

1. Upstream Oil and Gas Roadmap 2017-2040
2. Coal Roadmap 2017-2040
3. Downstream Oil Industry Roadmap 2017-2040
4. Downstream Natural Gas Roadmap 2017-2040
5. Electric Power Industry Roadmap 2017-2040
6. Renewable Energy Roadmap 2017-2040
7. Biofuels Roadmap 2017-2040
8. Alternative Fuels and Energy Technologies Roadmap 2017-2040
9. Energy Efficiency & Conservation Roadmap 2023-2050

In 2023, The Philippine Department of Energy introduced its Energy Transition Strategies under the Philippine Energy Plan 2023-2050. The vision is to enhance access to affordable energy, improve reliability and resilience, as well as expand the use of clean and sustainable energy. The energy transition strategies consist of at least four components:

1. Increasing renewable energy in the power generation mix from 32% to 35% by 2030, and further to 50% by 2040
2. Developing a smart and green transmission system
3. Expanding mainstream energy efficiency and conservation efforts
4. Advancing decarbonization in the transport sector through electric vehicles

Key clean energy opportunities within the Philippine Energy Plan 2023-2050 strategies include:

- Renewable Portfolio Standards and Green Energy Auction Program: Aiming for a 1% to 2.52% minimum annual increase in RE.
- this initiative will focus on achieving RE targets and accelerating the deployment of RE projects and clean energy technologies.
- Renewable Energy Investments up to 100% Foreign Ownership: The Philippines now permits up to 100% foreign ownership in RE projects, opening opportunities for geothermal, biomass, solar, wind, ocean, and tidal wave technologies.
- Offshore Wind Development (OSW): This sector will streamline environmental compliance processes for OSW pre-development and exploration activities.
- Smart and Green Grid Plan (SGGP): Rapid expansion of the grid to accommodate new sizeable RE capacity and connect demand centers with new sources of supply. The plan includes creating a third-party grid concession, opening opportunities for advanced transmission and distribution technologies.
- Energy Virtual One-Stop Shop System (EVOSS): Under Republic Act No. 11234, prospective energy companies can apply for, monitor, and receive all necessary permits through the EVOSS online platform.
- Decarbonization of the Transport Sector: Implementation of the Comprehensive Roadmap for the Electric Vehicle (EV) Industry, aiming for a minimum 10% EV share in the vehicle fleet by 2040 under the Business-as-Usual Scenario, and 50% under the Clean Energy Scenario. The government will also establish infrastructure for EVs and formulate policies for the use of sustainable fuels.

As part of the DOE's downstream roadmap, the targets in the long term (2023-2040) include among others:

#### Oil

1. Encourage investments in downstream oil industry.
2. Develop and implement capacity building programs for downstream oil industry

## STAKEHOLDERS

### Natural Gas

- Promote Natural Gas Market Development and Natural Gas Infrastructure Development Program to investors
- Conduct market study/desk research covering areas such as excise tax and incentives, inventory of natural gas technology, and commercial applications, emerging trends, and the impact of natural gas on the economy
- Update the Natural Gas Development Program.
- Conduct study and assessment on potential natural gas projects.<sup>53</sup>

### The Philippine Board of Investment

The Philippine Board of Investments (BOI), an attached agency of the Department of Trade and Industry, is the government agency tasked with promoting investment in the Philippines. The BOI supports both Filipino and foreign investors in terms of due diligence, business registration and facilitation and aftercare service their economic ventures.

The BOI currently chairs both the (Philippine Investment Promotion Plan (PIPP) Steering Committee and the Technical Working Group. In addition to its oversight role, the BOI coordinates the activities of the Investment Promotion Agencies (IPAs) as the PIPP Technical Secretariat. The PIPP is organized into three clusters based on priority industries, geographic locations, and the strengths of each IPA: Manufacturing and Logistics, Tourism, and Agro-Industrial.

The Philippines has a network of 19 IPAs, each tasked with formulating and developing strategies to position the country as a prime destination for investments, offering distinct locational advantages and attractive incentive packages.<sup>54</sup>

## Agencies

### Philippine National Oil Company

The Philippine National Oil Company (PNOC), a state-owned company, was established in 1973 to ensure Philippine's stable oil supply to support the country's economic growth and social well-being. PNOC's current initiatives include managing real estate assets, banked gas, and operating the Energy Supply Base in Batangas and the PNOC Industrial Park in Bataan. Additionally, PNOC is engaged in research to develop energy-related infrastructure projects aimed at achieving energy security and stability.

PNOC currently has 2 subsidiaries working together to realize PNOC's vision: PNOC Exploration Corporation and PNOC Renewables Corporation.

### PNOC Exploration Corporation (PNOC-EC)

PNOC Exploration Corporation is the state-owned Philippine National Oil Company's branch for exploring and producing oil, gas, and coal. Founded on April 20, 1976, PNOC-EC is tasked by the Department of Energy to lead the country's efforts in these sectors. It started trading on the Makati Stock Exchange in 1976 and the Manila Stock Exchange in 1977.<sup>55</sup>

### PNOC Renewables Corporation (PNOC-RC)

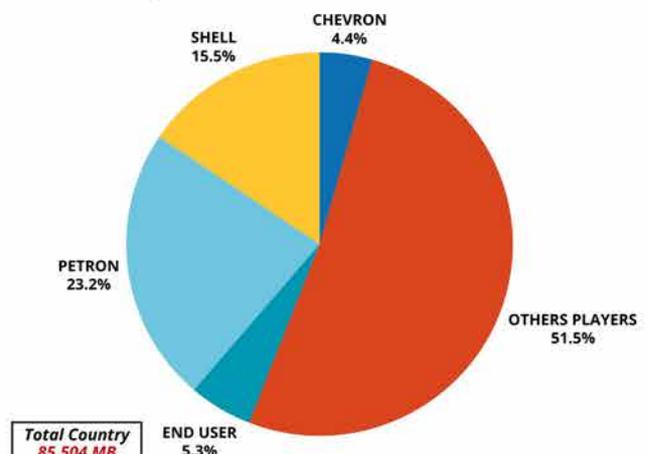
PNOC Renewables Corporation is a fully-owned subsidiary of the Philippine National Oil Company, established on March 7, 2008. As the newest member of the PNOC family, its main goal is to lead the charge in promoting and developing renewable energy sources across the country.



Source: PNOC

Major oil companies (Petron Corp., Chevron and Pilipinas Shell Petroleum Corp.) got the 43.13% market share of the total demand while other oil industry players including Seaoil, Insular, Unioil, Phoenix, Liguigaz, SL Harbor, South Pacific, Jetty, Pryce Gas, FLC, TPC, Isla LPG, TWA, PTT, Trafigura, Marubeni, Apex, Goldenshare, Peak Fuel, Petrotrade, Era1, Warbucks Industries, Micro Dragon, Warbucks Southern Corp., Power Fill, Lubwell, Eastern, and others, as well as the end-users who imported directly for own requirement, captured 56.87% of the market.<sup>56</sup>

### YTD June 2023 Total Petroleum Products Market 13,595.20 Million Liters



\*Excluding butane gas in canisters  
Data is as of October 16, 2023

Source: Oil Supply/Demand Report, 2023

The Philippine Government has issued several Supporting policy mechanisms to create enabling environment for robust renewable energy market, such as: renewable energy portfolio standards (RPS), net metering, green energy option (GEOP)/auction programs (GEAP), and the renewable energy market (REM) trading system. In addition, To accelerate renewable energy investments, the Philippine Government has allowed 100% foreign ownership of RE projects.<sup>57</sup>

The Department of Energy (DOE) prioritizes Building port infrastructure and policies to support offshore wind development. In 2023, DOE released the policy and administrative framework for offshore wind energy projects to accelerate the development of this sector. It directs permitting agencies to remove duplications and overlapping permit,; simplify application forms, processes, and requirements; reduce signatories and documentary requirements; review and rationalize fees and charges; ensure compliance with the time frames for issuance of permits prescribed by law; and automate the process through the Energy Virtual One-Stop Shop (EVOSS) System.<sup>58</sup>

By April 2024, the DOE has awarded 92 offshore Wind Energy Service Contracts (WESC), representing a total potential capacity of nearly 65 gigawatts. This indicates a growing interest in the rapidly developing Philippine offshore wind market.<sup>59</sup>

In 2023-2024, the Philippines has actively pursued joint ventures to enhance its oil infrastructure. The National Economic and Development Authority (NEDA) revised guidelines to improve competition and efficiency in joint ventures between the government and private entities. A notable project includes the partnership between Phoenix Petroleum and China National Offshore Oil Corporation (CNOOC) to develop a liquefied natural gas (LNG) terminal worth \$2 billion. This facility aims to support the country's energy security and diversify its energy mix.<sup>60</sup>

By creating a more favorable environment for joint ventures, the Philippines can attract both local and foreign investments. Collaborating with private entities often brings in advanced technologies and practices that can improve operational efficiency and environmental sustainability.



#### The Batangas Bay LNG Terminal

The Philippines LNG (PHLNG) terminal, developed by Atlantic Gulf & Pacific Company (AG&P), began operations in April 2023. This facility is the first LNG import terminal in the Philippines and has an initial capacity of 5 million tonnes per annum (MTPA). The terminal features a floating storage unit (FSU), which is capable of storing 137,500 cubic meters of LNG and was chartered from ADNOC Logistics and Services for up to 15 years. An FSRU (Floating Storage and Regasification Unit) is a floating vessel used to store liquefied natural gas (LNG), regasify it onboard, and then distribute the natural gas to shore via pipelines. It serves as an alternative to traditional onshore LNG import terminals, providing flexibility and faster deployment.

Picture : AG&P LNG

# SINGAPORE

## Country Key Highlights

### Government/ Political System

'Soft authoritarianism' or a limited democracy with only one ruling political party.<sup>1</sup>

### Demography

6,052,709 in 2024 a 0.63% increase from 2023.<sup>2</sup>

### GDP and Percentage From O&G

673.3 billion US dollars in 2023.<sup>3</sup>

The y-o-y growth at 1.1%.<sup>4</sup>

5% of Singapore's GDP is from Oil Industries.<sup>5</sup>

### GDP Per Capita

65,422.46 US dollars in 2023.<sup>6</sup>

### Reserves

Singapore has no proven oil or gas reserves.<sup>7</sup>

### Oil & Gas Production

Singapore has no hydrocarbon resources and imports crude oil for its refining and petrochemical industries. Over two-thirds of Singapore's crude oil imports come from the United Arab Emirates, Qatar, Saudi Arabia, and Kuwait.<sup>8</sup>

### Refining Capacity

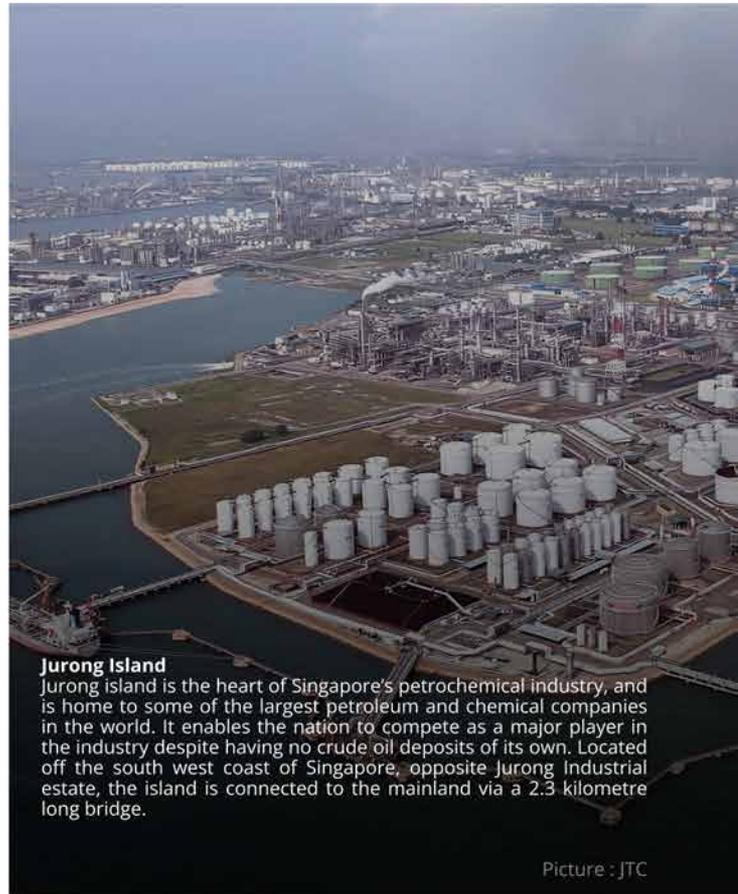
1.302M barrels/day for 2023.<sup>9</sup>

### Domestic Demand

1.359 million barrels/day in 2023.<sup>10</sup>

### Upstream Fiscal Term

Free and liberal nature.<sup>11</sup>



### Jurong Island

Jurong island is the heart of Singapore's petrochemical industry, and is home to some of the largest petroleum and chemical companies in the world. It enables the nation to compete as a major player in the industry despite having no crude oil deposits of its own. Located off the south west coast of Singapore, opposite Jurong Industrial estate, the island is connected to the mainland via a 2.3 kilometre long bridge.

Picture : JTC

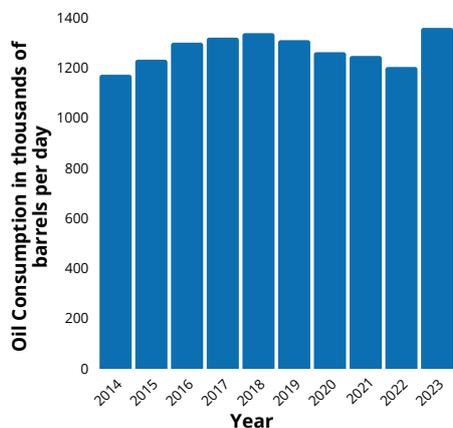


Picture: Shutterstock/photographics

# Energy Demand

## Oil

### Oil consumption in Singapore from 2014 to 2023



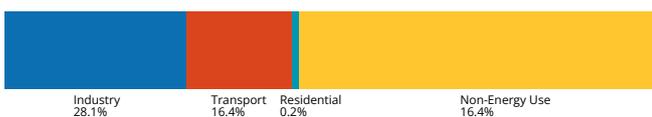
Source: statista

In 2023, approximately 1.36 million barrels of oil were consumed daily in Singapore. The values provided are measured in thousands of barrels a day.<sup>12</sup>

In 2022, Singapore imported 145.3 Mtoe of energy products, 2.8% lower than 2021. But, the major share of Singapore’s energy imports continued to be in the form of Petroleum Products (58.1 %).<sup>13</sup>

Petroleum and other liquids represent 86% of Singapore’s primary energy consumption, followed by natural gas at 13%.<sup>14</sup>

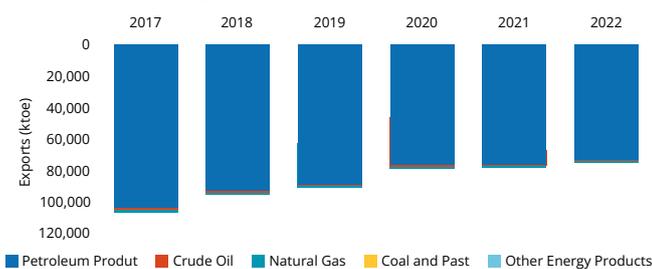
### Oil products final consumption by sector, Singapore, 2021



Source: International Energy Agency

Oil products dominated the nation’s energy demand at 66%. Most of Singapore’s oil products were utilized for the industries. Most of the society utilize the Naphtha (50% of the oil products demand), followed by gas/diesel and motor gasoline.<sup>15</sup>

### Exports of Energy Products



Source: Energy Market Authority of Singapore



**Exxon Refinery**  
The ExxonMobil Singapore refinery is the seventh largest refinery in the world. The refinery has a processing capacity of about 592,000bpd. It has two operating sites located at Jurong on the mainland and Pulau Ayer Chawan (PAC) on Jurong Island in Singapore. The Jurong mainland site has a processing capacity of 302,000bpd, whereas the PAC site has 290,000bpd of capacity.

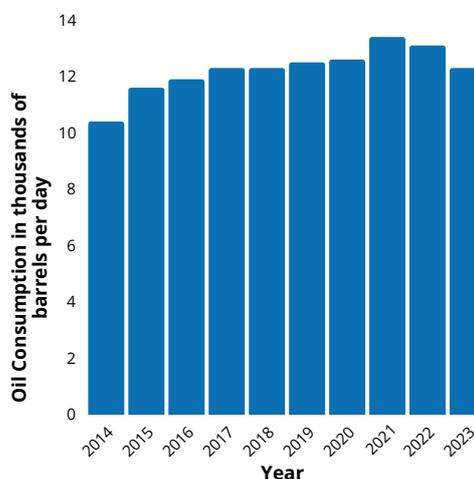
Picture : Hydrocarbons Technology

In addition to the domestic demand, Singapore’s oil products are allocated for exports. In 2022, approximately 72,000 ktoe oil products were exported. The total exports was worth \$62.9B in Refined Petroleum.<sup>16</sup>

Refined Petroleum was the 2nd most exported product in Singapore. The main destinations of Refined Petroleum exports from Singapore are mostly Southeast Asia Countries and the neighbourhood : Malaysia (\$11.2B), Australia (\$10.4B), Indonesia (\$9.29B), Burma (\$3.55B), and Bangladesh (\$2.45B).<sup>17</sup>

## Gas

### Oil consumption in Singapore from 2014 to 2023



Source: statista

In 2023, natural gas consumption reached a record high in Singapore, with about 12.3 billion cubic meters consumed, a decrease of 0.8 billion cubic meters from the previous year. This value increased steadily over the period measured.<sup>18</sup>

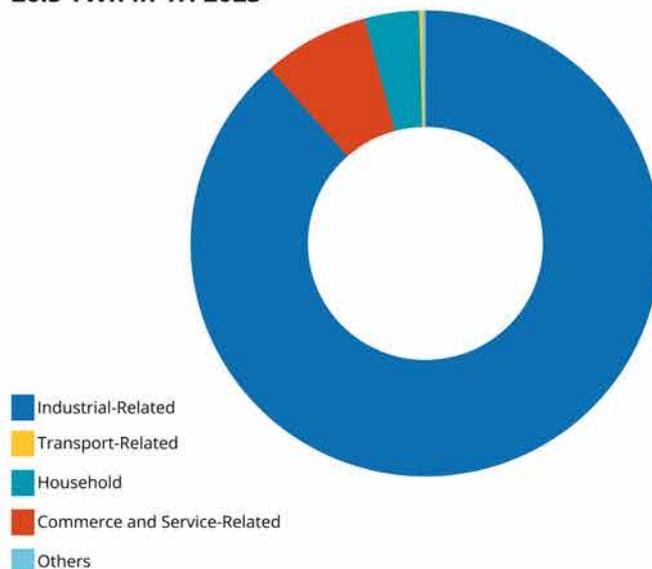
Among other emerging alternative marine fuels, demand for liquefied natural gas (LNG) touched the record highest at 26,900t as key players have explored the option of bunkering LNG in Singapore in the first quarter of 2024.<sup>19</sup>

Singapore receives natural gas via pipelines from neighboring Malaysia and Indonesia. It also imports liquefied natural gas (LNG) from Australia, the United States, Qatar, and Angola, among other countries.<sup>20</sup>

In 2020, LNG imports from Australia and the United States accounted for almost 70% of total LNG imports to Singapore.<sup>21</sup>

Singapore's government has promoted the use of natural gas for several years. Since 2005, many retired oil-fired electric power generators have been replaced with natural gas-fired generators. In 2020, Singapore consumed 445 billion cubic feet (Bcf) of natural gas.<sup>22</sup>

**Overall Electricity Consumption:  
26.5 TWh in 1H 2023**



Source: Energy Market Authority of Singapore

In 2022, Singapore's demand for natural gas almost reached 73,000 TJ.<sup>23</sup>



**The First Ship-to-Containership Liquefied Natural Gas (LNG) Bunkering Operation**

The first ship-to-containership Liquefied Natural Gas (LNG) bunkering operation in Asia was undertaken by CMA CGM, a world leader in shipping and logistics, and FueLNG, a joint venture between Keppel Offshore & Marine Ltd (Keppel O&M) and Shell Eastern Petroleum (Pte) Ltd, and the Maritime and Port Authority of Singapore (MPA). A containership, CMA CGM SCANDOLA, has been fuelled with 7,100m<sup>3</sup> of LNG from FueLNG Bellina, Singapore's first LNG bunkering vessel.

Picture: Indonesia Shipping Gazette

# Energy Supply

## Oil

Since there are no available oil and gas fields, Singapore has no domestic production.<sup>24</sup>

Lacking domestic sources of energy, Singaporean companies are active in overseas exploration and production. SPC owns assets in:

- a. The South China Sea's Song Hong Basin and the Gulf of Tonkin.
- b. SPC also has working interests in various production-sharing contracts (PSCs) in East Java and the West Natuna Sea.<sup>25</sup>

SPC's automotive diesel oil and gasoline powers the fleets of transportation companies, government agencies and support power stations' requirements. The automotive diesel oil and gasoline is also used by the industrial, construction, and manufacturing sectors' for their plant and machinery operations.

SPC's marine gas oil is typically sold on an ex-wharf basis to barging companies and on a delivered basis to offshore islands.

When it comes to road building, SPC's asphalt/bitumen is supplied by bulk to leading premix companies and blend mainly for road paving purpose. It is also sold ex-gate in bitu-container for export.<sup>26</sup>

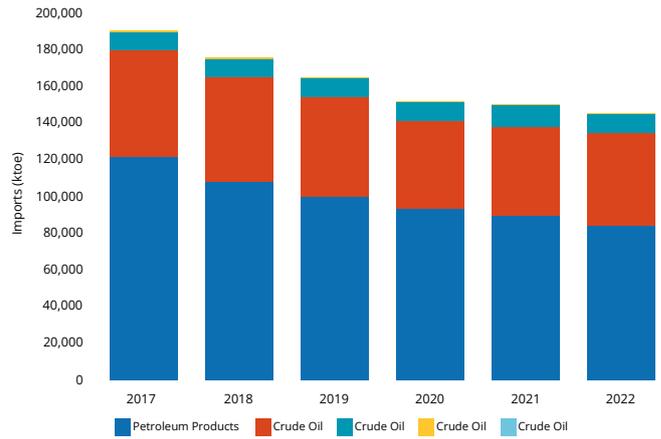
Singapore has also continued to invest in storage facilities to ensure the future supply. Storage capacity was around 55 million barrels and kept increasing. The country's largest oil storage facility is located on Jurong Island and can store about 17 million barrels. The government also maintains strategic petroleum reserves of about 32 million barrels of crude oil and 65 million barrels of refined petroleum products.<sup>27</sup>

In ensuring the domestic supply, oil from the United Arab Emirates, Saudi Arabia, and Qatar accounts for over 50 percent of Singapore's crude imports.

Despite having no O&G resources of our own, Singapore is Asia's top petrochemicals hub and one of the world's top 3 export refining centres. As a premier financial and supply-chain hub with world-class logistics infrastructure, we fully support the business and HQ functions of O&G firms based here. We continue to enhance our infrastructure, such as building a LNG terminal, with a second one being considered.

Picture : Singapore Economic Development Board (EDB)

## Imports of Energy Products<sup>28</sup>



Source: Energy Market Authority of Singapore

While the amount started to decrease, Singapore remains reliant on its energy supply from energy imports.<sup>29</sup>

## Gas

Singapore's dependence on natural gas imports is significant, as the country requires a steady supply of natural gas to meet its energy needs. Liquid natural gas (LNG) has emerged as a promising alternative for power generation.<sup>30</sup>

Piped natural gas imported from neighboring countries i.e. such as Indonesia and Malaysia, makes up a significant portion of Singapore's natural gas supply.<sup>31</sup>

After several natural gas pipeline import contracts expire in 2024, Singapore plans to import LNG to meet all of its natural gas demand. The government appointed ExxonMobil LNG Asia Pacific, Sembcorp Fuels (Singapore), Pavilion Energy Singapore, and Shell Eastern Trading as term LNG importers to import and sell LNG in Singapore.<sup>32</sup>

Imported crude goes mostly to the petrochemicals and refining sector. Imported natural gas fuels most of Singapore's power generation, with small amounts of coal and renewable resources fueling the rest.

## Evolution of Gas Supply, Singapore<sup>33</sup>



Source: U.S. Energy Information Administration

Natural Gas imports totalled 10.5 Mtoe in 2022, with the bulk comprising Piped Natural Gas (6.4 Mtoe). The amount of Natural Gas imports decreased by 0.8% in 2022. While the amount of Pipeline Natural Gas imported decreased by 13.0%, the amount of Liquefied Natural Gas increased by 27.0%.<sup>34</sup>

In 2021, there was a net stock draw of 750.6 ktoe of total energy products. Stock draw in 2021 comprised Natural Gas Liquids (440.7 ktoe) and Petroleum Products (470.3 ktoe). On the other hand, there was a stock build of Natural Gas (160.4 ktoe).<sup>35</sup>

The total Natural Gas supply in Singapore was 433,526.0 TJ in 2022. This was contributed by an import of 441,376.3 TJ of Natural Gas into Singapore and a stock build of 7,850.3 TJ from the inventory.<sup>36</sup>

About 366,398.2 TJ of Natural Gas, representing 84.5% of total Natural Gas supply, was used for power generation in 2022. Another 72,881.2 TJ of Natural Gas, which included Town Gas, was consumed directly by end-consumers.<sup>37</sup>

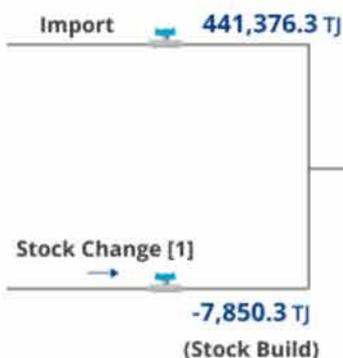


**Singapore LNG Corporation (SLNG) Small Scale**  
Singapore LNG Corporation (SLNG) has successfully performed its first small-scale LNG reload at its terminal on Jurong Island in 2017. The operation was carried out for the newly built, 6,500 cubic meter Cardissa, an LNG bunker vessel. The 120-meter (394-foot) Cardissa is owned by Shell and co-financed by the European Union's Connecting Europe Facility that will serve customers in Northwest Europe.

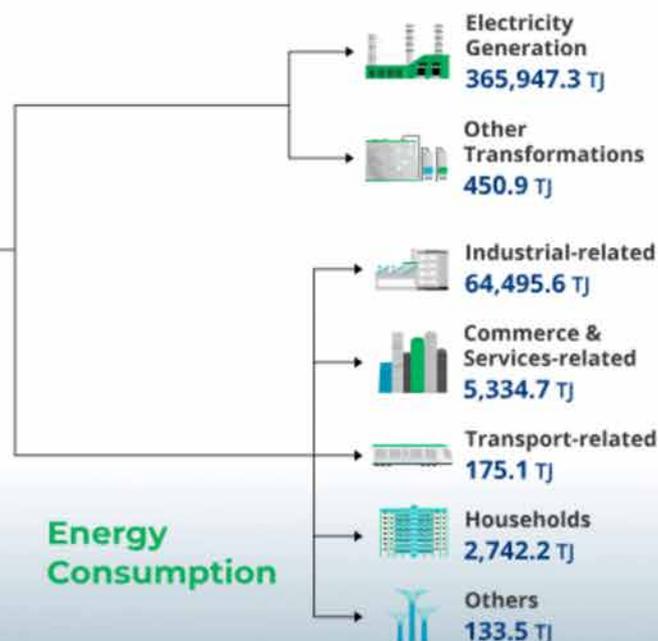
Picture : Singapore LNG Corporation Pte Ltd

**Natural Gas Balance**

**Energy Supply**



**Energy Transformation**



**Energy Consumption**

Source: Energy Market Authority of Singapore

According to Energy Market Authority, the largest consumer of energy in Singapore is the Industrial sector at 41.3% with natural gas as the main source of energy at 90.3%, consuming a total of 21.0 TWh in 2020. In the first half of 2021, the total energy consumption is 10.8 TWh. Should this trend continue to rise, Singapore's Industrial sector will see a growth of up to 2% each year. A report from the Ministry of Trade and Industry stated that manufacturers in Singapore saw an increase in energy costs in 2021, and is likely going to continue to rise from 2022 onwards. With these numbers in mind, is your manufacturing facility taking the right steps to be more energy- and cost-efficient? Here are 5 ways your industrial business can save on energy consumption and cost.

Picture : GasHub



#### Singapore LNG Corporation Pte Ltd (SLNG)

Singapore LNG Corporation Pte Ltd (SLNG) was incorporated in June 2009 to develop, build, own and operate Singapore's first LNG (Liquefied Natural Gas) Terminal on Jurong Island. This is a key national infrastructure that supports Singapore's energy diversification strategy and future economic development in the energy sector. The Terminal began commercial operations on 7 May 2013, and currently operates with three storage tanks, two jetties and a throughput capacity of 6 Mtpa.

Picture : The Business Times

## Overall Energy Outlook

Singapore's clean energy transition hinges on regional collaboration in power grids and diversified renewable energy imports.<sup>38</sup>

Currently, renewables account for about 5% of Singapore's total electricity generation, with solar power being the main contributor. Singapore has set an ambitious target to increase its renewable energy capacity to at least 2 gigawatts peak by 2030.<sup>39</sup>

Solar power is being brought into Singapore's energy mix. With a total expected solar capacity of around 2 GW by 2030, Singapore is seriously rethinking its electricity generation and is moving towards renewable energy options.<sup>40</sup>

Singapore aims to connect with regional power grids to access cost-effective clean energy.<sup>41</sup>

Singapore also plans to develop hard-to-decarbonise industries which will harness carbon capture and storage/utilisation (CCSU) technologies to meet greenhouse gas emissions targets.<sup>42</sup>

Singapore believes that low-carbon hydrogen has the potential to be a major decarbonisation pathway to support the country's transition towards net zero by 2050. Hydrogen can potentially complement and diversify Singapore's power mix, supplying up to half of Singapore's power needs by 2050.<sup>43</sup>

Besides domestic emissions, low-carbon hydrogen and hydrogen-derived fuels are potential alternatives to fossil fuels in the maritime and aviation sectors.<sup>44</sup>

## Oil

The petrochemical sector plays a key role in Singapore's \$300 billion economy. But as the country has no natural resources to speak of, this income is not generated through oil itself, but through its processing and refinement.<sup>45</sup>

Singapore's petroleum refining, storage, and distribution infrastructure is key to global energy trade. Jurong Island is home to over 100 international petroleum, petrochemical, and chemical companies.<sup>46</sup>

The refining and petrochemicals industry is critical to Singapore's economy, which continues to benefit from strong growth in regional demand for petroleum products.<sup>47</sup>

Almost 90 percent of Singapore's primary energy consumption comes from petroleum use, mostly for refining.<sup>48</sup>

Singapore has a total crude oil refining capacity of 1.5 million barrels per day (bbl/d). Its three main refineries:

- a. ExxonMobil's 605,000-bbl/d refinery at Pulau Ayer Chawan.
- b. Royal Dutch/Shell's 500,000-bbl/d refinery on Pulau Bukom.
- c. the Singapore Refining Company's 290,000-bbl/d refinery on Pulau Merlimau.<sup>49</sup>

## Gas

In Singapore, there are two distinct gas pipeline networks – one for town gas and another for natural gas.<sup>50</sup>

Town gas, produced by City Energy Pte Ltd, is mainly used by residential and commercial customers for cooking and heating purposes. Natural gas, on the other hand, is mainly used for power generation and industrial feedstock and is imported through licensed gas importers.<sup>51</sup>

PowerGas, as the licensed gas importer, owns the town gas and natural gas pipelines. It is responsible for transporting both types of gas to consumers who purchase gas from gas shippers and retailers.<sup>52</sup>

## Other Energy Sources

Singapore aims to deploy at least 2 gigawatt-peak of solar energy by 2030. This is equivalent to powering about 350,000 households for a year.<sup>53</sup>

Solar deployment in Singapore grew significantly over the years, surpassing 1 GWp of solar installed capacity in the first half of 2023. Grid-connected installed capacity increased from 126.0 MWp in 2016 to 1005.7 MWp in the first half of 2023. Singapore is on track to meet 1.5 GWp of solar deployment by 2025, and at least 2 GWp by 2030.<sup>54</sup>

### Solar Installations by Planning Region



Source: Energy Market Authority of Singapore

## Oil

The country is the fifth-largest refinery and export hub in the world and among the top 10 exporters of petrochemicals.<sup>55</sup>

Following a completed upgrade to the production of EHC™ Group II base stocks, ExxonMobil is now investing in a multi-billion dollar expansion of its Singapore refinery in Jurong. The upgrade is set to further enhance the competitiveness of the Singapore facility, adding 20,000 barrels per day (bpd) to ExxonMobil Group II base stocks and 48,000 bpd of capacity to produce lower-sulfur fuels, allowing the company to meet increasing demand within the Asia-Pacific region.<sup>56</sup>

Following the ceremonious launch of the Liza Destiny FPSO (Floating Production and Offloading) from Keppel's Singapore yard, ExxonMobil is already developing the second phase of the project for offshore Guyana.<sup>57</sup>

Another exciting oil project headed by ExxonMobil and Hess Corporation, 'Liza Phase 2' will produce up to 220,000 barrels of oil per day and further capitalize on the noteworthy potential of the Stabroek Block in Guyana, where ExxonMobil has estimated it will be producing more than 750,000 barrels of oil per day by 2025.<sup>58</sup>

At the end of 2018, Neste announced its decision to expand the Singapore refinery. The expanded refinery increases the Singapore refinery's total production capacity to 2.6 million tons annually, including up to 1 million tons of sustainable aviation fuel and will have its own hydrogen production unit. The successful Singapore Expansion Project makes our Singapore refinery the world's biggest renewable diesel refinery, as well as the world's largest producer of sustainable aviation fuel, in terms of capacity.<sup>59</sup>

The Project of Singapore Resid Upgrade: The demand for high-quality lubricants in the automotive and industrial sectors is on the rise worldwide, especially in the Asia-Pacific region. Therefore, ExxonMobil is increasing production capacity at its integrated manufacturing complex in Singapore by an additional 20,000 barrels of base stocks per day.<sup>60</sup>

Catalysts play a critical role in the base stock manufacturing process, enabling the reactors to convert bottom-of-the-barrel fuels into higher-value products, like low-sulfur diesel and EHC

50, EHC 120 and EHC 340 MAX base stocks. Preparation work for catalyst loading is underway.<sup>61</sup>

## Gas

Energiean's latest Floating Production Storage and Offloading (FPSO) unit is being developed in Singapore before sailing to their Karish and Tanin development in Israel.

The large-scale FPSO will have a gas treatment capacity of 800 MMscf/day (8 BCM/per annum) and liquids storage capacity of 800,000 bbls. The new-build unit is based on an existing design and will utilise a spread mooring system to reduce technical risks on the field.<sup>62</sup>

Liza Phase 2 will also have associated gas treatment capacity of 400 million cubic feet per day and water injection capacity of 250,000 barrels per day. Similarly to the Karish-Tanin FPSO, Liza Phase 2 will be spread moored in water with depth of about 1,600 meters and will be able to store up to 2 million barrels of crude oil.<sup>63</sup>

Singapore aims to have a second liquefied natural gas (LNG) terminal operational by the end of the decade. SLNG is studying the possibility of having the terminal on an LNG ship, unlike the current one, which is an onshore terminal.<sup>64</sup>

Japan's power generation company JERA, a joint venture of two major Japanese electric power companies, TEPCO Fuel & Power Incorporated and Chubu Electric Power Company, has signed a memorandum of understanding (MoU) with Singapore's Energy Market Authority (EMA) to cooperate on areas in liquefied natural gas (LNG) procurement and supply chains.<sup>65</sup>

Singapore aims to strengthen its role in LNG Value Chain by:

- a. Engaging many major international companies such as BP, Diamond Gas, ExxonMobil and Jera. Their traders manage these companies' entire global LNG trading activities from Singapore, while facilitating LNG trade from the city-state to other markets including Australia, China, Japan, Korea, and the US.
- b. Developing manpower initiatives to build our pool of local expertise to support LNG trade. For example, the Leadership Development Initiative for LNG professionals. This will enable them to join the trading desks of LNG companies such as Chevron and TotalEnergies.<sup>66</sup>

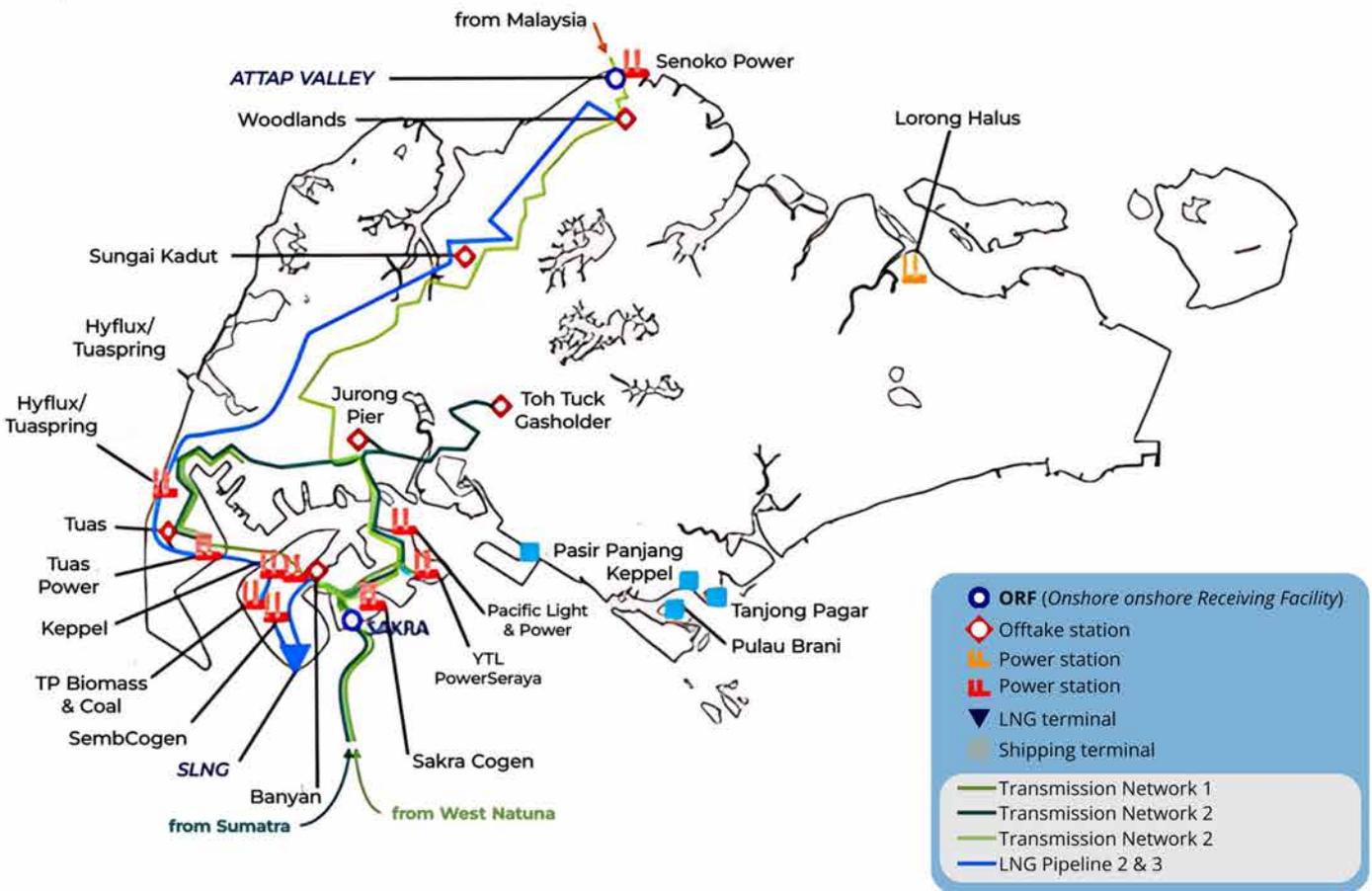
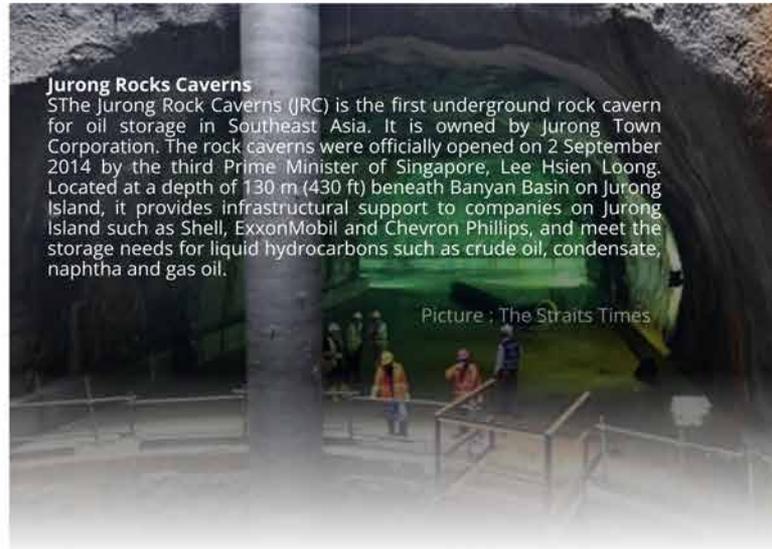


SLNG To Develop, Own And Operate Second LNG Terminal In Singapore AS It Marks 10 Years Of Commercial Operations

Picture: SLNG

Singapore plans the investment in a new floating storage and regasification unit (FSRU). FSRU is driven by the need to address supply disruptions from potential loss of pipeline gas imports from Malaysia and Indonesia. The new project is expected to offer Singapore the flexibility to deploy the FSRU closer to consumers and allow SLNG to cater to the burgeoning LNG bunkering business, and also enhance its re-exports to regional markets as export volumes to neighbouring countries such as Malaysia remain low.<sup>67</sup>

The Singapore government plans to establish a single gas buying entity – Gasco – in 2024 to help centralise purchases in the power sector to protect against future gas supply shortfalls and volatile electricity prices. The plan was in response to record global gas prices in 2022, which led to a decline in LNG imports due to an aversion to costly gas purchases by utility companies.<sup>68</sup>



source: Gas Supply Pte Ltd

Piped Natural Gas (PNG) is imported into Singapore from South Sumatra and West Natuna in Indonesia and from Malaysia via offshore pipelines. PNG from Indonesia is injected into Singapore’s gas network via Sakra Onshore Receiving Facility while PNG from Malaysia is injected via Attap Valley Onshore Receiving Facility. Liquefied natural gas (LNG) is imported into Singapore from diverse sources. Singapore LNG Terminal provides storage of LNG and injects regasified LNG into Singapore’s gas network.<sup>69</sup>

The Singapore LNG Terminal serves as the primary hub for LNG importation. It provides storage for LNG and is equipped with regasification facilities to convert LNG back into gas for distribution. Once regasified, LNG is injected into Singapore’s gas network, supplying natural gas to power plants, industries, and residential consumers.

## Other Energy Sources

Neste Singapore biofuel refinery extending their existing facility within the Tuas industrial area, Neste is investing 1.5 billion dollars (1.4b euros) in growing the facility to enhance their biofuel refinery capabilities. Neste's Singapore refinery currently produces the world's cleanest renewable diesel, providing up to 90% lower GHG emissions compared to conventional diesel over its life cycle.<sup>70</sup>

In 2022, the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP) was ready to apply, transferring 100 MW of hydroelectricity from Laos through Thailand and Malaysia into Singapore using existing infrastructure. The agreement runs till 2024, after which energy trade may be increased to 300MW and the agreement's term extended from two to five years.<sup>71</sup>

SunCable's flagship development project, Australia-Asia PowerLink (AAPowerLink), will harness and store renewable energy from one of the most reliably sunny places – Australia's Northern Territory – for 24/7 transmission to Darwin and Singapore via a high voltage direct current (HVDC) transmission system.<sup>72</sup>

A 2022 study by Singapore's Energy 2050 Committee explored various scenarios for Singapore's energy future, all of which included electricity imports from other countries in the Association of Southeast Asian Nations (ASEAN). Through regional power trade, Singapore has an opportunity to drive positive change by ensuring its electricity imports are not only low or zero carbon, but also that they exclude other avoidable environmental impacts.<sup>73</sup>



source: SunCable

Singapore has a set target of 4,000 MW of electricity imports by 2035 and has signed memorandums of understanding (MOUs) with Malaysia, Thailand, Laos, Indonesia, Cambodia, and Vietnam, which are more than sufficient to meet that.<sup>74</sup>

Keppel Infrastructure has signed agreements to explore expanding the Monsoon Wind Power Project in southern Laos by 1,000 MW for potential export to Singapore within the scheme of LTMS-PIP. However, the actual route that this power would take is unclear—it could be sent via LTMS-PIP, assuming that Thailand is willing to consider cross-border wind electricity trade, or through new transmission lines.<sup>75</sup>

Singapore has granted conditional approval to 4,200 MW of projects in Cambodia, Indonesia, and Vietnam to meet its current target, all of which will require undersea cables. These would allow for more distant connections and avoid reliance on neighboring grids and the single interconnection with Malaysia.<sup>76</sup>

In March 2023, they signed a MOU on renewable energy as the basis for collaboration on solar, hydrogen/ammonia, and battery energy storage with a view to electricity export to Singapore.<sup>40</sup> And in September 2023, Singapore and Indonesia signed an MOU on electricity trade with direct reference to EMA's conditional approval for five specific projects in Indonesia to sell 2 GW of low-carbon electricity to Singapore.<sup>77</sup>

**Power Imports to Singapore**

Singapore has a target to import 4 GW of power from around the region by 2035. The Energy Market Authority of Singapore has granted conditional approval to imports from Cambodia, Vietnam, and Indonesia, but there are numerous proposals for additional projects and expansions which are still under consideration. The markers are scaled based on projected power.

**Map Key**

- ⚡ Ongoing Power Trade
- Conditional Approval
- ⊕ Proposed Project
- Solar
- Mixed Green Energy
- Hydropower
- Wind



Source: Stimson

### Ministries

Ministry of Trade and Industry (MTI) Energy Division is responsible for formulating Singapore's energy policies and strategies to ensure a reliable, affordable and environmentally sustainable energy future. This includes working closely with the Energy Market Authority, other Government agencies, academics and private sector stakeholders to develop and maintain competitive energy markets, drive the development and deployment of solar and other alternative sources of energy, and promote international and regional cooperation.<sup>78</sup>

- Singapore further liberalized its gas market with the amendment of the Gas Act and implementation of a Gas Network Code in 2008, which were designed to give gas retailers and importers direct access to the onshore gas pipeline infrastructure. However, key parts of the local gas market, such as town gas retailing and gas transportation through pipelines remain controlled by incumbent Singaporean firms.

- Singapore announced in October 2022 that it would launch its national hydrogen strategy with a focus on using low-carbon hydrogen as a decarbonization solution. Singapore intends to use hydrogen to decarbonize sectors that could not be easily electrified, such as using hydrogen as a feedstock in semiconductor plants and petrochemical processes or producing low-carbon sustainable fuels in the maritime and aviation sectors.
- Singapore introduced a new investment screening mechanism in November 2023 that empowers the Ministry of Trade and Industry to designate entities as critical to national security interests. Designated entities have to seek the Trade and Industry Minister's approval for purchases or sales of controlling stakes in the entities and appointment of key officers if such changes exceed certain thresholds. The new mechanism complements and mirrors existing powers the authorities have over entities in sectors covered by prior legislation, such as in the banking and telecommunications sectors.<sup>79</sup>

#### Banyan Terminal in Singapore

Singapore LNG Corporation (SLNG) Small Scale Singapore LNG Corporation (SLNG) has successfully performed its first small-scale LNG reload at its terminal on Jurong Island in 2017. The operation was carried out for the newly built, 6,500 cubic meter Cardissa, an LNG bunker vessel. The 120-meter (394-foot) Cardissa is owned by Shell and co-financed by the European Union's Connecting Europe Facility that will serve customers in Northwest Europe.

Picture : vopak



### Floating Energy Storage System (ESS)

Seatrium Limited (SEAT,SI) has installed a floating Energy Storage System (ESS) in Singapore, which is expected to commence operations by Q1 2024. The storage system was developed in partnership with Singapore's Energy Market Authority (EMA) and this is the first floating and stacked ESS in Southeast Asia. The ESS will operate as an energy reservoir by capturing the surplus energy during low demand and releasing it during peak power consumption periods. The facility has a maximum storage capacity of 7.5 MWh and can meet the electricity needs of more than 600 four-room HDB households in a day in the country.

Picture - Southeast Asia Infrastructure

## Agencies

Energy Market Authority (EMA) regulates Singapore's electricity, gas industries and district cooling services to ensure fair competition and protect consumers' interests.

The EMA lays out "Four Switches" in its 2019-2020 annual report to respond to climate change and energy security needs:

1. domestic renewable energy buildout;
2. electricity imports from neighbors through a regional power grid;
3. diversification and cleaning of the natural gas supply via carbon capture ;
4. low-carbon alternatives including hydrogen. The latter two are longer-term efforts, but the first two are already shaping regional energy dialogues.<sup>80</sup>

The National Environment Agency (NEA) actively promotes energy efficiency in the industrial, household, and public sectors through legislation, incentives, and public education.<sup>81</sup>

Several Oil and Gas Companies in Singapore:

- ExxonMobil – Jurong Island Refinery (Revenue = USD 9.4 Billion): One of the largest refining facilities in the country is the Singapore Refinery, located on Jurong Island.

- Singapore Petroleum Company (Revenue = USD 26 Million): Singapore Petroleum Company is investing heavily in the oil and gas exploration, refining, storage and transportation of petroleum products. As a result, it owns a 50% share in a refinery with a capacity of 290,000 barrels per day.
- Shell – Pulau Bukom Refinery (Revenue = USD 133 Billion): The Pulau Bukom Refinery was constructed in 1961 as Singapore's first petroleum refinery. Currently, it is owned by Royal Dutch Shell and is the company's only major energy and chemical facility in Asia.
- Trafigura Pte Ltd (Revenue = USD 147 Billion): Trafigura is a Singapore-based multinational commodity trading company. Overall, it facilitates the trade of petroleum products, from production companies to distribution networks.
- City Energy (Revenue = USD 10 to 100 Million): City Energy provides several energy solutions for Singaporean residents – from natural gas for home heating to EV charging stations. For this reason, the company is focused on good energy.
- PetChem (Revenue = USD 8 Million): PetChem is a Singapore-based trading company that deals heavily in fossil fuel transport and sale. Above all, they focus on the Asian market and have a presence in Vietnam, Cambodia, Thailand, Philippines, Indonesia and China.<sup>82</sup>

## INSIGHT

Singapore has become one of the most important shipping centers in Asia and is often listed as one of the world's top three oil trading and refining hubs with a total crude oil refining capacity of 1.5 million barrels per day (bbl/d).<sup>83</sup>

Jurong Island is home to over 100 international petroleum, petrochemical, and chemical companies. Singapore is a leading manufacturer and operator of advanced floating production, storage, and offloading (FPSOs) conversions and jack-up rigs, which are autonomous offshore drilling rigs attached to a barge.<sup>84</sup>

Most of Singapore's refined petroleum products and petrochemical exports are destined for neighboring Asian countries. Malaysia, Indonesia, Australia, and China together account for nearly 60% of refined petroleum product exports, and China, Indonesia, India, Malaysia, Thailand, and Vietnam are the top destinations for Singapore's petrochemical exports.<sup>85</sup>

The Sustainable Energy Association of Singapore (SEAS) is a non-government and non-profit business association that represents the interests and provides a common platform for companies in Sustainable Energy sector to meet, discuss, collaborate and undertake viable projects together.<sup>86</sup>

The Government of Singapore has announced plans to build two additional hydrogen-ready natural gas power plants by 2030. The Energy Market Authority (EMA) invited the private sector to build, own, and operate these plants, which are expected to be operational by 2029 and 2030. Each plant will have a capacity of at least 600 MW, capable of powering around 864,000 four-room flats annually.<sup>87</sup>

Hydrogen Initiative follows that the YTL PowerSeraya will construct a USD800 million power plant on Jurong Island, set to be operational by 2027 with the capacity to use up to 30 per cent hydrogen. Additionally, Keppel is building the Keppel Sakra Cogen Plant on Jurong Island, which is expected to be completed by the first half of 2026.<sup>88</sup>

As part of the Trade 2030 strategy announced by the Ministry of Trade and Industry in 2022, Singapore will continue to deepen and widen its energy trade. The ambition is to double offshore trade to US\$2 trillion by 2030; growing the energy-trading sector will contribute to this goal. LNG trade is a major component of Singapore's total energy trade, with trade volumes here almost doubling between 2018 and 2022.<sup>89</sup>

To deepen cooperation and information sharing in relation to LNG bunkering, an MOU was signed in October 2016 by MPA, Antwerp Port Authority, Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Norwegian Maritime Authority, Port of Jacksonville (represented by JAX Chambers), Port of Zeebrugge, Port of Rotterdam Authority and the Ulsan Port Authority. Three more members, Port of Ningbo-Zhoushan, Port of Vancouver and Port of Marseille, joined the MOU in July 2017 bringing the total number of members to eleven. Through the MOU, Singapore aims to:

- a. establish a network of LNG bunker-ready ports across the East and the West to encourage the adoption of LNG bunker by ship owners;
- b. deepen cooperation and information sharing in relation to LNG bunkering; and
- c. promote the adoption of LNG as a marine fuel by coordinating with international organisations and private operators.<sup>90</sup>

The National University of Singapore (NUS), Keppel Data Centres, and Singapore LNG Corporation (SLNG) will collaborate to develop a new cooling technology that can potentially help Singaporean data centers improve their PUE by as much as 20 percent. The project entails the harnessing of the cold energy released during the re-gasification process for liquified natural gas (LNG) to cool data centers. If successful, this can result in significant energy savings and reduce the carbon footprint of data centers in tropical Singapore with its limited avenues for clean energy.<sup>91</sup>

### Pulau Bukom First Singapore's Refinery

Pulau Bukom Refinery by Shell. Pulau Bukom, it is Shell's only energy and chemicals park in Asia. What was once an oil storage installation and later Singapore's first refinery in 1961, has transformed into an energy and chemicals park that will focus on producing low-carbon energy products like biofuels; incorporate circularity, such as waste plastics for feedstock; as well as provide renewable energy.

Picture : Shell



# THAILAND

## Country Key Highlights

### Government/ Political System

Parliamentary democracy with a constitutional monarchy<sup>1</sup>

### Demography

71,801,279 (2023)<sup>2</sup>

### GDP and % from O&G

USD 514.94 billion (2023)<sup>3</sup>

### GDP Per Capita

USD 7,171.8 (2023)<sup>4</sup>

### Reserves

Oil: 95 million barrels/day;

Gas: 3,445 bcf (Approx. 121.65 TCF)<sup>5</sup>

### Oil & Gas Production

Oil: 696.100 barrels/day;

Gas: 2,648 MMscfd (Approx. 0.00265 TCF)<sup>6</sup>

### Refining Capacity

1.24 million barrels/day<sup>7</sup>

### Domestic Demand

1.37 million barrels/day<sup>8</sup>

### Upstream Fiscal Term

Concession and Production Sharing Contract (PSC) terms<sup>9</sup>



# Energy Demand

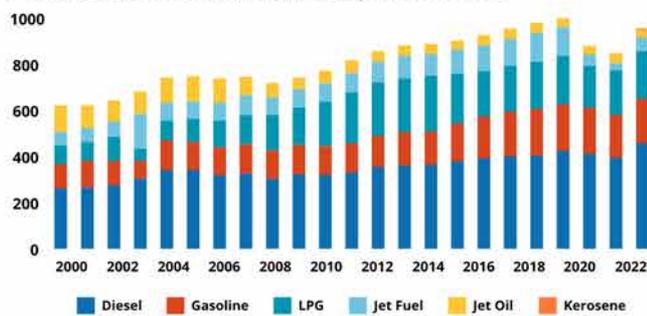
## Oil

In Dec 2023, Thailand Oil Consumption was reported at 1,221.144 Barrel/Day. This records an increase from the previous year, that is 1,220.860 Barrel/Day.<sup>10</sup>

Thailand's petroleum consumption is made up of diesel, gasoline, jet fuel for transportation; and fuel oils for industry.<sup>11</sup>

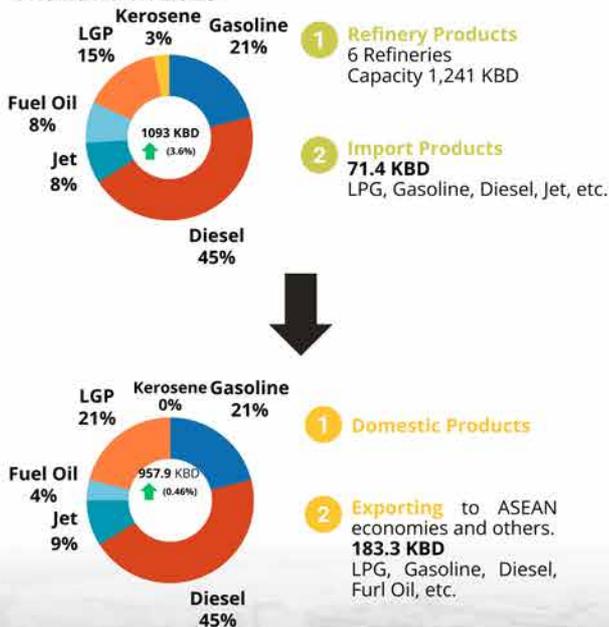
The LPG is mostly consumed by the petrochemical industry as a feedstock, followed by household cooking, transportation, and industrial sector.<sup>12</sup>

### Petroleum Product Consumption (kb/d)<sup>13</sup>



Source: EPPO, 2023

### Oil Production Supply-Demand Situation of Thailand in 2023<sup>14</sup>



Thailand has various potential logistics, such as trucks, oil tankers, railways, and pipelines, for providing oil products.

Source: EPPO & DOEB, 2024. Edited  
\*LPG including production from Gas Separation Plant

Domestic demand in Thailand anticipates further rise this year due aviation and tourism recovery. The overall consumption of petroleum products is expected to increase 2.8% this year, with a significant 24.2% rise in jet fuel consumption.<sup>15</sup>

### Fuel demand forecast in Thailand's Oil Plan 2015-2036<sup>16</sup>

Economic Sector	Type of Oil	BAU		EEP 100%	
		2026	2036	2026	2036
Transport	Gasoline	9,303	12,934	4,683	4,523
	Diesel	17,086	24,309	9,898	10,067
	LPG	4,601	8,001	2,785	4,264
	NG	5,731	9,269	4,020	5,447
	Jet Fuel	7,206	10,036	7,206	10,036
	Fuel Fuel	1,010	909	1,010	909
	<b>Total</b>		<b>44,937</b>	<b>65,459</b>	<b>29,602</b>
Over All Sector	Gasoline	9,381	13,012	4,760	4,600
	Diesel	23,972	32,389	16,784	18,147
	LPG	8,986	13,022	7,170	9,285
	NG	5,731	9,269	4,020	5,447
	Jet Fuel	7,217	10,047	7,217	10,047
	Fuel Fuel	1,699	1,598	1,699	1,598
	<b>Total</b>		<b>56,985</b>	<b>79,338</b>	<b>41,650</b>

Remark : BAU = Business as Usual  
EEP = Energy Efficiency Plan  
ktoe = kilo ton of oil equivalent

Source: Energy Policy and Planning Office

## Gas

By 2030, gas demand in Thailand is projected to rise by 1.7% to 4,945 MMscfd, up compared to the estimated 4,859 MMscfd in 2024, mainly influence by power sector.<sup>17</sup>

The primary consumer of the gas supply is the power generation, using about 62% of the total supply. Gas separation businesses use 18%, the industrial sector 17%, and the transport sector 3%.

### Consumption of Natural Gas by Sector (MMscfd)<sup>18</sup>



Source: EPPO, 2023

### LNG Terminal Map Tà Phut, Rayong

Map Tà Phut, located in Rayong Province, Thailand, is home to one of the largest industrial estates in the country. It is particularly known for its Liquefied Natural Gas (LNG) infrastructure has a 7.5 mmtpa and a peak output capacity of 9 mmtpa.

Picture : PTT LNG Company Limited

# Energy Supply

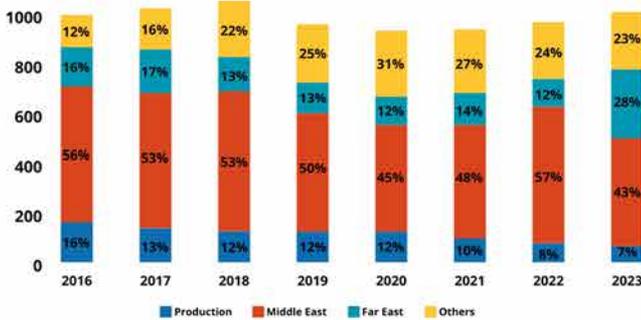
## Oil

Thailand is a net importer of both crude and refined oil products. While oil remain leading the energy supply, the country's domestic crude oil production accounted for only 25.4% of its total crude oil supply, highlighting its limited domestic resources. As of 2024, the country has total refining capacity of nearly 1.244 million b/d, unchanged from 2023.<sup>19</sup>

Surplus products are exported to neighboring countries through contracts and spot markets, while occasional minimal imports are used for blending or meeting specific requirements.<sup>20</sup>

Crude oil is Thailand's top imported product. Much of Thailand's oil supply coming from the Middle East, such as United Arab Emirates, Sudi Arabia, and Libya. Thailand also imports crude oil from Malaysia.

### Oil Supply Situation in 2023<sup>21</sup>

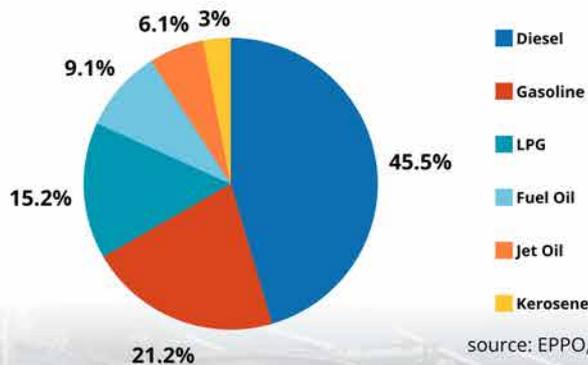


### Crude Oil Supply 2023

Import 982 KBD ▲(5.4%) Domestic 70 KBD ▼(11.7%)

Source: S&P Global Commodity Insights

### Petroleum Product Yield Mix from Thai Refineries in 2022<sup>22</sup>



source: EPP0, 2023

## Hybrid Power Plant at Sirindhorn Dam

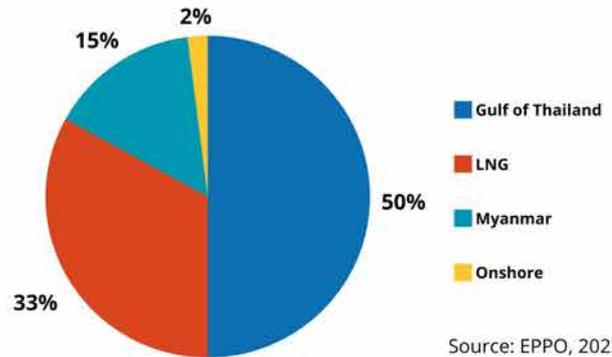
The Sirindhorn Dam, located in the Ubon Ratchathani Province in northeastern Thailand, hosts the world's largest Hydro-Floating Solar Hybrid Project. The project generates electricity from solar power during the day and switching to hydropower from the dam at night or during peak demand. The power plant utilizes 7 sets of solar panels installed on less than 1% of the reservoir's surface area. The design of this power plant is eco-friendly, ensuring no adverse impact to the underwater environment. This innovative project combines a total power capacity of 81 MW, with 36 MW sourced from hydroelectricity and 45 MW from floating solar panels.

Picture : Floating PV Solar Project

## Gas

Considerable natural gas resources are available domestically and used as the main source of power generation, imports remain in the mix of natural gas supply, both through LNG imports and pipeline gas imports from Myanmar.

### Natural Gas Supply 2023<sup>23</sup>

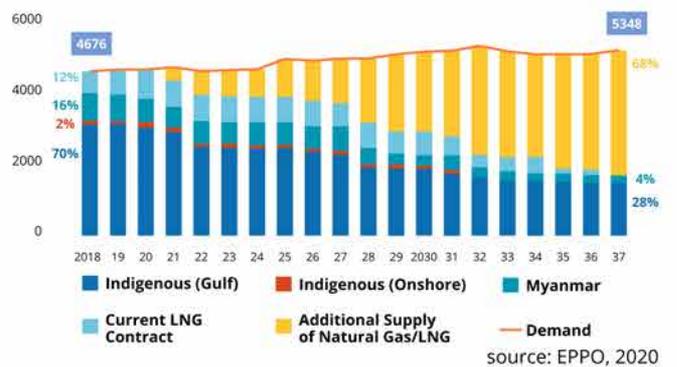


Source: EPP0, 2023

In 2022, natural gas production from Thailand's Gulf reached 2,648 MMscfd, making up 62% of the total supply of 4,274 MMscfd. This domestic production has sharply fallen in recent years due to a reduction in investment.

Thailand has been taking proactive steps to address the depleting domestic gas production, signalling its commitment to diversify and explore new natural gas reserves. In 2021, Thailand's energy ministry has awarded the renewed production sharing contracts for two major gas fields to PTTEP and Chevron Exploration.

### Future Supply and Demand of Natural Gas (MMscfd)<sup>24</sup>



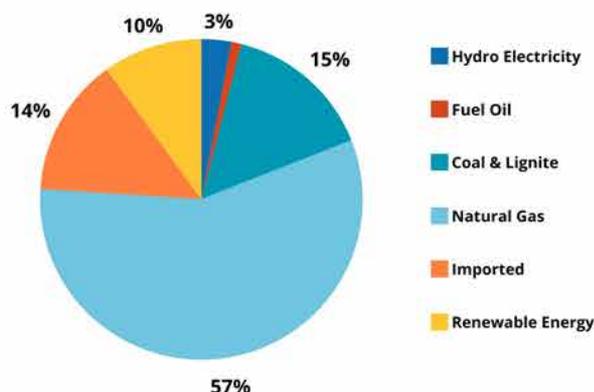
source: EPP0, 2020

## Overall Energy Outlook

Thailand has set a new renewable energy target of 30% of total final energy consumption by 2036 in its Alternative Energy Development Plan (AEDP) 2015. Thailand aims to achieve carbon neutrality by 2050 and net-zero emissions by 2065. This ambitious plan involves enhancing the use of solar, wind, and other renewable sources to generate electricity and reduce reliance on fossil fuels.<sup>25</sup>

According to the policy statement of the council of ministers to the Parliament on 11 September 2023, the new government affirmed its priorities to: (i) reduce energy expenses, (ii) promote the use of clean and renewable energy to align with sustainability goals, and (iii) support new energy sources that will promote future energy security.<sup>26</sup>

Natural gas will be the key energy source for the foreseeable future.



source: The Energy Policy and Planning Office

Natural Gas remains the key driver in Thailand's energy mix, accounting for approximately 57% of all electricity generation in 2023 to date, while 53% in the previous year.<sup>27</sup>

Thailand has projected that the demand for LNG will increase significantly in the next years due to the country's transition effort from fossil fuels. The Gas Plan 2018-2037 states that Thailand's demand for LNG will reach 30 million tons per annum (MTPA) by 2037, and the country aims to become the LNG hub for ASEAN.<sup>28</sup>

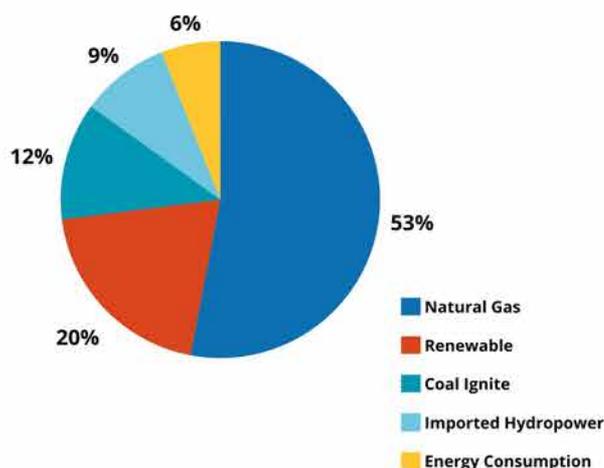
The move toward LNG is part of a broader strategy to reduce greenhouse gas emissions and improve air quality. In Thailand's perspective, LNG is viewed as a cleaner alternative to traditional fossil fuels.

According to EPPO, hydrogen has the potential to replace 20% of the natural gas and LNG which have been the primary source of Thailand's power generation. In its "Hydrogen Strategic Plan,

the hydrogen development in Thailand is expected to be carried out in these following phases:<sup>29</sup>

- Short-term phase (2021-2030): starting from grey hydrogen, together with support from studies and the use of trial technologies as well as investment incentives.
- Mid-term phase (2031-2040): blue hydrogen begins to be used as fuel in power generation.
- Long-term phase (2040-2050): infrastructure for hydrogen production technology to be developed, including pipeline, storage, transport system, and fueling station.
- From 2051 and beyond: green hydrogen to be available for commercial use.

### Thailand Power Development Plan (PDP) 2018's Projection of Energy Production from 2018-2037<sup>30</sup>



source: The Energy Policy and Planning Office

The Ministry of Energy is planning new tenders for rooftop solar projects, which will include options for both self-consumption and selling excess energy back to the grid. This initiative is expected to significantly boost solar energy adoption across residential and commercial sectors. Additionally, the government has approved a procurement scheme for 3,668.5 MW of renewable energy, including 2,632 MW from ground-mounted solar farms and 1,000 MW from wind energy.<sup>31</sup>

The Long-term Low Greenhouse Gas Emission Development Strategy (LT-LEDS) supports this goal by promoting renewable energy and improving energy efficiency. The strategy aims for 68% renewable electricity by 2040 and 74% by 2050. Initiatives under the National Energy Plan (NEP) include significant investments in renewable energy infrastructure and the promotion of energy conservation measures to reduce overall consumption by 30% by 2030 and 40% by 2050. The LT-LEDS outlines Thailand's commitment to reducing greenhouse gas emissions while supporting economic growth and energy security. It aligns with international climate agreements, including the Paris Agreement.<sup>32</sup>



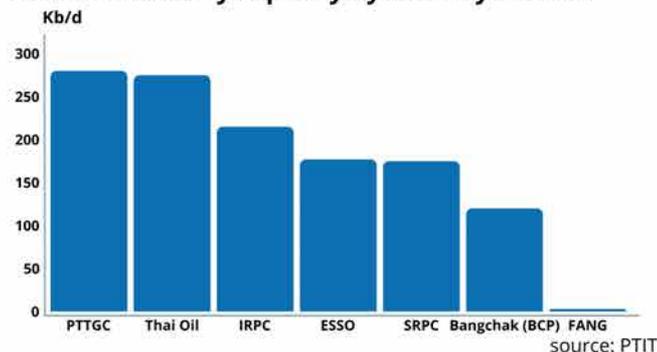
**Lopburi Solar Power Plant**  
 The 73-megawatt Lopburi solar power plant in central Thailand is one of the largest solar photovoltaic projects in the world. It will be central to Thailand's efforts to generate energy from renewable sources.

Picture : flickr , Asian Development Bank

## Oil

Thailand has seven oil refineries with a total crude oil distillation capacity of 1.245 kb/d, including the 2.5 kb/d Fang refinery owned by the Royal Thai Army for military purposes. Apart from the Bangchak refinery (BCP) in Bangkok and the Fang refinery in Chiang Mai province, all other refineries are located in eastern Thailand and are connected via an oil product pipeline.

**Crude oil refinery capacity by refinery in 2022<sup>33</sup>**



In 2022, Thai refineries processed 1.021 kb/d of crude oil, achieving an 82% utilization rate. These modern and complex refineries have consistently maintained high utilization rates to meet the demand for petroleum products.<sup>34</sup>

Thailand is divided into five regions: Central, Northeastern, Northern, Southern, and Eastern.

- Petroleum products from the five refineries in the Eastern region were distributed to meet the demand in each area. Diesel, gasoline, and jet fuel were transported via pipelines to the Central region and then redistributed by oil trucks to serve Bangkok and nearby areas.
- In the Northeastern and Northern regions, products were transported to regional oil depots primarily by oil trucks and subsequently delivered to gas stations by smaller trucks.
- The Southern region, located along the Gulf of Thailand, is unique in that petroleum products are mainly transported by marine vessels to domestic marine depots before being redistributed to gas stations.<sup>35</sup>

The petroleum product pipelines have been extended from the Central region to handle the increasing demand in the Northeastern and Northern regions. While extension to the Northern region is already completed, the Northeastern is expected to be finished by 2025. The main pipeline system, Thapline, has a high capacity and is currently running at about 75% of its total capacity.<sup>36</sup>

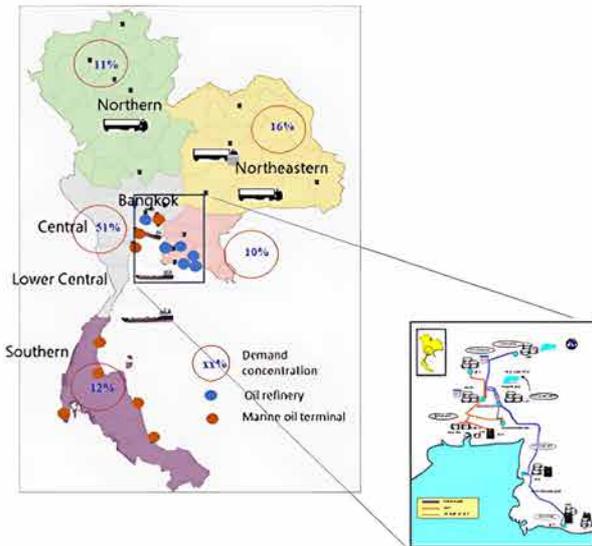
**The Songkhla Basin**

The Songkhla Basin, the largest of four Tertiary basins within the 8,500 km<sup>2</sup> G5/43 block in the southwestern Gulf of Thailand, lies in water less than 25 meters deep. This area has been the focus of exploration efforts for over 20 years, with the first exploration well, Songkhla No. 1, drilled in 1989. The field is operated by Valeura Energy.

Picture : Coastel Energy

Thailand's oil distribution network has seen significant expansions, particularly with PTT Public Company Limited's comprehensive pipeline system and Thai Oil's Sriracha refinery increasing its capacity to 400,000 barrels per day by 2025. The Northeast Thailand Oil Pipeline, operational since August 2023, spans 342 kilometers, enhancing efficiency by reducing reliance on trucked oil. Additionally, the completion of the LNG terminal in Nong Fab, with a capacity of 7.5 million metric tons per year, supports the country's shift towards natural gas, ensuring long-term energy security and meeting international clean energy standards.<sup>37</sup>

**Distribution of petroleum products and demand concentration<sup>38</sup>**



source: PTIT

The Saraburi-Khon Kaen oil pipeline, a significant onshore project, commenced operations in 2023. Spanning 342 kilometers, this pipeline is operated by Thai Pipeline Network (TPN) and aims to replace trucked oil transportation in northeast Thailand, enhancing efficiency and capacity. Additionally, the Rayong Map Ta Phut, Bangkok gas pipeline, a 430-kilometer-long project, is set to start operations in 2024. This pipeline will be critical for transporting gas from Rayong to Bangkok, improving the distribution network.<sup>39</sup>

**Gas**

Natural gas extracted from 13 major production platforms in the Gulf of Thailand is transported via subsea pipelines. These pipelines primarily supply gas separation plants in the Eastern region, with some extending to facilities in the Southern region. After separation, the gas is blended with imported LNG post-regasification and distributed via an inland gas grid to power plants and industrial consumers across the Eastern, Central, and Northeastern regions.<sup>40</sup>

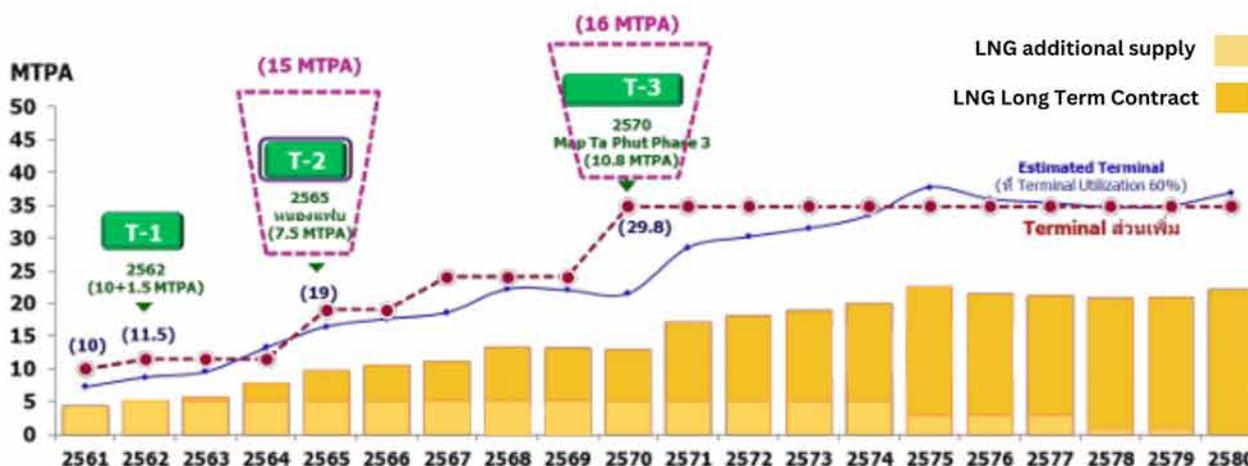
Thailand's gas grid is also connected to piped gas imports from Myanmar's production platforms in the west. Additionally, there are smaller gas grids in the Upper Northeastern and Southern regions, facilitating onshore and offshore gas supply to local power plants and facilities.<sup>41</sup>

**Thailand LNG Terminal<sup>42</sup>**



source: PTT International Trading Business Unit

LNG Current infrastructural development actions<sup>43</sup>

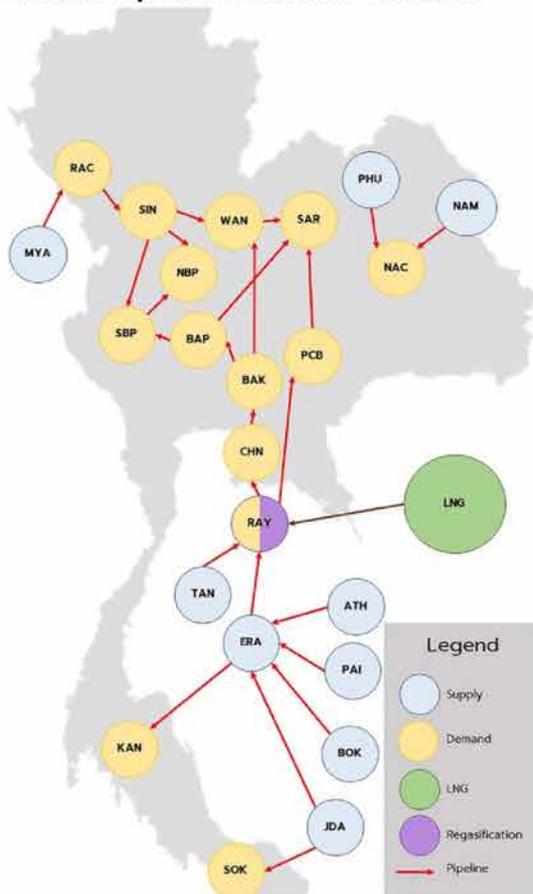


Source: Ministry of Energy

Thailand has completed LNG terminal which is operated by PTT LNG at Map Ta Phut and Ban Nong Faep, Rayong, with 11.5-MTPA and 7.5-MTPA gasification capacity, respectively.<sup>44</sup>

Thailand is expanding its natural gas pipeline network to support increasing domestic demand and enhance energy security. The government has prioritized developing infrastructure, including the new pipelines associated with the G1/61 and G2/61 projects in the Gulf of Thailand.<sup>45</sup>

Natural Gas Pipeline Network in Thailand



Source: (PTT, 2023)

Thailand's LNG import capacity is being significantly boosted. The Map Ta Phut LNG Terminal 2, which began operations in early 2023, is a critical addition, capable of handling 7.5 million tonnes per annum. Further expansions are planned with new LNG terminals proposed in Surat Thani and Songkhla to cater to rising natural gas demand.<sup>46</sup>

Other Energy Sources

Thailand has one of the world's largest solar photovoltaic (PV) projects called Lopburi solar power plant. The solar power plant has the capacity of 73 megawatts in the central province of Lopburi, about 150km north of Bangkok. It enables Thailand to reduce emission by over 1.3mtCO<sub>2</sub>e throughout the 25-year project period and cut fuel imports by over 35,000 tonnes per year.<sup>47</sup>

Authority of Thailand (EGAT), a state-owned enterprise, has launched the world's largest hydro-floating solar hybrid project, a 45MW facility, at Sirindhorn Dam. This project aims to enhance Thailand's power system security and cut greenhouse gas emissions by approximately 47,000 tons per year. The main feature of this hybrid plant is its ability to generate electricity from solar power during the day and from hydropower at night or during peak demand when there is no sunlight.<sup>48</sup>



Arthit Oil and Gas Field

The Arthit oil and gas field is located in the Gulf of Thailand, approximately 230 kilometers offshore from the Songkhla Province. The Arthit gas field is divided into four blocks, B14A, B15A, B16A, G8/50. Arthit is recognized as one of Thailand's most productive gas and condensate fields, boasting proven reserves of 1.9 trillion cubic feet (tcf) of gas.

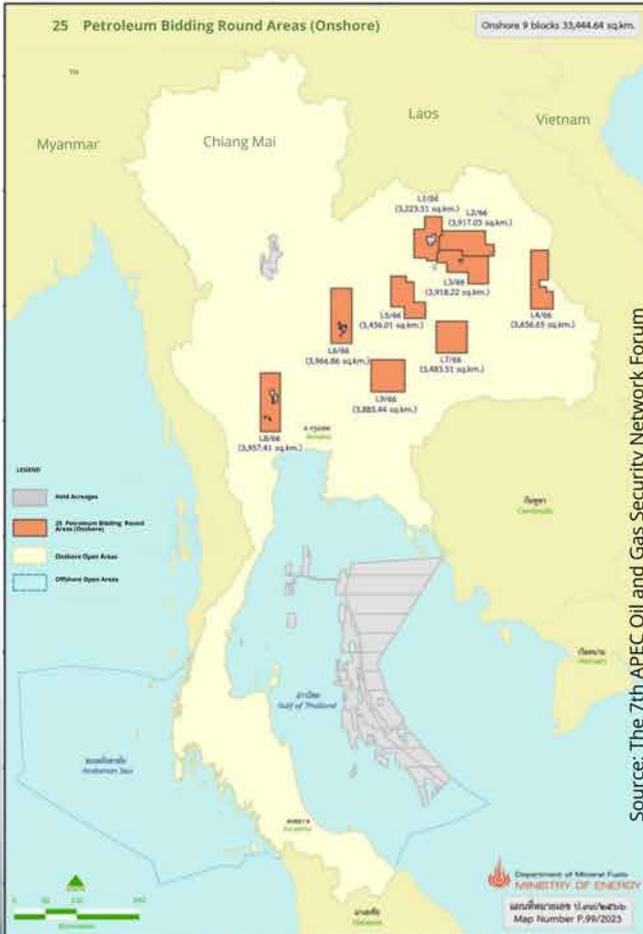
Picture : PTT Exploration and Production

# Projected

## Oil

25th Thailand Petroleum Bidding Round will be organized by the end of 2024. A new bidding round for petroleum exploration in 9 onshore blocks: (1) 7 blocks in Northeast; (2) 2 blocks in the Central.

### New oil and gas concession blocks in the Gulf of Thailand<sup>49</sup>

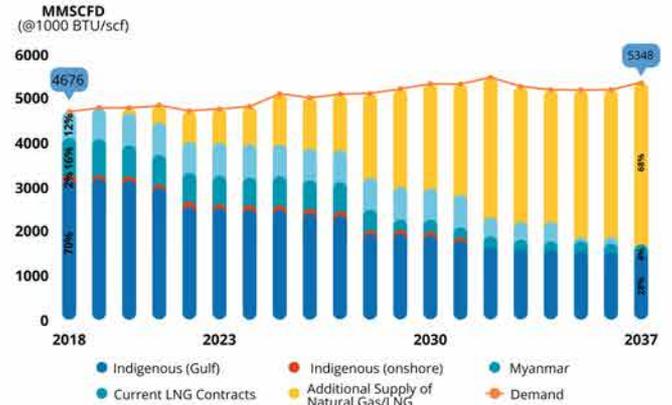


#### Bongkot Offshore Field

Bongkot South is an active conventional gas field situated in shallow waters in Thailand, managed by PTT Exploration and Production Public. The field is positioned in block G12/48 at a water depth of 253 feet

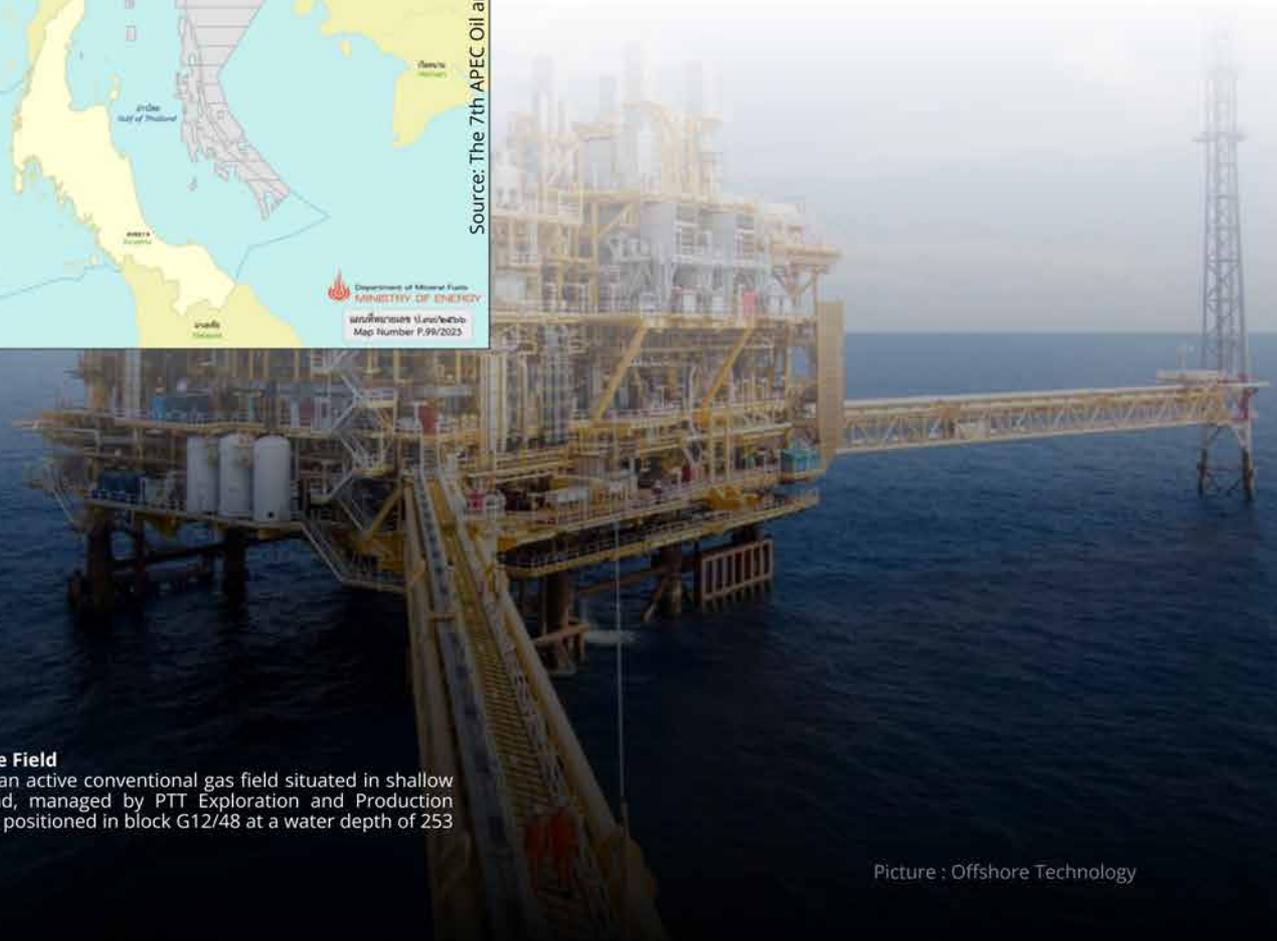
## Gas

### Promoting Investment & Activities E&P from Domestic Fields and Joint Development Area<sup>50</sup>



Source: The 7th APEC Oil and Gas Security Network Forum

PTT currently holds long-term LNG supply contract with four sellers, totalling 5.2 million tonnes per annum (Mtpa). Qatari contracts make up a large share (38%) of the current contract slate, making Thailand very vulnerable to potential disruptions from this economy. However, with the Qatargas contract due to expire within this decade, there is an urgency for Thailand to secure new contracts. To address this, PTT has successfully negotiated three new LNG supply agreement, totalling 2.8 Mtpa, which are set to commence in 2026.<sup>51</sup>



Picture : Offshore Technology

LNG supply contracts (Mtpa)			
Seller	Start year	End year	Volume (Mtpa)
Qatargas	2015-06-30	2029-06-30	2.00
BP	2017-06-30	2037-06-30	1.00
Petronas	2017-06-30	2032-06-30	1.20
Shell	2017-06-30	2032-06-30	1.00
Cheniere Eenergy	2026-01-01	2046-01-01	1.00
Oman LNG	2026-01-01	2035-01-01	0.80
PTTGL	2026-01-01	2040-01-01	1.00

Source: (Cedigaz, 2023. edited)

### Other Energy Sources

According to the Power Development Plan (PDP) 2012 – 2030 and the PDP 2015 – 2036, nuclear power with capacity of 2,000 MW was intended to be added to total capacity during the 2020s and 2030s.

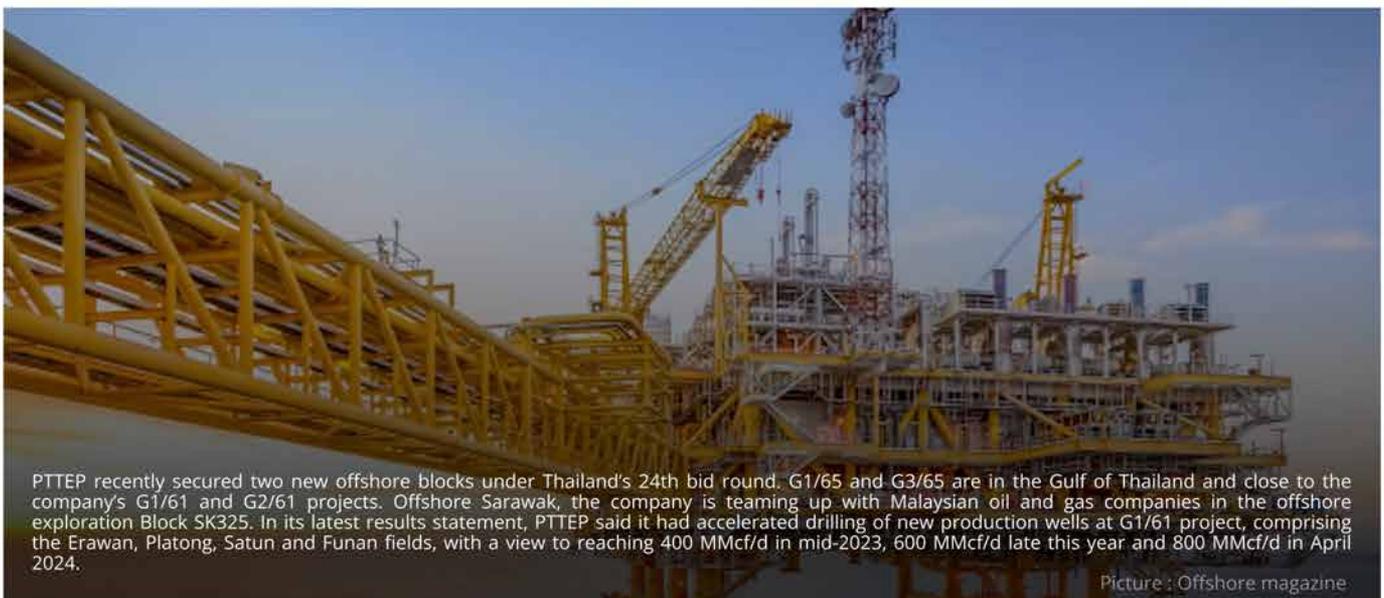
PTTEP announced the country's first CCS project in June 2022 which located at the Arthit offshore gas field. The project is currently undergoing a preliminary front-end engineering and design (Pre-FEED) study, and it is anticipated that CCS operations will commence in 2026. PTTEP is also exploring additional opportunities in CCUS initiatives.<sup>52</sup>

In February 2023, the Energy Policy and Planning Office (EPPO) approved the initial scope of the action plan to promote Battery energy storage systems (BESS) Action Plan 2023-2032. The Action Plan is expected to create enabling environment for BESS ecosystem and larger scale of demand for the BESS industry,

as well as increase the capacity to compete in the market for BESS manufacturers or operators utilizing BESS. The procurement target for groundmounted solar with BESS for the year 2024 is set at 100MW and will progressively increase to 200MW in 2028. By 2030, the total aggregate procurement for groundmounted solar with BESS is targeted at 1,000 MW.<sup>53</sup>

Power Business and Acting Governor of Electricity Generating Authority of Thailand (EGAT) will develop 16 floating solar projects at EGAT nine dams with a total installed capacity of 2,725 MW.<sup>54</sup>

The Thai government has introduced various incentives to attract investment in renewable energy projects. These include the promotion of 100% foreign ownership in power generation projects under specific conditions and offering investment incentives under the investment promotion law. Such measures aim to facilitate the development and financing of renewable energy projects, ensuring sustained growth in this sector.<sup>55</sup>



PTTEP recently secured two new offshore blocks under Thailand's 24th bid round. G1/65 and G3/65 are in the Gulf of Thailand and close to the company's G1/61 and G2/61 projects. Offshore Sarawak, the company is teaming up with Malaysian oil and gas companies in the offshore exploration Block SK325. In its latest results statement, PTTEP said it had accelerated drilling of new production wells at G1/61 project, comprising the Erawan, Platong, Satun and Funan fields, with a view to reaching 400 MMcf/d in mid-2023, 600 MMcf/d late this year and 800 MMcf/d in April 2024.

Picture : Offshore magazine

## Ministries

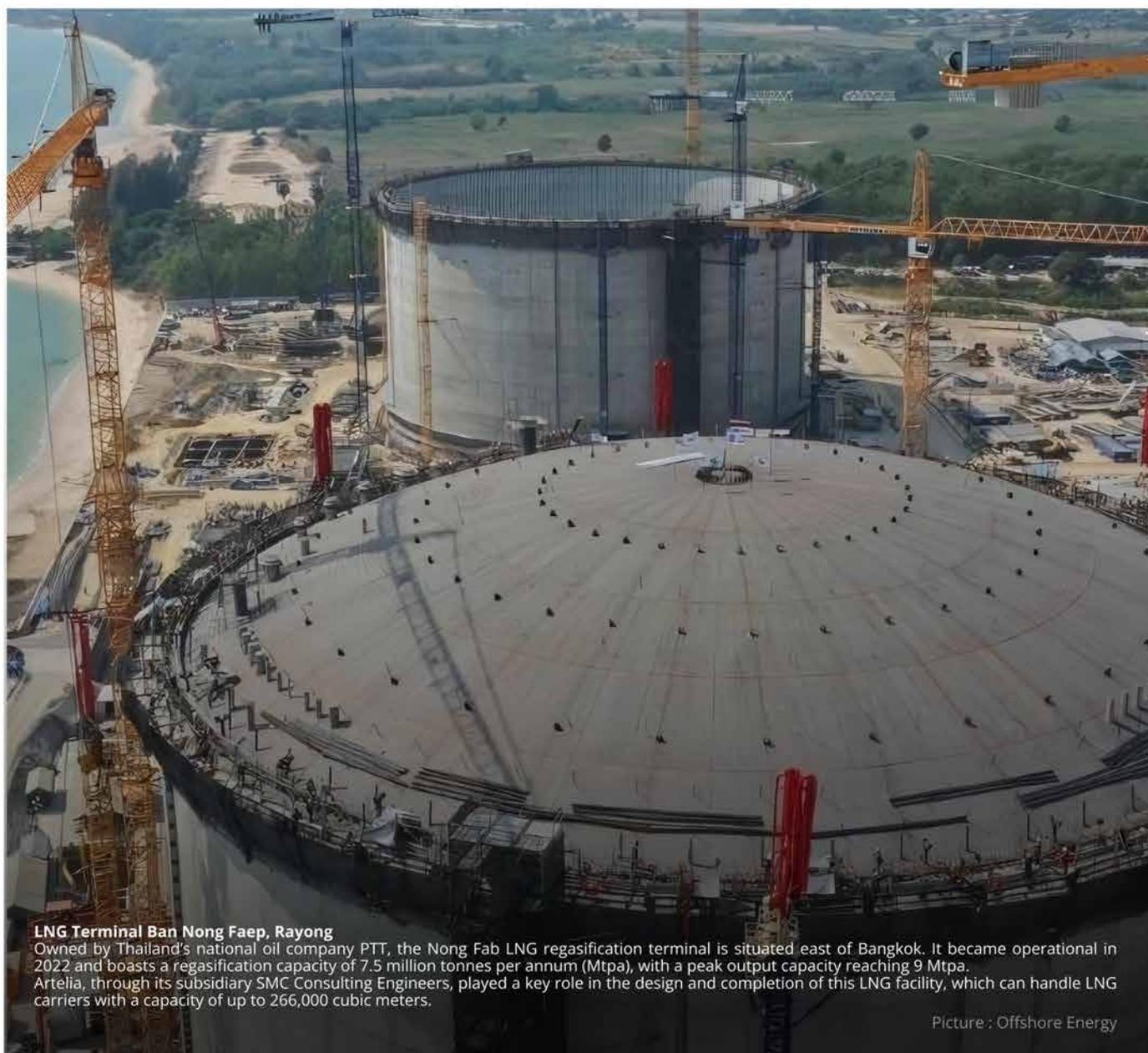
### Ministry of Energy

Thailand's energy policy is centered around reducing its dependency on natural gas to strengthen energy security, such as by diversifying energy mix. Thailand's Ministry of Energy has developed the Thailand Integrated Energy Blueprint (TIEB). There are 5 energy master plans are reviewed for the period 2015 – 2036, in consistent with the national economic and social development plan:

- The Power Development Plan (PDP)
- The Energy Efficiency Development Plan (EEDP)
- The Alternative Energy Development Plan (AEDP)
- The Oil Development Plan
- The Gas Development Plan<sup>56</sup>

Primary departments that hold primary role in Thailand's oil and gas industry structure, among others, are:

- The Department of Fuels (DMF), Ministry of Energy, specifically handles the administration of laws pertaining to petroleum.
- The Department of Mineral Fuels (DMF) regulates petroleum exploration and production under the supervision of the Petroleum Committee, established under the Petroleum Act.
- The Energy Policy Planning Office (EPPPO) plays a key role in formulating policies and regulations, along with managing funds dedicated to oil and energy conservation. The EPPPO's authority extends to natural gas, oil, and energy matters (e.g. solar and waste-to-energy).<sup>57</sup>



## Agencies



### December 29, 1978

Petroleum Authority of Thailand (PTT) was established on December 29, 1978 according to the Petroleum of Thailand Act B.E. 2521 principally to operate petroleum and related businesses.



### August 21, 2001

The Cabinet resolution on August 21, 2001 approved a corporatization plan of the Petroleum Authority of Thailand.



### September 25, 2001

September 25, 2001 approved the corporatization under the State Enterprise Corporatization Act B.E. 2542 to establish PTT Public Company Limited by converting capital of the Petroleum Authority of Thailand into capital stock. It is mandated the state holds at least 51% share in PTT and for PTT to remain the national oil company.

Natural Gas Business and Transmission Pipeline Business: PTT and its subsidiaries are engaged in the entire gas supply chain from exploration, production and transmission through to trade, import and distribution to retail.

PTT has expanded its investment in natural gas-related businesses both domestically and internationally and new business development through affiliates in PTT group such as PTT LNG Company Limited (PTTLNG) and PTT Natural Gas Distribution Company Limited (PTTNGD), PTT Global LNG Company Limited (PTTGL).<sup>58</sup>

The Office of Board of Investment (BOI)

BOI is a government agency under the Office of the Prime Minister. The BOI's primary vision is to promote valuable investment, both into Thailand and Thailand's overseas investment.

Based on Thailand's investment promotion strategy for 2023-2028, the BOI's aim is to promote investments for restructuring Thailand's economy into a "new economy" in three aspects:

- (i) innovation (being an economy that is driven by technology, innovation and creativity);
- (ii) competition (being an economy that is competitive, adaptive and generates high growth);
- (iii) inclusivity (being an economy that values environmental and social sustainability, creates opportunity and reduces inequality).

The promoted activities were recategorized into several new promoted businesses which now include:

- (a) businesses related to electric vehicles, such as fuel cell electric vehicles (FCEV) and battery swapping stations;
- (b) businesses related to new energy technologies, such as hydrogen production from renewable energy, green ammonia, hydrocarbons or fossil fuels, and power or steam production from hydrogen; and
- (c) novel food or organic food businesses.<sup>59</sup>

Competitive Landscape of Thailand Oil and Gas Industry:

- The most prominent petroleum corporations in Thailand include PTT, Bangchak Corporation, ExxonMobil, Chevron, and The Shell Company. However, PTT remains the country's largest stakeholder.
- In 2019, China and Japan were key players in Thailand's market for oil, gas, and energy equipment.
- Key international suppliers and brands in Thai oil and gas equipment and services are Bechtel, Schlumberger, Cameron, National Oilwell Varco, Petrofac, SGS, and Halliburton. Notable local companies are JST Group and OPS Group.<sup>60</sup>

Thailand's Gas Plan 2018-2037 highlights the need for more natural gas sources, whether imported as LNG, through pipelines, or found domestically. As local gas reserves dwindle and current long-term LNG contracts end, the plan predicts that by 2037, about 68% of the gas supply will come from new sources, including LNG imports and fresh domestic discoveries.

The Thai government has introduced various incentives to attract investment in renewable energy projects. These include the promotion of 100% foreign ownership in power generation projects under specific conditions and offering investment incentives under the investment promotion law. Such measures aim to facilitate the development and financing of renewable energy projects, ensuring sustained growth in this sector.<sup>61</sup>

Despite Thailand's active effort in seeking additional contracted volumes, the economy is still expected to heavily depend on the spot LNG market. This reliance persists due to the growing number of third-party LNG players. Based on the Gas Plan 2018-2037, Thailand's demand for LNG is expected to reach 30 million tons per annum (MTPA) by 2037, driven by increasing energy consumption from industrial and residential sectors.<sup>62</sup>

Major producers of crude oil are, for example, PTT Exploration and Production Public Company Limited, Chevron, Medco, Mubadala, and Mitsui Oil Exploration Co., Ltd.<sup>63</sup>

Further, petroleum products are marketed by PTTOR, Bangchak, Shell, Chevron (through Caltex), ThaiOil, IRPC, FUFECO and PT (through PTG Energy), among others.<sup>64</sup>

The updated 2024 Oil Plan, once approved by the National Energy Policy Council and the Cabinet, is expected to attract 113 billion baht investment to Thailand, enable biodiesel and ethanol producers to generate over 71 billion baht in revenue annually, save the cost of importing crude oil by 59 billion baht a year, allow farmers to generate 41.5 billion baht a year.<sup>65</sup>

Thailand's long-term energy policies reflect a strong commitment to transitioning to cleaner energy sources while ensuring energy security and economic stability. The strategic focus on expanding renewable energy, improving energy efficiency, and reducing dependence on fossil fuels positions Thailand as a proactive player in the global energy transition.<sup>66</sup>

### Erawan Field

The Erawan field is a significant gas field located in the Gulf of Thailand, operated by PTTEP Energy Development (PTTEP ED). It is situated in shallow waters with a depth of around 243 feet, within Block 12A and G1/61. The field has been a major contributor to Thailand's natural gas supply since its discovery. Originally operated by Chevron, the Erawan field transitioned to PTTEP ED in April 2022 under a new production-sharing contract. This transition marked the first time Thailand implemented such a contract, replacing the older concession agreements. The field produces about 399 million cubic feet of gas per day, contributing approximately 7% of Thailand's daily gas production. As of 2021, cumulative production was reported at 115.75 million barrels of condensate and 96,431.83 million cubic meters of gas. The field's production capacity was noted to be around 146,000 million cubic meters per year in 2023.

Picture : Bangkok Post Public Company Limited



# VIETNAM

## Country Key Highlights

### Government/ Political System

The Socialist Republic guided by The Communist Party.<sup>1</sup>

### Demography

99,507,841 (2024) with 0.7% average growth.<sup>2</sup>

### GDP and Percentage From O&G

The Gross Domestic Product (GDP) in Vietnam was worth 429.72 billion US dollars in 2023. The y-o-y growth at 5.66%. 0.7% of Vietnam's GDP is from Oil Industries.<sup>3</sup>

### GDP Per Capita

GDP per Capita in Vietnam (or Viet Nam) (with a population of 98,186,856 people) was \$3,655 in 2022.<sup>4</sup>

### Reserves

180 bcm (approx. 6.356 TCF) of proven natural gas reserves (2022), and around 595 Mt (approx. 4361.35 barrels/day) of crude oil reserves (2022).<sup>5</sup>

### Oil & Gas Production

Oil Production: 188,000 barrels/day (2023).

Gas Production: 7.2 bcm (Approx. 0.254 TCF) (2023).<sup>6</sup>

### Refining Capacity

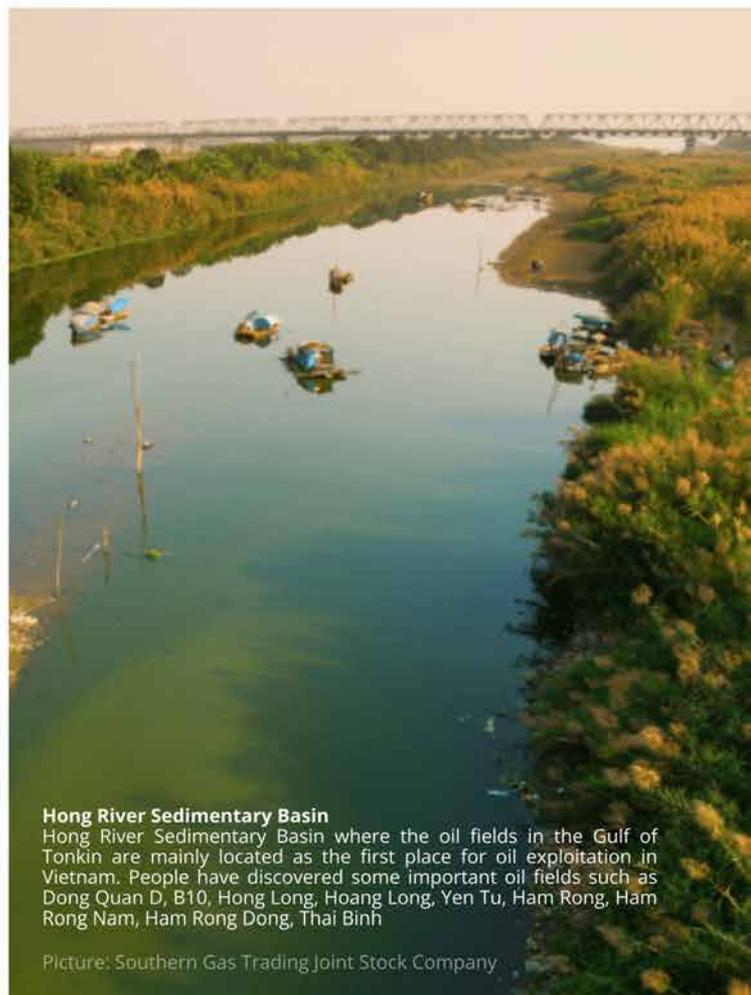
367,000 barrels/day (2023).<sup>7</sup>

### Domestic Demand

602,000 barrels/day (2023).<sup>8</sup>

### Upstream Fiscal Term

All licences are governed by production sharing contracts (PSCs).<sup>9</sup>



### Hong River Sedimentary Basin

Hong River Sedimentary Basin where the oil fields in the Gulf of Tonkin are mainly located as the first place for oil exploitation in Vietnam. People have discovered some important oil fields such as Dong Quan D, B10, Hong Long, Hoang Long, Yen Tu, Ham Rong, Ham Rong Nam, Ham Rong Dong, Thai Binh

Picture: Southern Gas Trading Joint Stock Company

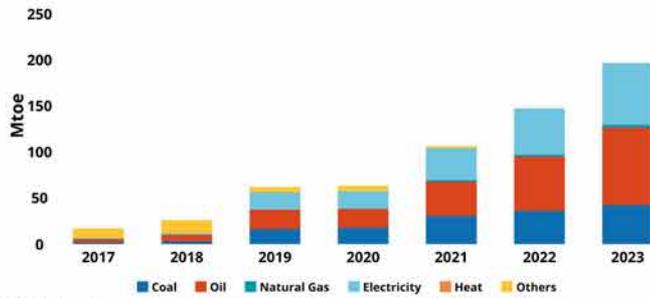


# Energy Demand

## Oil

### Vietnam's projected energy shares until 2050

Final Energy Demand by Sector, Business-As-Usual, 1990-2025 (Mtoe)



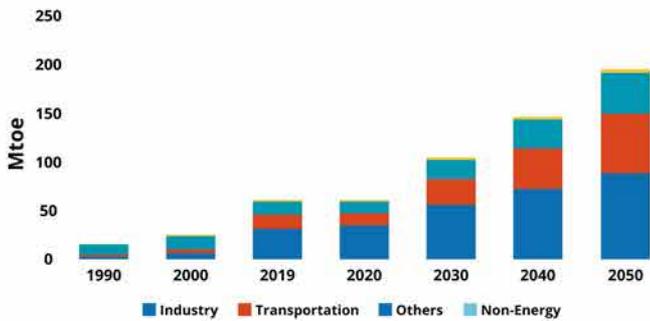
BAU= business-as-usual, Mtoe = million tonnes of oil equivalent  
Note: 'Others' is mainly biomass.

source: Eria

On a per fuel basis under BAU, natural gas is projected to exhibit the fastest growth in final energy consumption, increasing at 5.0% per year between 2019 and 2050. Oil is projected to have the second-highest growth rate of 4.6% per year, followed by electricity with 4.3% and coal with 3.1%. Other fuels (mainly biomass) are projected to decrease at an annual rate of 6.5% due to the transition from biomass to modern fuels.<sup>10</sup>

### Vietnam's Projected Energy Use

Final Energy Consumption by Sector, Business-As-Usual, 1990-2025 (Mtoe)



BAU= business-as-usual, Mtoe = million tonnes of oil equivalent  
Note: 'Others' includes residential and commercial sectors

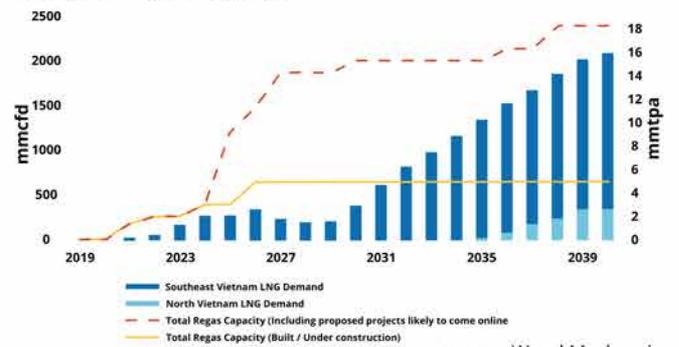
source: Eria

Economic growth is expected to continue improving the standard of living, thus increasing the transition from biomass to modern fuels such as LPG. During 2019–2050, the industry sector is expected to remain the largest consumer of energy in Viet Nam. However, its share of energy consumption will increase from 54.0% in 2019 to 56.2% in 2020, before slightly declining to 45.8% in 2050. Meanwhile, the transport sector will become the second-largest consumer, with its share increasing slowly from 22.9% in 2019 to 31.3% in 2050.<sup>11</sup>

## Gas

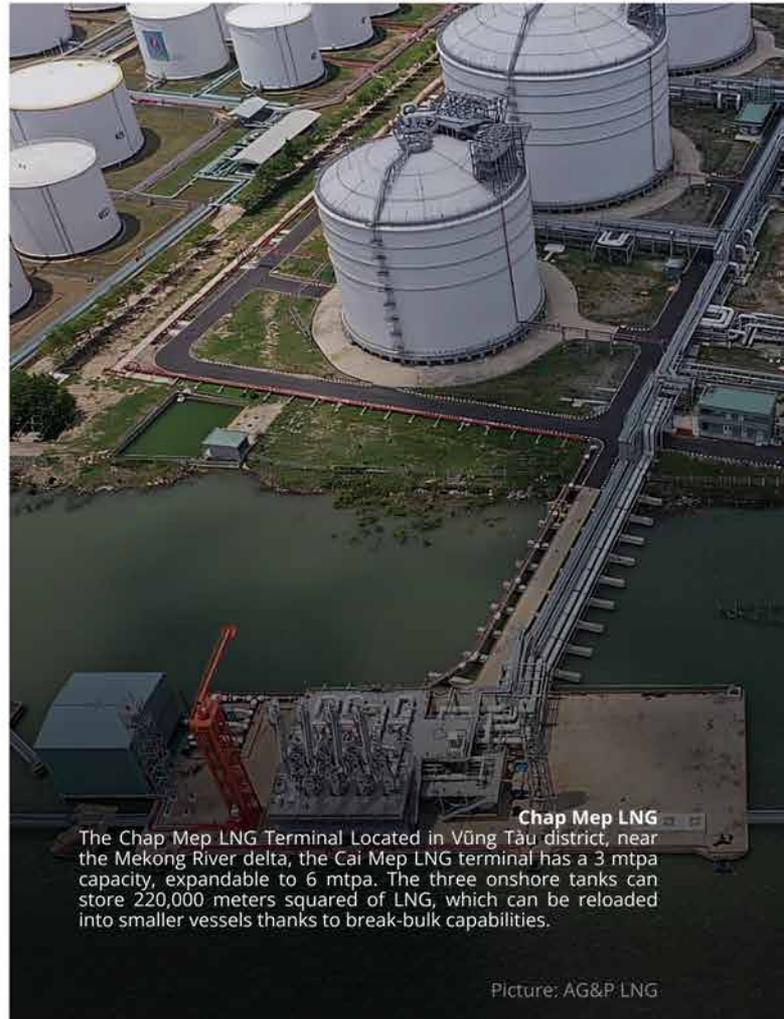
Vietnam plans to rely on LNG to diversify its energy sources. According to the Viet Nam Gas Industry Development Master Plan for the period up to 2035, demand is expected to increase to around 5 million tonnes by 2025, 10 million tonnes by 2030, and 15 million tonnes by 2035.<sup>12</sup>

### Vietnam LNG Demand<sup>13</sup>



source: Wood Mackenzie

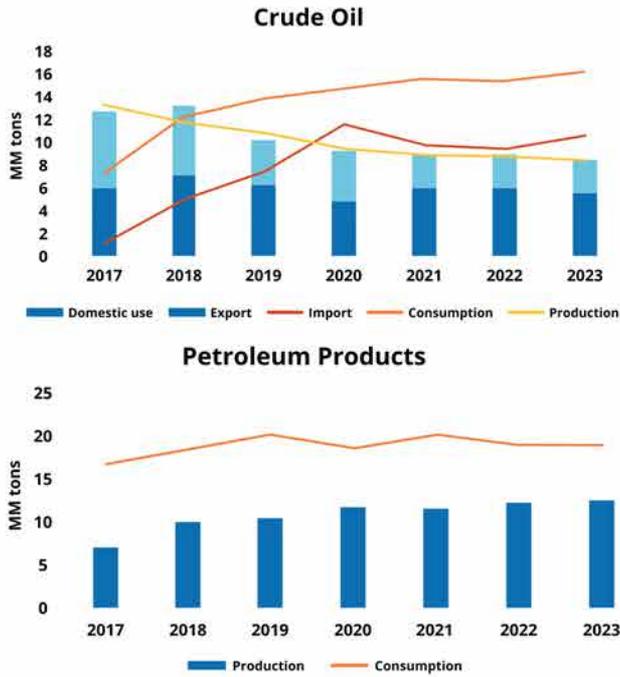
Vietnam is “chasing domestic demand with growing gas production.” Its reserves from new fields ranks it second in this briefing with 198.1 bcm coming from one megaproject and one field.<sup>14</sup>



# Energy Supply

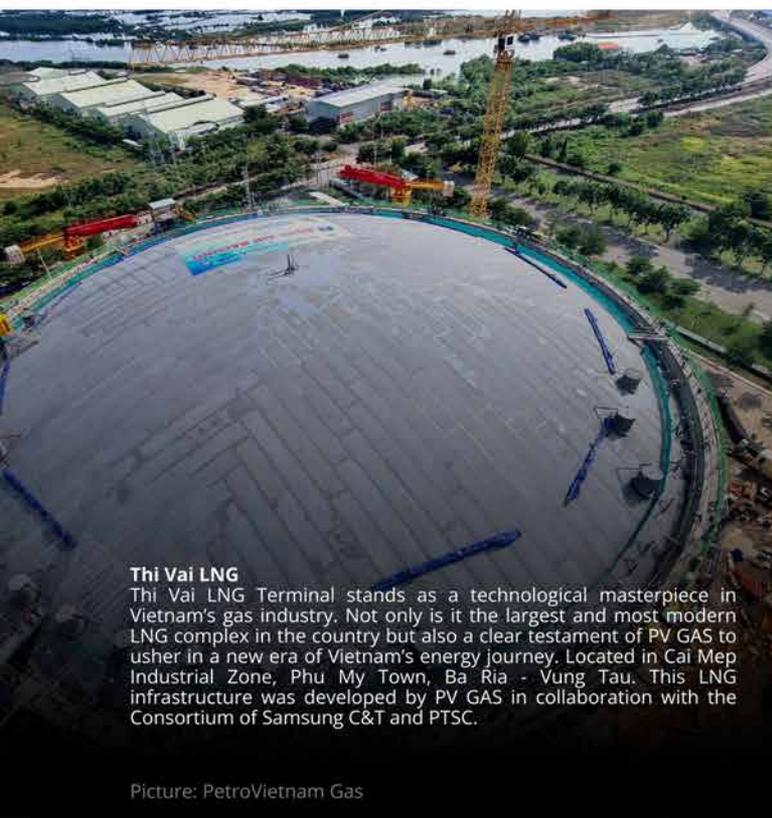
## Oil

Vietnam's Crude Oil and Petroleum Productions until 2023<sup>15</sup>



source: Ministry of Industry and Trade

According to the National Energy Master Plan (NEMP) for the 2021-2030 with the vision of 2050, Domestic petroleum production should



### Thi Vai LNG

Thi Vai LNG Terminal stands as a technological masterpiece in Vietnam's gas industry. Not only is it the largest and most modern LNG complex in the country but also a clear testament of PV GAS to usher in a new era of Vietnam's energy journey. Located in Cai Mep Industrial Zone, Phu My Town, Ba Ria - Vung Tau. This LNG infrastructure was developed by PV GAS in collaboration with the Consortium of Samsung C&T and PTSC.

Picture: PetroVietnam Gas

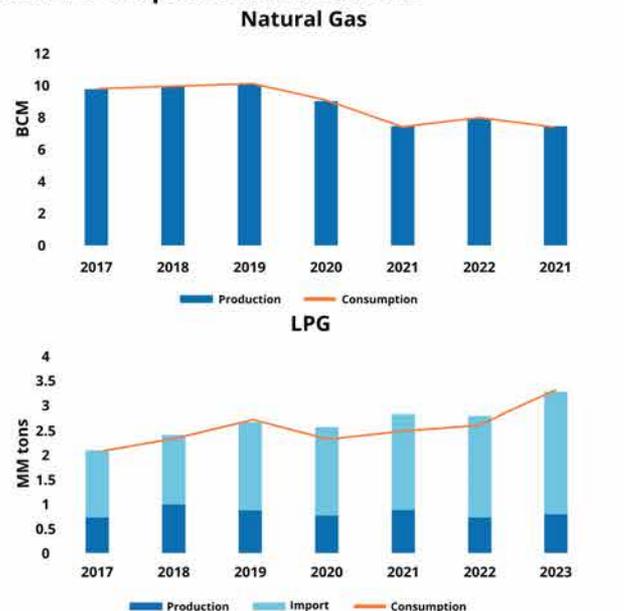
meet at least 70 percent of domestic demand.<sup>16</sup>

The government needs to ensure that crude oil production shall reach 6 to 9.5 million tonnes annually by 2030 and 7 to 9 million tonnes a year from 2031 to 2050. Petroleum reserves shall increase until 2030 by 16 to 22 million tonnes of oil equivalent per year and 16 to 27 million tonnes of oil equivalent each year by 2050.<sup>17</sup>

The Vietnam Oil & Gas Upstream Market size is estimated at 177,000 barrels per day in 2024, and is expected to reach 181,000 barrels per day by 2029.<sup>18</sup>

## Gas

Vietnam's Gas production until 2023<sup>19</sup>



source: Ministry of Industry and Trade

According to the National Energy Master Plan (NEMP) for the 2021-2030 with the vision of 2050, Natural gas production is expected to reach 5.5 to 15 billion m3 each year by 2030. From 2031 to 2050 that number is expected to reach 10 to 15 billion m3 each year.<sup>20</sup>

Vietnam's industrial and commercial sectors rely heavily on natural gas for various applications such as manufacturing, petrochemicals, and hospitality.<sup>21</sup>

### List of LNG to Power Projects in Vietnam<sup>22</sup>

LNG terminal projects are planned to be in line with PDP-8

Supply gas for LNG power projects with total capacity up to 22,400 MW by 2030



source: APERC 2024, Ministry of industry and trade report

## Overall Energy Outlook

**Motor fuel prices nearly doubled** between 2020 and 2022 and then decreased in 2023.<sup>23</sup>

**Vietnam aims to develop its oil-stockpiling system** to stabilize its domestic oil consuming market and the productive capacity of its oil refineries, enhance energy security, and keep up with the development of the domestic oil market.<sup>24</sup>

**Vietnam's power consumption ranks second among ASEAN Countries, with an annual rate of 8% through 2030** to decrease the reliance on coal, the country has various gas-based power projects planned.<sup>25</sup>

Vietnam has significant energy reserves:

- 100 TWh of economically exploitable hydro resources
- more than 3 100 Mt of proved recoverable coal reserves
- almost 180 bcm of proven natural gas reserves (2022)
- approximately 595 Mt of crude oil reserves (2022), which are the third largest in Asia, behind China and close to those for India.<sup>26</sup>

In February 2023, the Vietnamese government approved the investment policy of the 2,250 MW Son My 2 CCGT power plant project in Quy Nhon, Binh Dinh province. The project will require an investment of USD 1.8 billion. The construction was expected to begin in 2023, and the commissioning is scheduled for 2025.<sup>27</sup>

In March 2024, Japan's Mitsui Oil Exploration (MOECO) announced its decision to invest in and develop Vietnam's Block B gas field, with its share of the development cost of about USD 740 million. The project, 330 km (205 miles) off southwest Vietnam, will comprise a gas field and a pipeline linking it to a gas-fired thermal power plant.<sup>28</sup>

To meet the growing demand, Vietnam needs 60,000MW of electricity by 2020, 96,500MW by 2025, and 129,500MW by 2030. To do so, the country needs to increase its installed capacity by 6,000MW – 7,000MW annually and spend close to US\$148 billion by 2030.<sup>29</sup>

As for the renewable energy sector, the funding required would be around US\$23.7 billion by 2030. For energy efficiency, a further US\$1.5 – US\$3.6 billion would be required during the same period, according to a report by the United Nations Development Programme.<sup>30</sup>

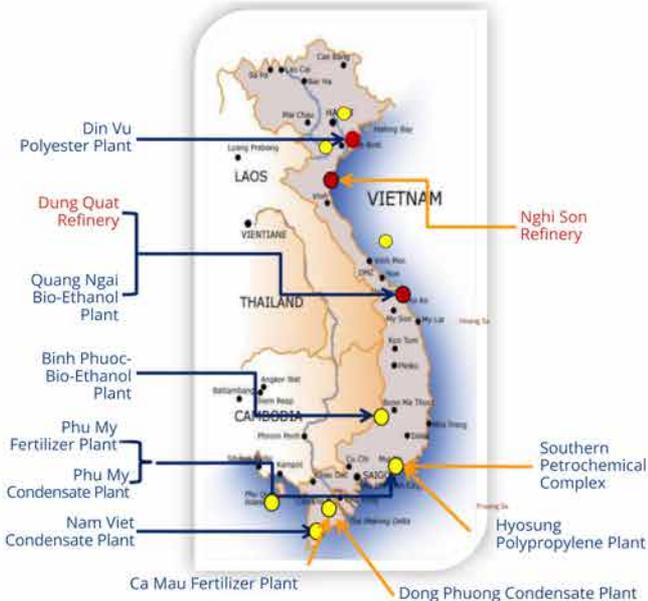


Picture: PetroVietnam Exploration Production

**PetroVietnam Oil Tanks in Vung Tau**  
PetroVietnam Oil Tanks, in which the investment would raise the country's crude oil and refined fuel storage capacity to 75-80 days of net imports. The country's current fuel storage capacity stands at 65 days of net imports.

## Oil

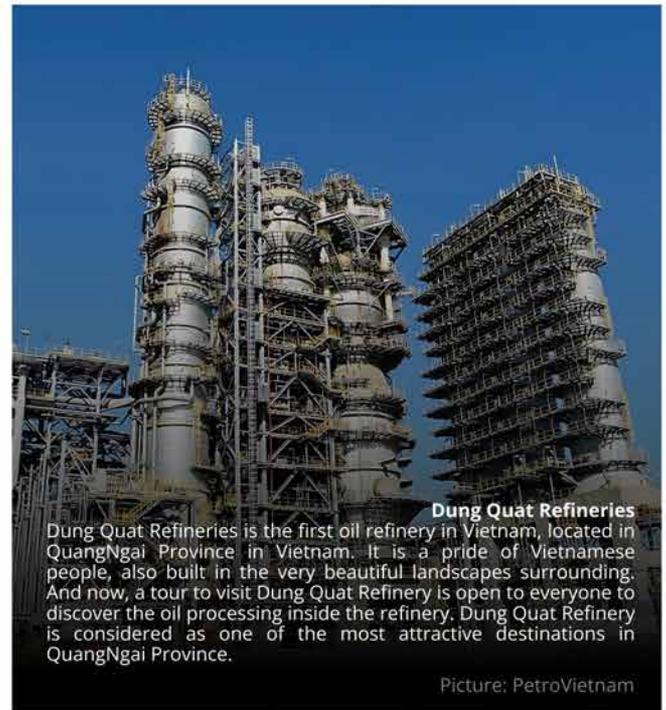
### Refineries and Petroleum Plants in Vietnam



source: APERC 2024, Ministry of industry and trade report

Capacities: 1)Dung Quat and Nghi Son refineries: 16.5 MM tons. Dung Quat will expand its capacity to 7.6 MM tons in 2028; 2)Southern Petrochemical complex will operate partially from 2022 and will reach full capacity of 2.7 MM tons in 2024.<sup>31</sup>

PetroVietnam has made two new oil discoveries with combined initial reserves of 100.5 million barrels of crude oil. Drilling at the R79 well in the Rong Field in the Block 09-1 off southeast Vietnam found initial reserves of 16.5 million barrels of crude oil. The field is operated by Vietsovpetro, a Vietnam-Russia joint venture.<sup>32</sup>



**Dung Quat Refineries**  
Dung Quat Refineries is the first oil refinery in Vietnam, located in QuangNgai Province in Vietnam. It is a pride of Vietnamese people, also built in the very beautiful landscapes surrounding. And now, a tour to visit Dung Quat Refinery is open to everyone to discover the oil processing inside the refinery. Dung Quat Refinery is considered as one of the most attractive destinations in QuangNgai Province.

Picture: PetroVietnam

Vietnam currently has 217 oil storage warehouses with a total capacity of about 6.38 million m<sup>3</sup>. Petrolimex is the only enterprise currently operating the oil pipeline network, with its biggest infrastructure being the B12 petroleum pipeline running from Quang Ninh province to Ha Nam province. This pipeline has strategic importance as it supplies over 50% of petroleum products consumed in Northern Vietnam.<sup>33</sup>

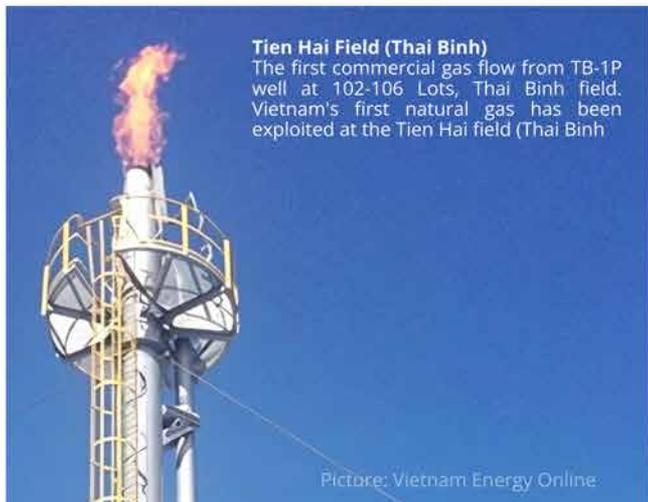
The main oil and gas fields under development are located in offshore zones in the southeast of the country. Hydrocarbon production is carried out by using numerous floating production storage and offloading (FPSO) units.<sup>34</sup>



#### Bach Ho Oil Field

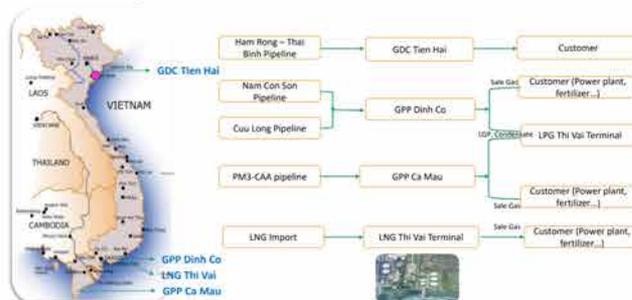
Fact: Bach Ho is the largest oil field in Vietnam, with a significant volume of crude oil. According to specific data, this field is producing about 38,000 tons of crude oil per day, accounting for 80% of the total crude oil exploited in Vietnam.

Picture: Wikimedia Commons



**Capacity:** 3 million metric tons of LNG a year.<sup>37</sup>

**Vietnam's gas and LNG infrastructure<sup>38</sup>**



source: APERC 2024, Ministry of industry and trade report

**Gas**

Vietnam's Plans on LNG terminals, specifically in Southern Parts of Vietnam:

- 2021-2025: 4 terminal with an estimated capacity of 1-3 million tonnes/year.
- 2026-2035: 6 more LNG import terminals each with an estimated capacity of around 3 million tonnes per year.<sup>35</sup>

The Thi Vai LNG: The 1st LNG Terminal Project was put into operation in the Southern province of Ba Ria - Vung Tau in October 2023. It is one of the biggest of its kind in Vietnam.

**Partners:** 1) Petrovietnam Gas Joint Stock Corporation (PV GAS), a subsidiary company of the Vietnam Oil and Gas Group (Petrovietnam; 2) Samsung C&T Corporation; 3) Petrovietnam Technical Services Corporation (PTSC).

**Capacity:** terminal capable of handling vessels with deadweight tonnage (DWT) of up to 100,000, a storage tank of 180,000 cu.m; storage capacity of 1 million tonnes of LNG per year, which will be raised to 3 million tonnes in the second phase. Its LNG deliquification capacity stands at 171 tonnes per hour.<sup>36</sup>

Vietnam's second LNG terminal starts commissioning phase In May 2024, named The Cai Mep LNG. Located in Vietnam's southern Ba Ria Vung Tau province. It is connected to the Phu My industrial zone and will supply gas to the Hiep Phuoc power plant, Partners: Singapore-based Atlantic, Gulf and Pacific LNG (AG&P LNG) and Vietnamese petroleum trader Hai Linh Company Capacity: 3 million metric tons of LNG a year.

**Partners:** Singapore-based Atlantic, Gulf and Pacific LNG (AG&P LNG) and Vietnamese petroleum trader Hai Linh Company.

**Other Energy Sources**

Large State-owned companies operate in the energy sector: PVN for hydrocarbons (90% of total gas production), EVN for electricity (46% of total output), and Vinacomin for coal (95%). PDP8 prioritizes the development of solar and wind power sources on a large scale (with a tripling of wind power capacity and a doubling of solar power capacity.<sup>39</sup>

Vietnam's installed solar capacity of rooftop solar and solar farm has doubled in recent years, rising to an estimated 17,600 MW in 2021, owing mainly to a massive build of more than 11,000 MW in 2020.<sup>40</sup>

Hydropower source: Currently there are about 17GW of large hydroelectricity over 30MW and 3.4GW of small hydroelectricity. As of November 2023, the total hydropower installation capacity reached more than 23 GW, accounting for more than 40% of the country's total power capacity. Large power plants in Vietnam include Hoa Binh, Son La, Lai Chau, and Yaly.<sup>41</sup>

Vietnam's wind power industry is making strong developments. As of November 2023, the total installed wind power capacity reached more than 7 GW, a 10-fold increase compared to 2020. Many large wind power projects are being implemented such as the La Gan offshore wind power project (4 GW), Mui Dinh offshore wind power project (3.5 GW), and Thang Long offshore wind power project (2 GW).<sup>42</sup>

**Supply and Future Demand<sup>43</sup>**

Vietnam's Renewable Energy Sources			
Power Source	Installed Capacity (MW)	Potential (MW)	
Small hydropower	1648	7,000 (technical)	
Wind	189.2	26,763 (technical))	
Biomass	270	318,630 (theoretical)	
Solar	8	7,140 (commercial)	

Source: EVN Annual Report 2018 modified

## Energy Supply

### Oil

From now to 2025, the Vietnam Oil and Gas Group (PVN) will expect to exploit 6 - 10 new oil and gas projects:

- RC-8 of Dragon field, BK-22 rig, and BK-4A rig of Bach Ho field and a number of structures in Block 09.1
- White Whale (Kinh Ngu Trang) – Southern White Whale field, Lot 05.1a, Gold Camel -A rig and 2 gas projects as Swan – Gull (Thien Nga - Hai Au)
- Nam Du - U Minh fields. In the period of 2025 - 2030, PVN will strive to put large gas projects into operation such as Block B (quarter 4/2026), White Lion (Su Tu Trang) - Phase 2 B (September 2026)
- Blue Whale (2028).<sup>44</sup>

Vietnam would need investment of up to 270 trillion dong (\$11.51 billion) to expand its national fuel storage system by 2030. The investment would raise the country's crude oil and refined fuel storage capacity to 75-80 days of net imports.<sup>45</sup>

November 2023: SK Innovation's subsidiary, SK Earthon, an exploration and production company, announced the successful discovery of crude oil in Block 16-2 in the southeastern offshore area, located in the Cuu Long Basin, which is considered one of the most promising exploration areas in Vietnam.<sup>46</sup>

April 2024: Hibiscus Oil & Gas Malaysia Limited, a subsidiary of Hibiscus Petroleum Berhad, announced a second discovery in the offshore Malaysia-Vietnam agreement area, with the successful completion of the drilling of the Bunga Aster-1 exploration well. The Bunga Aster-1 well encountered approximately 17.5 m of oil-bearing sandstone with up to 46 m of potential oil column.<sup>47</sup>

### Gas

Vietnam plans to build 15 LNG-fired power plants by 2035 with a combined capacity of more than 22 GW, accounting for nearly 15% of the country's total power generation mix.<sup>48</sup>

Due to its LNG terminal development, Cai Mep LNG will issue and award a tender in June seeking a commissioning cargo for the terminal.<sup>49</sup>

The upcoming tender aims to procure a commissioning cargo, which is essential for testing the terminal's systems and ensuring operational readiness. This initial shipment is a crucial step before the terminal becomes fully operational.

PV GAS is also building Son My LNG import terminal, based in the south-central province of Binh Thuan, with a designed capacity of 3.6 million tonnes of LNG per year in the first phase and 10 million tonnes in the second phase.<sup>50</sup>

Vietnam will maintain the operation of its 16 existing liquid petroleum gas (LPG) warehouses until 2030. Investments will be directed towards the construction of liquefied natural gas (LNG) reserve infrastructure at the Cai Mep Industrial Park in Ba Ria-Vung Tau and Nam Dinh Vu Industrial Park in the northern port city of Haiphong, with a total capacity of about 5.1 million tonnes per year.<sup>51</sup>

## Other Energy Sources

### The Hydrogen Projects in Vietnam:<sup>52</sup>

No.	Title of project	Project capacity (1,000 tons/yr)
<b>I The 2026-2030 period</b>		
1	Projects in the Northern region	100 - 200
2	Projects in the Central region	200 - 400
3	Projects in the Southren region	200 - 400
<b>II The 2031-2050 period</b>		
1	Projects in the Northern region	1,000 - 6,000
2	Projects in the Central region	3,000 - 12,000
3	Projects in the Southren region	3,000 - 12,000

source: APERC 2024, Ministry of industry and trade report

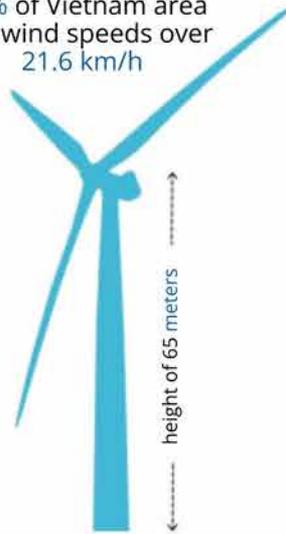
In 2022, Vietnam's government authorities approved the construction of two floating solar projects on the Khe Go and Vuc Mau lakes with a total capacity of 450 MW. Both are expected to be commissioned by the end of December 2023 and are estimated to cost USD 340 billion.<sup>53</sup>

Vietnam is considered the country with the greatest potential for solar energy development in Southeast Asia. Vietnam can reach 85 GW of solar power by 2030 and 214 GW by 2050. With more than 2,500 hours of sunshine per year, Power projects are being implemented across the country, especially in sunny regions such as the central and southern regions.<sup>54</sup>

The country is actively capitalizing on this potential, with plans to nearly double its onshore and near-shore wind power capacity by 2030, reaching 11.3 GW from its current level of 5.8 GW in 2021. Looking ahead, Vietnam has set its sights on offshore wind farms as well. The government has identified a promising pipeline of 143 offshore wind farm projects, including several large-scale ventures exceeding 2 GW each.<sup>55</sup> The Vietnamese government recognizes the potential of offshore wind as a clean and renewable energy source. Offshore wind farms can help meet the growing energy demands while reducing greenhouse gas emissions.

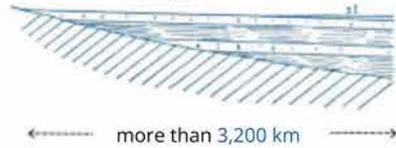
## STAKEHOLDERS

39% of Vietnam area has wind speeds over 21.6 km/h



The country's long and narrow geographic shape consisting of:

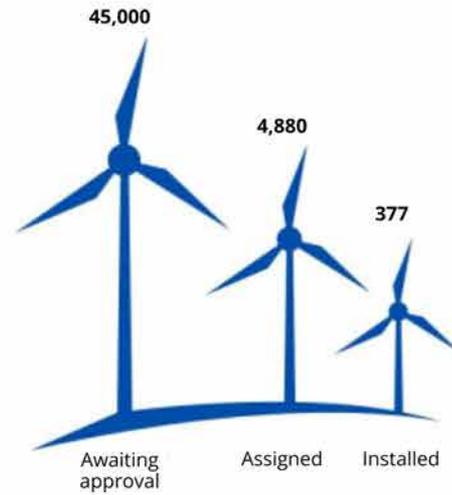
A long coastline



**8.6%**

of country's land area suitable for large wind farms

TOTAL WIND ENERGY CAPACITY BY 2020  
unit: megawatt (MW)



source: Source of Asia

In 2016, the government approved the revised National Power Development Master Plan ("PDP VII") for the 2011- 2020 Period, with a vision for 2030. The next PDP VIII is expected to be released sometime in 2020.<sup>56</sup>

Vietnam's Renewable Energy Sources <sup>57</sup>				
Power Source		2020	2025	2030
Hydro Power	Total capacity (MW)	800	2000	6000
	Electricity production	0.80%	1%	2.10%
Wind	Total capacity (MW)	21,600	24,600	27,800
	Electricity production	29.50%	20.50%	15.50%
Biomass	Electricity production	1%	1.20%	2.10%
Solar	Total capacity (MW)	850	4,000	12,000
	Electricity production	0.50%	1.60%	3.30%

source: EVN Annual Report 2018 modified

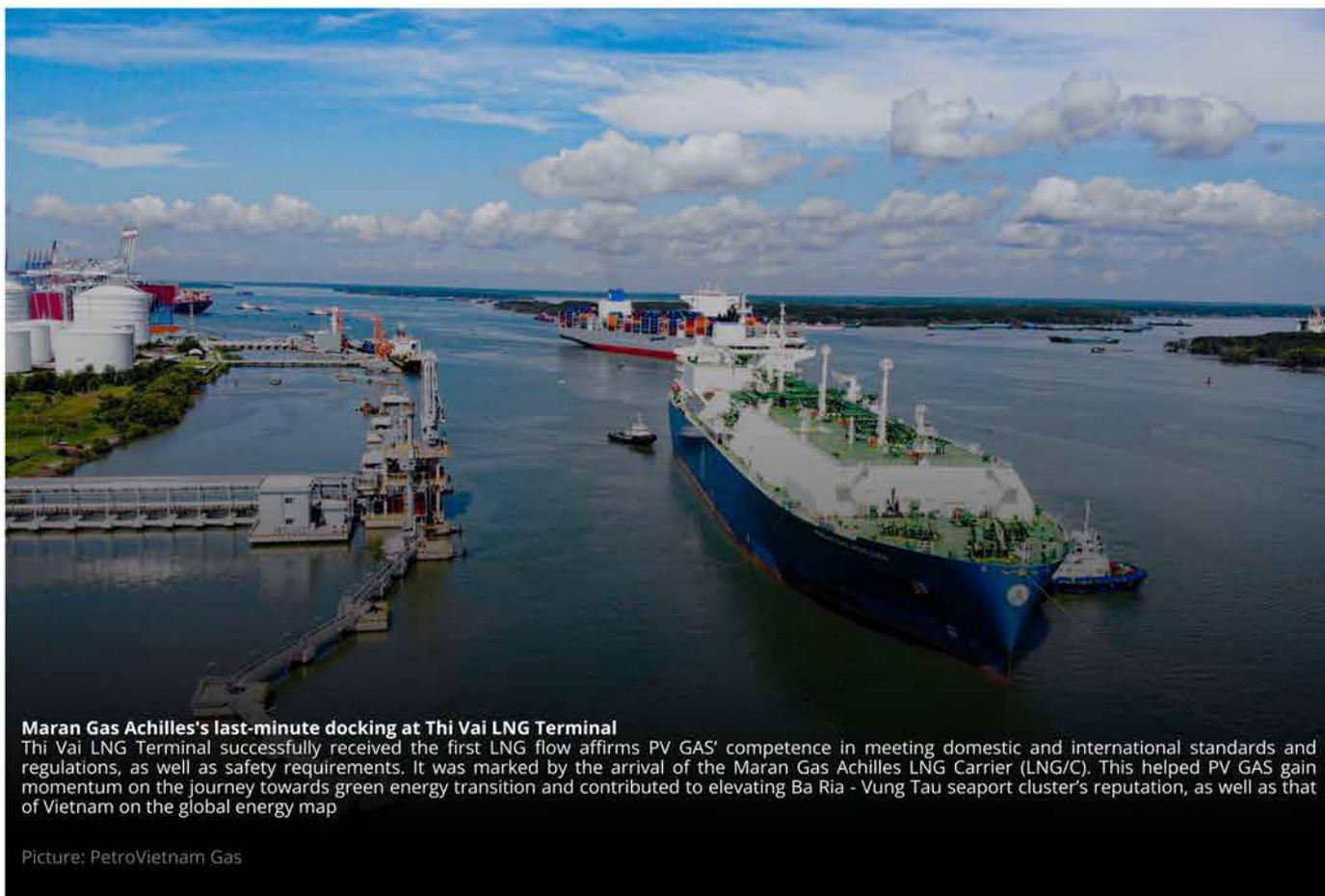


**Son La Hydroelectric Plant**

Son La hydroelectric plant, the largest hydroelectric plant in Southeast Asia. Hydroelectric projects are not only a source of clean energy but also play a significant role in regulating drought and floods, and promoting tourism development in many areas. Large power plants in Vietnam include Hoa Binh, Son La, Lai Chau, and Yaly.

Picture: Đặng Công Sà Vietnam

## Ministries



### Maran Gas Achilles's last-minute docking at Thi Vai LNG Terminal

Thi Vai LNG Terminal successfully received the first LNG flow affirms PV GAS' competence in meeting domestic and international standards and regulations, as well as safety requirements. It was marked by the arrival of the Maran Gas Achilles LNG Carrier (LNG/C). This helped PV GAS gain momentum on the journey towards green energy transition and contributed to elevating Ba Ria - Vung Tau seaport cluster's reputation, as well as that of Vietnam on the global energy map

Picture: PetroVietnam Gas

## The Ministry of Industry and Trade (MOIT)

The Ministry of Industry and Trade (MOIT) supervises the energy sector. Within the MOIT, the General Directorate of Energy (GDE) administers the energy sector through three Departments: Electricity and Renewable Energy, Petroleum and Coal, and Energy Saving and Sustainable Development.

Regulations: Goals for the National Energy Development Strategy to 2030 with a vision to 2045:

- To maintain the national energy security as the firm foundation for socioeconomic development while rapidly and sustainably developing the energy sector;
- Based on the socialist-oriented market mechanism, to quickly develop a competitive and transparent energy market, diversify forms of ownership (especially the private sectors) and business models, and eliminate monopolies or unfair competition;
- To develop and diversify energy forms;
- To accelerate digital transformation and R&D in order to become more technology self-sufficient;

- To emphasize energy efficiency and environmental protection.

Supporting Policy Frameworks:

- Resolution 55-NQ/TW of the Politburo on orientation of Vietnam's National Energy Development Strategy through 2030, with a vision toward 2045
- National Energy Master Plan for period of 2021-2030, a vision to 2050
- National Energy Development Strategy of Vietnam to 2030, a vision to 2045
- Scheme on developing a competitive energy market to 2030, a vision to 2045
- Oil and Gas Industry Development Strategy toward 2025, orient to 2035
- Masterplan Development Of Vietnam's gas industry up to 2025, orientation to 2035
- National Master plan on infrastructure for petroleum and gas stockpiling and supply to 2030 and the orientation towards 2050
- Vietnam's Hydrogenenergy development strategy through 2030, with a vision to 2050
- National Power Development Plan 8 (PDP8)<sup>58</sup>

## Agencies

### PetroVietnam

National oil company, PetroVietnam, has the right to take an equity stake in each contract area; recent contract awards suggest up to 20-50% under a joint operating company structure. Royalty rates and profit sharing splits are based on production rates. Various fees, export duty on crude oil, petroleum income tax and oil surcharge (additional profits tax) are also payable. Bonuses, cost recovery ceilings and profit splits are negotiable. In designated frontier areas, investors can benefit from lower royalty, oil surcharge and petroleum income tax, and higher cost recovery ceilings and profit splits under the 'petroleum investment promotion' scheme.<sup>59</sup>

International O&G in Vietnam:

- Murphy Oil take FID on Lac Da Vang development: in November 2023, Murphy Oil announced that they had taken FID on their Lac Da Vang oil field development in Block 15-1/05. Murphy hold 40% and are operator, with their partners being PVEP (35%), and SK Earthon (25%). The phased development plan is based on a production platform and a leased FSO, with first production expected in 2026. It targets 100 MMboe of estimated recoverable resource, with an expected production rate of 30-40Mbbbl/d.
- Jadestone Energy sign gas sales HoA: in January 2024 (not strictly 2023), Jadestone Energy signed a heads of agreement (HoA) related to the potential development of the Nam Du and U Minh gas fields located in Block 46/07 and Block 51. Jadestone holds 100% in these PSCs and the HoA is the first real progress towards developing the fields since 2019.
- In addition, there appears to be some firmer progress around the Block B - O Mon project. However, we have been here a number of times in the past and we know positive talk does not always equal real progress. As a reminder, the project partners are PetroVietnam, PVEP, MOECO, and PTTEP.

**Basis investment law:** Vietnam's Law on Enterprises 2014 & Law on Investment 2014, recognizes 3 forms of contracts: branch, representative office (RO), business cooperation contract (BCC), public-private partnership (PPP).

**Liberalization (doi moi) in Vietnam:** Amended and Supplemented Law on investment in 2017 by reducing 267 conditional business to 243, including removing legal barriers & supporting entrepreneurship (SME).



The Vietnam Oil and Gas Group (Petrovietnam) has worked hard over the past nearly 50 years to fulfill its missions of contributing to ensuring national energy security and being an economic locomotive.

Picture: VietnamPlus

#### Fiscal term (Cost rec, PSC, gross split)

- Based on Amended Petroleum Law 2008, Implements Production Sharing Contract (PSC) since 2005, modified to a new model in 2013.

#### Exploration term & Production term

- Incentives for NRE investment: corporate income tax rate of 10% for the first 15 years; exemption from land use fees for up to 11 years can be extended to 15 years; exemption from land rents and water.
- Article 17: The term of oil and gas contract (approved only by the Prime Minister) max. 25 years with max. 5 years extension; exploration and prospecting period max 5 years with 2 years extension.

#### Partnership obligation & Local content

- Vietnam Oil and Gas Group has the preemptive right to buy part or whole of an oil and gas; must give priority to Vietnamese organizations and individuals in concluding these contracts. Yet, the land is owned by Vietnamese Government.

#### New Oil and Gas Law (2023)

- To promptly guide the novel and progressive provisions of the 2022 Law on Oil and Gas (the Law), on July 1, the effective date of the Law, the Government promulgated Decree 45/2023/ND-CP issuing the model product sharing contract.
- The Decree give provisions on dossiers, order and procedures for appraisal and approval of matters falling within the Prime Minister's competence (Article 64); dossiers, order and procedures for appraisal and approval of matters falling within the competence of the Ministry of Industry and Trade (Article 65); and principles for receiving dossiers and settling procedures related to basic oil and gas investigation and oil and gas activities (Article 66).
- To guide Article 7 of the Law concerning procedures for appraisal and approval of the list of oil and gas blocks, Article 12 of the Decree says that the Vietnam Oil and Gas Group is responsible for drawing up or modifying the list of oil and gas blocks and submitting, by hand-delivery or by post, two dossiers (one dossier with original papers and the other with copied papers) to the Ministry of Industry and Trade for appraisal.



## 5 Days

Within 15 days after receiving the request from the Ministry of Industry and Trade, the consulted ministries, sectors and localities will have to give their written opinions on contents falling under their state management to the Ministry of Industry and Trade.



## 15 Days

Within 15 days after receiving the request from the Ministry of Industry and Trade, the consulted ministries, sectors and localities will have to give their written opinions on contents falling under their state management to the Ministry of Industry and Trade.



## 45 Days

Subsequently, within 45 days after receiving a valid dossier, the Ministry of Industry and Trade will have to complete the appraisal thereof and finalize and submit the new or modified list of oil and gas blocks to the Prime Minister for consideration and approval.

- A dossier for approval of the above list must comprise a report on appraisal results to the Prime Minister, requesting approval of the list of oil and gas blocks; documents on the list of oil and gas blocks drawn up by the Vietnam Oil and Gas Group; and a sum-up report on making of replies, and explanation about replies, to the opinions of the above ministries and sectors, and a paper showing copies of such opinions.
- The Decree allows organizations and individuals to access, refer to, exploit and use specimens of, and documents, information, data and reports on, basic oil and gas investigation results in the form of public services and pay a service charge in accordance with the law on charges and fees.
- Particularly, organizations in charge of implementing basic oil and gas investigation schemes under agreements signed with the Vietnam Oil and Gas Group may propose cost recovery when participating in the bidding and signing of oil and gas contracts at oil and gas blocks in areas where basic investigation has been carried out under such scheme.<sup>60</sup>

By the end of November, the Vietnam Oil and Gas Group (Petrovietnam) had completed all targets of finance and oil and gas exploitation and production in 2022 ahead of schedule, and set new records in revenue and pre-tax profit, according to its General Director Le Manh Hung.

Picture: VietnamPlus

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## IN COLLABORATION

### Center for ASEAN Research on Energy (CARE) Universitas Pertamina

Welcoming Indonesia's transition to leadership in ASCOPE as Secretary-in-Charge, starting in November 2024 and continuing until 2029, CARE Universitas Pertamina is honored to collaborate with Pertamina Energy Institute (PEI), PT. Pertamina (Persero) to develop the ASCOPE Country Profiling 2024: Revealing Update on the Energy Status of 10 Southeast Asian Countries with the spirit to explore potential business collaborations among ASCOPE members.

The Center of ASEAN Research on Energy (CARE) Universitas Pertamina is a Center of Excellence at Universitas Pertamina, Jakarta, Indonesia. CARE Universitas Pertamina focuses on the development of research and the implementation of science in the fields of science, technology, and social sciences, especially related to energy issues and sustainable development.

CARE Universitas Pertamina was officially established on March 20, 2020, bringing together several International Relations, Communication Science, Management, Economics, and Industrial Technology experts. The vision of CARE Universitas Pertamina is to become an advanced study center in the energy sector, and its main strategic fields related to ASEAN and facilitate experts at Universitas Pertamina and its domestic and foreign affiliates. CARE Universitas Pertamina commits to (1) developing research that is closely related to energy issues and sustainable development; (2) building cooperation with strategic partners to encourage study results that are beneficial to the broader community; (3) building a reputation as a study center at the national and international levels, especially within the scope of ASEAN; (4) encourage the availability of comprehensive academic references to the policy-making process of government and industry in the field of energy and sustainable development.



Several areas of focus for studies by expert researchers in CARE Universitas Pertamina:

1. **Global Energy Politics Study**, which includes strategic research related to socio-economic and political risks in the development of the international energy business, geopolitical mapping for energy cooperation at the multilateral level, and diplomatic intelligence studies, regarding government-to-government, business-to-business, and people-to-people.
2. **Sustainable Development Study**, which includes analysis of green, blue, and circular economy policies; Publication of ESG Industry reports; and holding webinars in the field of energy and sustainable development, including the development and empowerment of the community economy.
3. **Training**, which includes negotiation training, social research methods, and training related to visual design, as well as training in developing the capacity of local governments in foreign relations.

CARE Universitas Pertamina is confident that the ASCOPE Country Profiling 2024 reports will serve as a supporting reference for policymakers and stakeholders in the ASEAN Member States as they work to establish a robust policy framework that ensures secure, accessible, affordable, and sustainable energy in every country and throughout the region. We are eager to strengthen our collaboration with PT Pertamina (Persero) to advocate effectively for energy business development initiatives. This partnership will play a crucial role in advancing our shared goals and addressing the energy challenges that lie ahead.

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