

4. The Role of Natural Gas in Southeast Asia

APERC Workshop

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Asmayati Ab Manan, Senior Researcher, APERC

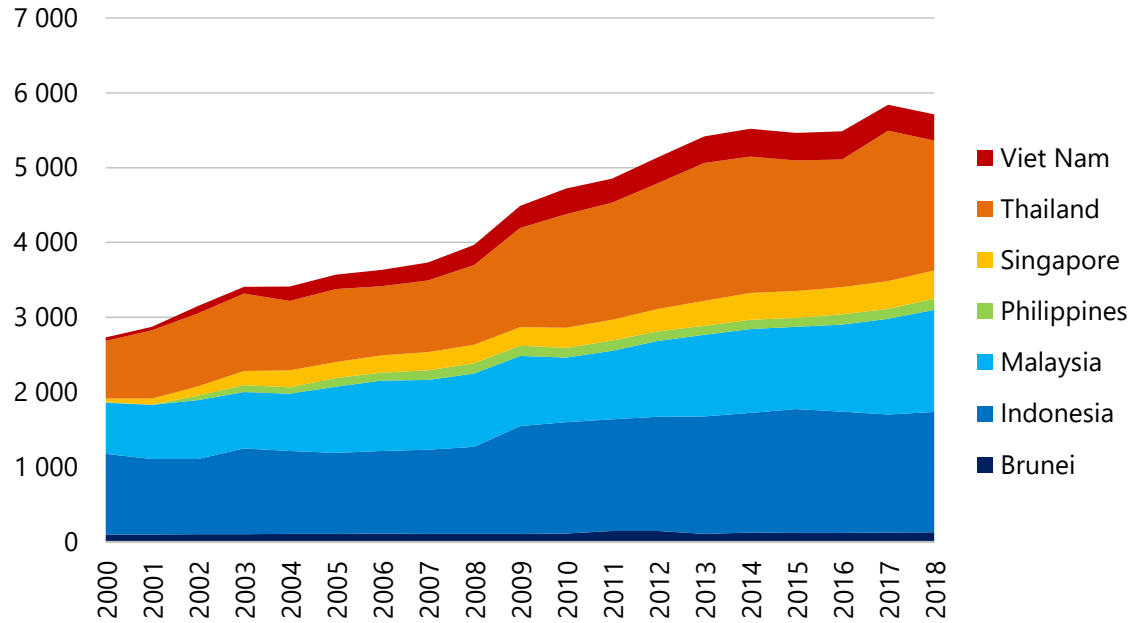


Outline

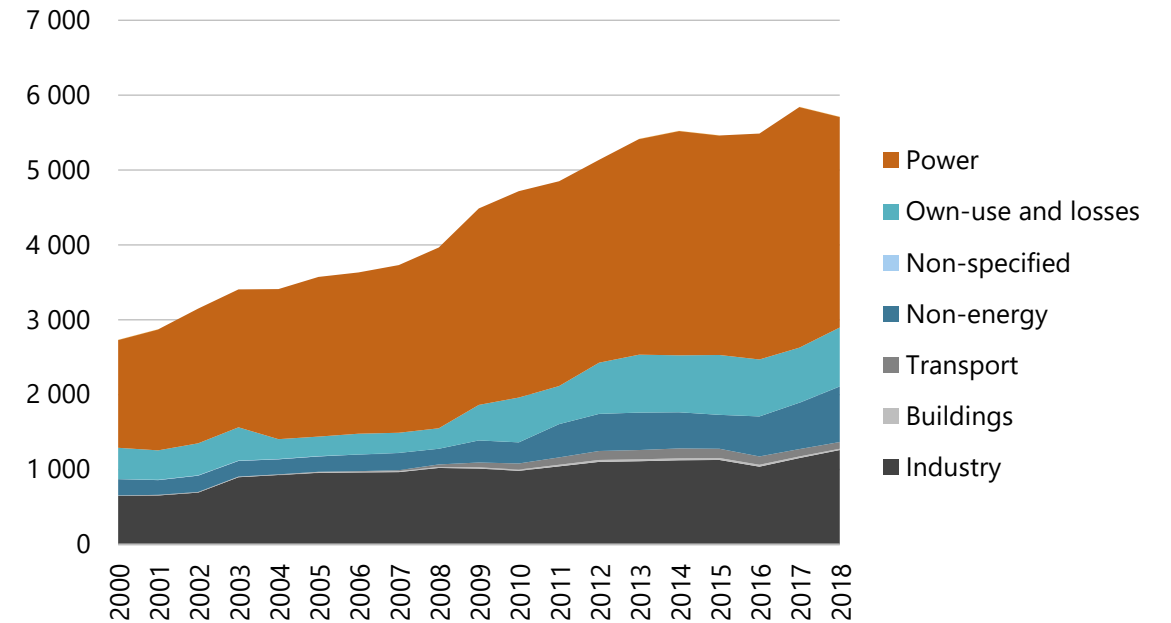
1. Historical role of natural gas in APEC Southeast Asia
2. The future role of natural gas in APEC Southeast Asia
3. Current gas issues and challenges
4. Summary

Coal-to-gas switching in the power sector drove gas demand growth in APEC Southeast Asia between 2000-2018

APEC SEA gas demand by economy, 2000-2018 (PJ)



APEC SEA gas demand by sector, 2000-2018 (PJ)

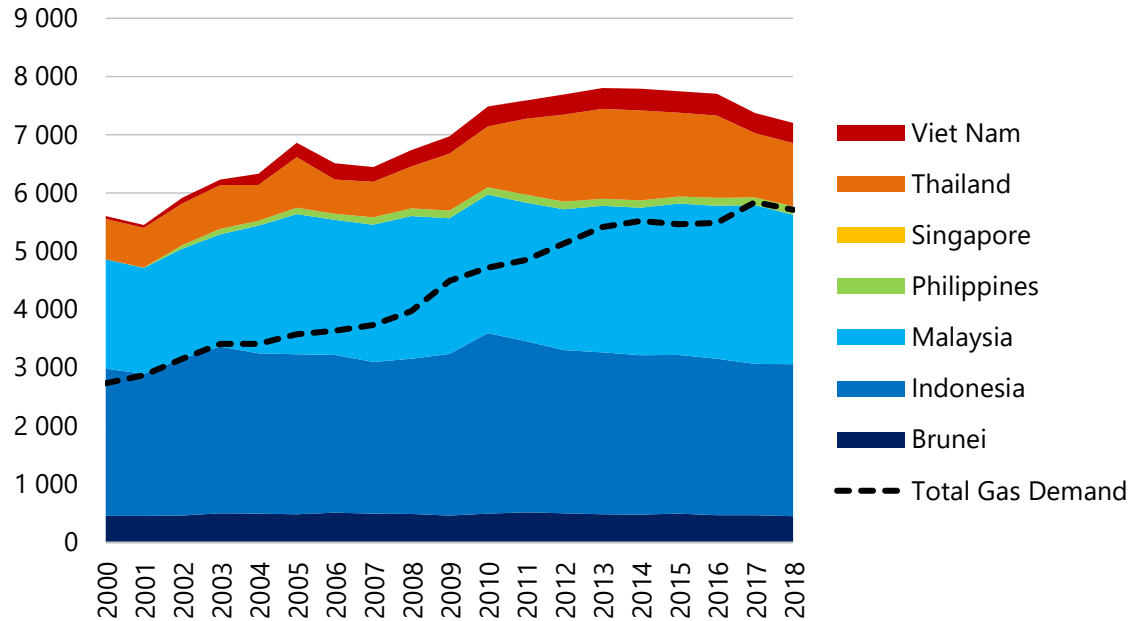


Source: APEC Energy Demand and Supply Outlook 8th Edition

- Strong economic and population growth in APEC Southeast Asia (APEC SEA) region and low gas prices in a few APEC SEA economies drove the 109% increase in gas demand from 2000 to 2018.
- Indonesia, Malaysia, and Thailand were APEC SEA's top 3 largest gas users, consuming more than 80% of total gas use.
- Power sector was the largest gas user in APEC SEA, ranging between 49% to 61% of total gas demand during the same period.

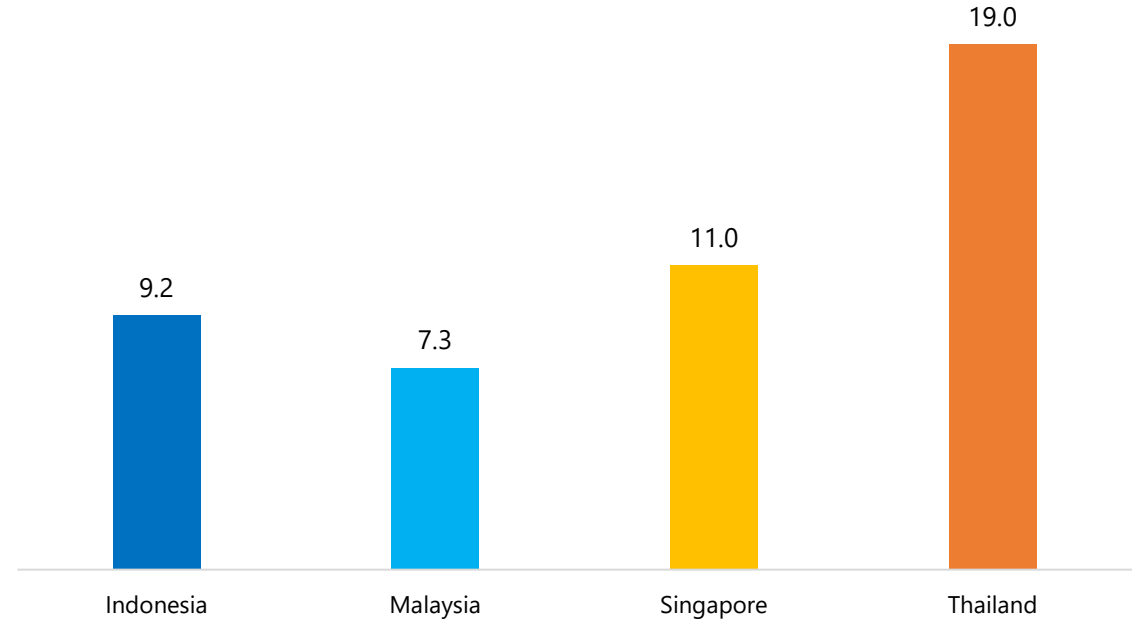
APEC SEA region started importing LNG in 2011

APEC SEA gas production by economy, 2000-2018 (PJ)



Source: APEC Energy Demand and Supply Outlook 8th Edition

LNG receiving terminal capacity as of February 2023 (Mtpa)



Source: CEDIGAZ, Refinitiv

- Several APEC SEA economies decided to build LNG receiving terminals due to various factors, including –
 - increasing gas demand,
 - declining domestic gas production due to matured oil and gas fields,
 - diversification of gas supply, and
 - geographic separation of gas supply and demand centres.

Almost all APEC SEA economies have committed to achieving carbon neutrality or net zero emissions

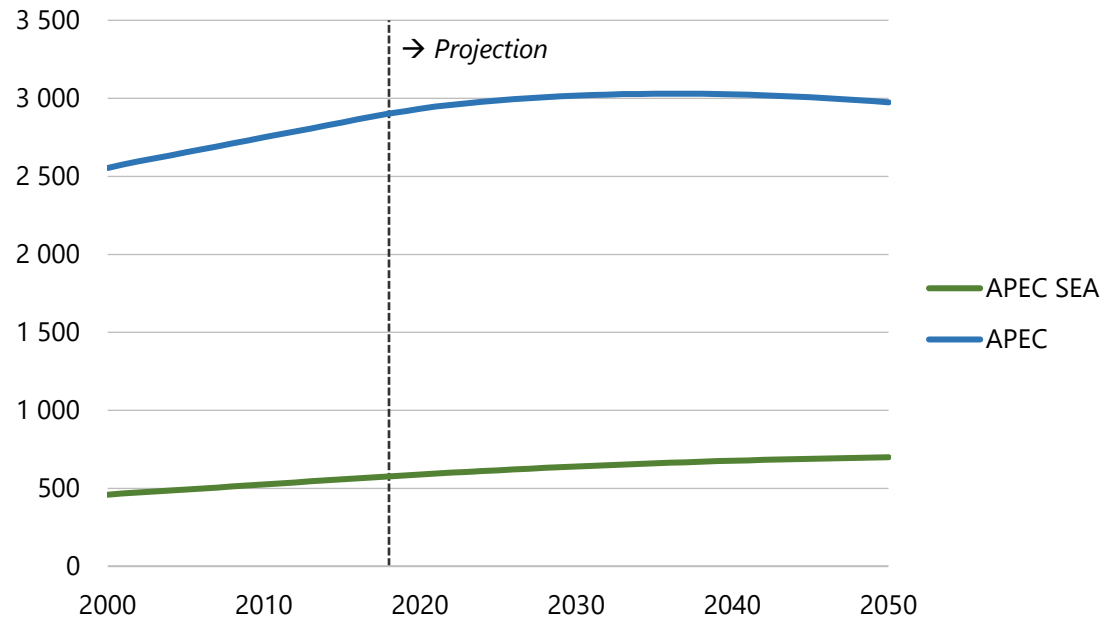
Economy	Economy's NDC reduction target (%)	Carbon Neutrality/Net Zero Emissions target?
Brunei	Reduce GHG emissions by 20% relative to BAU levels by 2030	Yes, net zero emissions by 2050
Indonesia	<ul style="list-style-type: none"> Reduce GHG emissions by 31.89% relative to BAU levels by 2030 Increase reduction to 43.20% by 2030, subject to international support 	Yes, net zero emissions by 2060 or sooner
Malaysia	Reduce GHG emissions intensity (against GDP) by 45% in 2030 from 2005 levels	Yes, carbon neutrality by 2050
Philippines	Reduce GHG emissions by 75% relative to BAU levels by 2030 (2.71% unconditional, and 72.29% conditional)	Not yet committed to carbon neutrality/net zero emissions
Singapore	Reduce GHG emissions to around 60 million tonnes CO ₂ e in 2030	Yes, net zero GHG emissions by 2050
Thailand	<ul style="list-style-type: none"> Reduce GHG emissions by 30% relative to BAU levels by 2030 Further reduce up to 40%, subject to enhanced support. 	Yes, carbon neutrality by 2050 and net zero GHG emissions by 2065
Viet Nam	<ul style="list-style-type: none"> Reduce GHG emissions by 15.8% relative to BAU levels by 2030 Further reduce up to 43.5%, subject to international support 	Yes, net zero emissions by 2050

Source: <https://unfccc.int/>

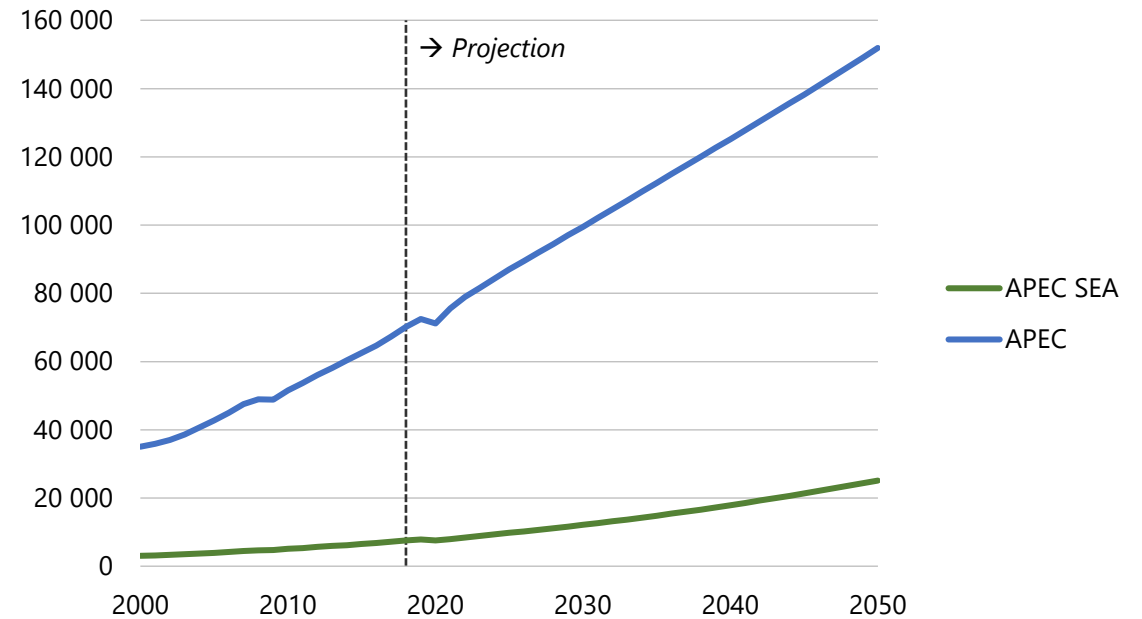
- APEC SEA economies pledged to reduce a certain level of GHG emissions by 2030 and to achieve carbon neutrality or net zero emissions target as early as 2050 or 2060, despite currently depending on fossil fuels.
- Singapore released the 2030 Nationally Determined Contribution and an Addendum to Singapore's Long-Term Low-Emissions Development Strategy (LEDS) in November 2022. comprising the action plans and detailed strategy to achieve climate targets. While other APEC SEA economies are developing their roadmap for the energy transition.

In addition to climate ambitions, macroeconomic trends will also drive APEC SEA region gas demand growth

Population, 2000-2050 (millions)



GDP, 2000-2050 (billions USD PPP 2018)

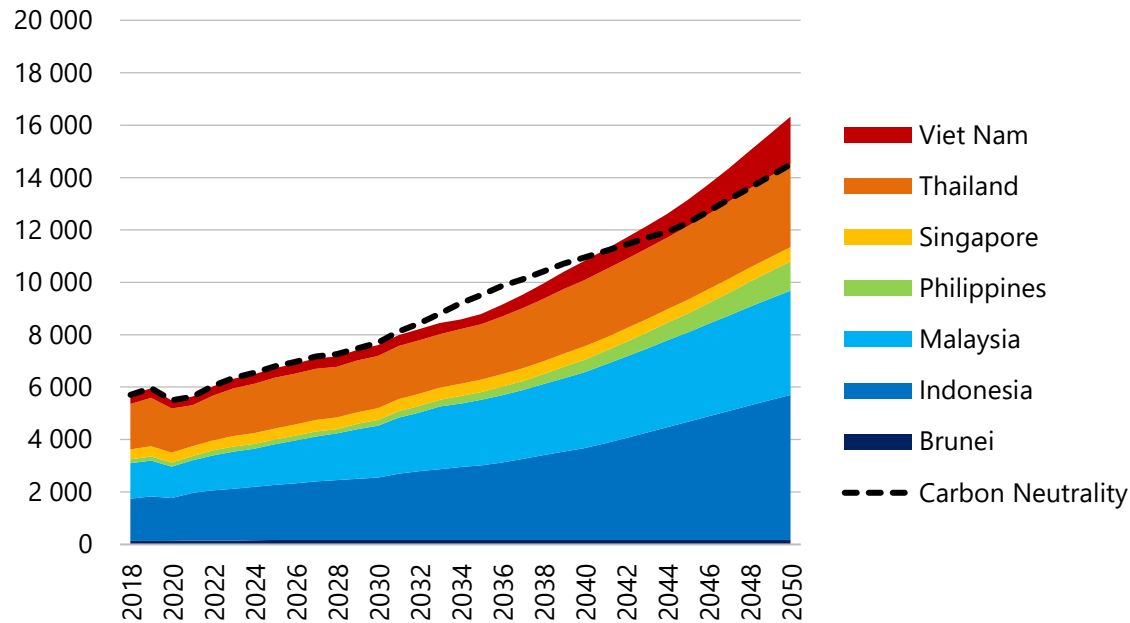


Source: UNDesa, OECD, APERC analysis

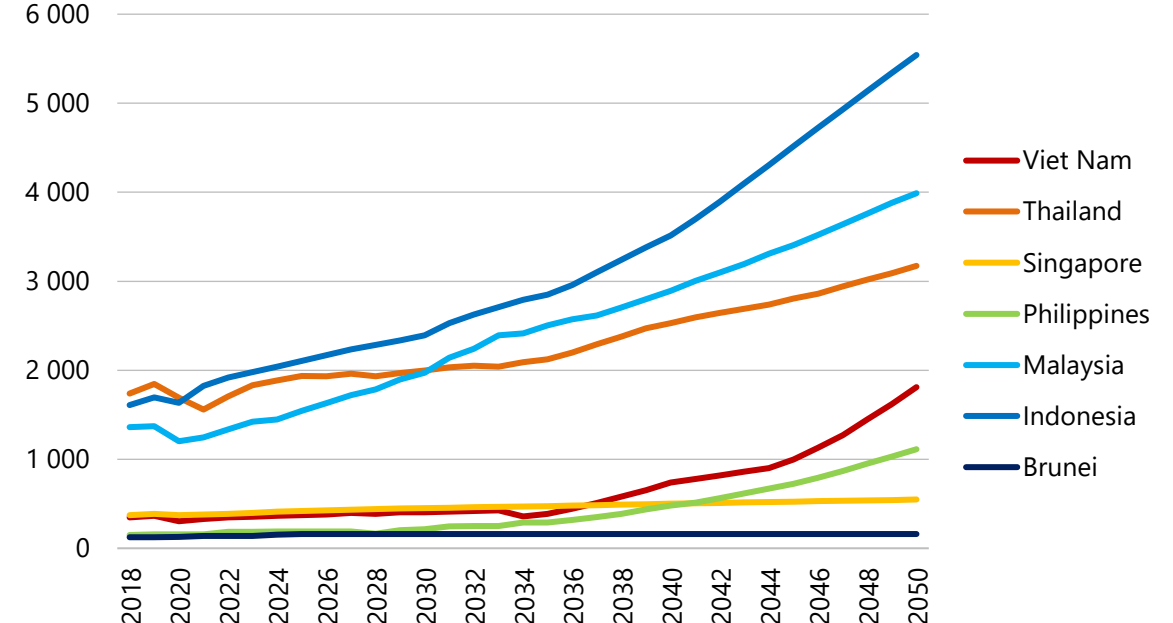
- Population and GDP trends are expected to drive energy demand (including gas) through 2050.
- The APEC SEA represents around 20% of the APEC-wide population.
- GDP of 4 APEC SEA economies are expected to triple or more by 2050, i.e. Indonesia, Malaysia, Philippines, and Viet Nam.

Gas is projected to account for 30% of the total primary energy supply in APEC SEA by 2050

APEC SEA total gas demand in REF, 2018-2050 (PJ)



APEC SEA gas demand by economy in REF, 2018-2050 (PJ)

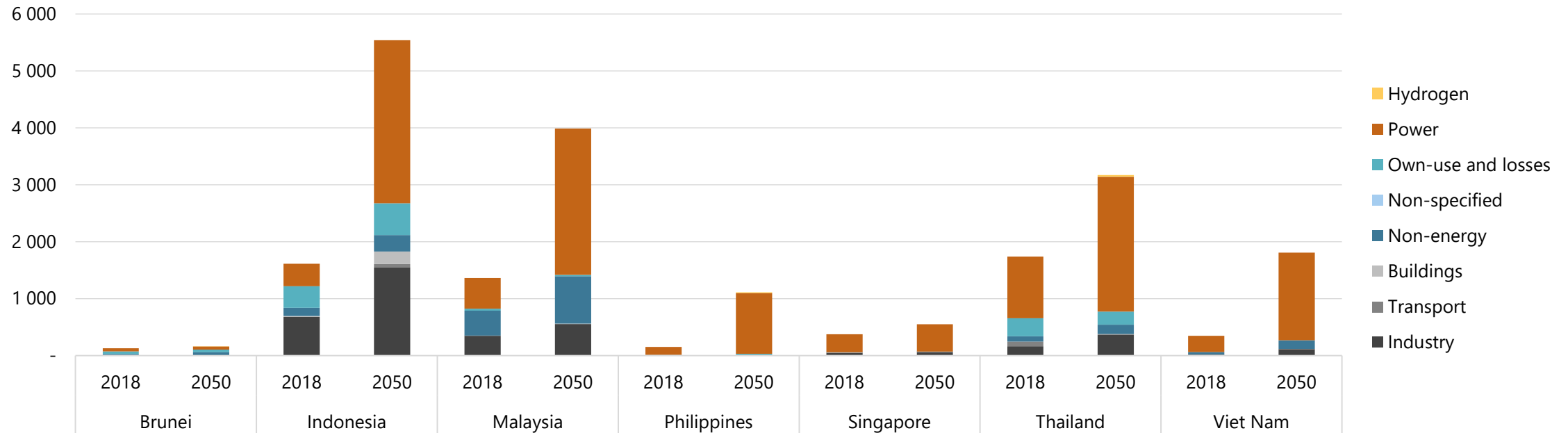


Source: APEC Energy Demand and Supply Outlook 8th Edition

- 186% increase in gas demand by 2050 in Southeast Asia economies, driven by climate ambitions and economic growth.
- Indonesia, Malaysia, and Thailand will remain Southeast Asia's top 3 largest gas users through 2050. These three economies represented 83% of the region's gas use in 2018. The share will peak at 85% in 2034 and decrease to 78% by 2050.

Power sector will remain the largest gas user in APEC SEA through 2050

APEC SEA gas demand by sector, 2018 and 2050 (PJ)

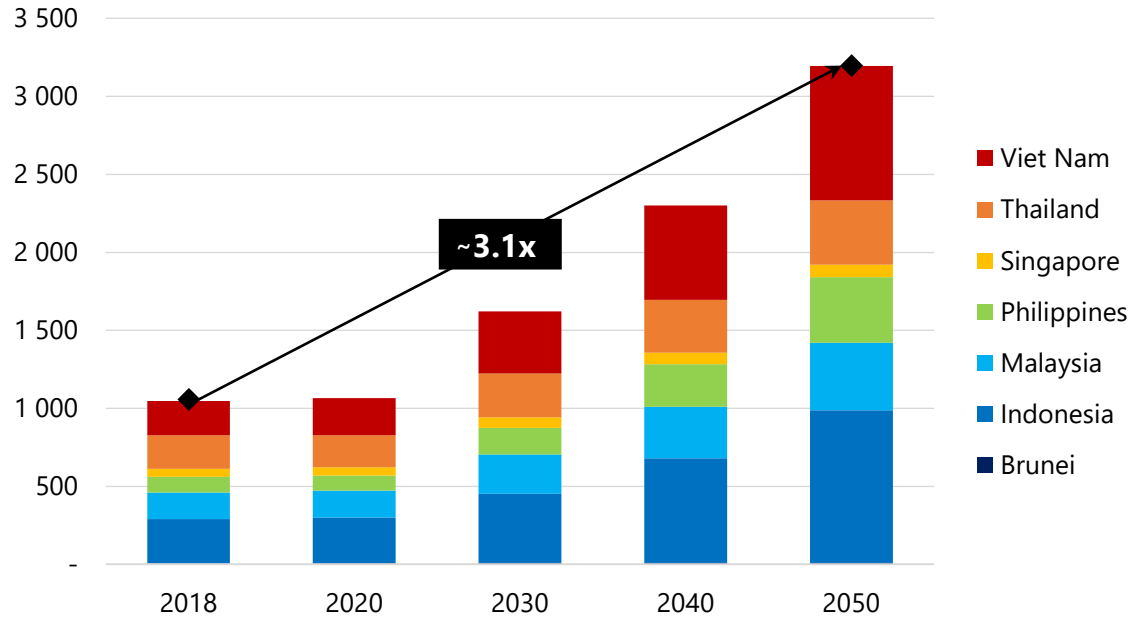


Source: APEC Energy Demand and Supply Outlook 8th Edition

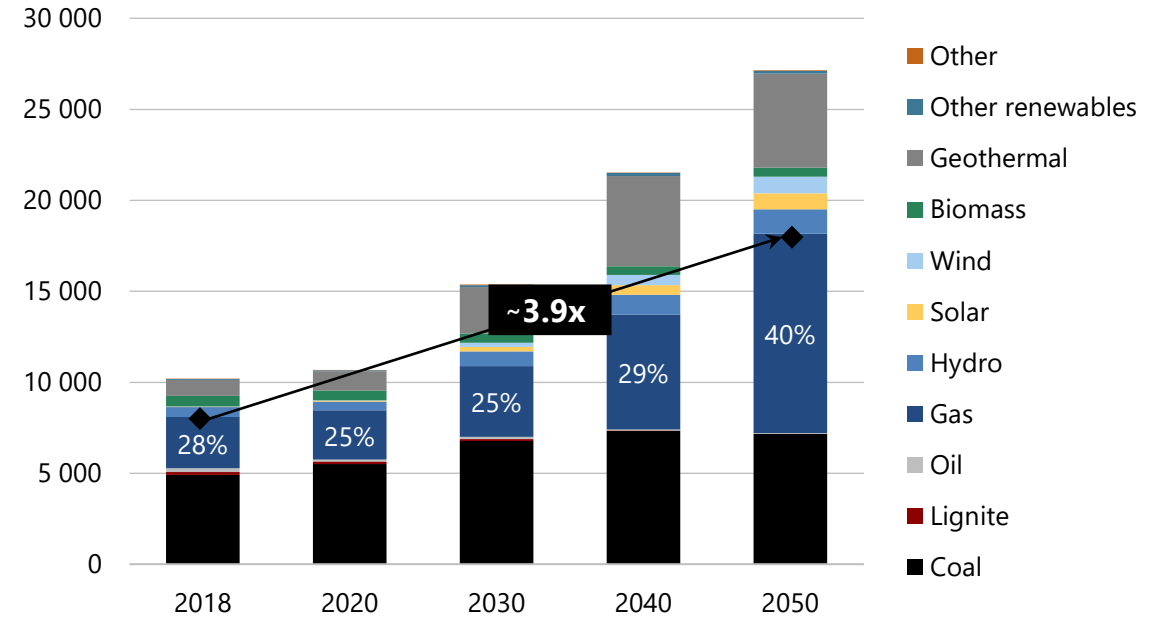
- The power sector will replace the industry sector as the largest gas user in Indonesia in 2040.
- Indonesia, Malaysia and Thailand will contribute about 78% of industry sector gas demand growth through 2050.
- Gas demand from the non-energy sector will remain substantial in Brunei and Malaysia through 2050, specifically as a feedstock for fertiliser and petrochemical plants.

APEC SEA power sector gas demand expected to almost quadruple by 2050

APEC SEA electricity generation by economy in REF, 2018-2050 (TWh)



APEC SEA input fuel for electricity generation in REF, 2018-2050 (PJ)

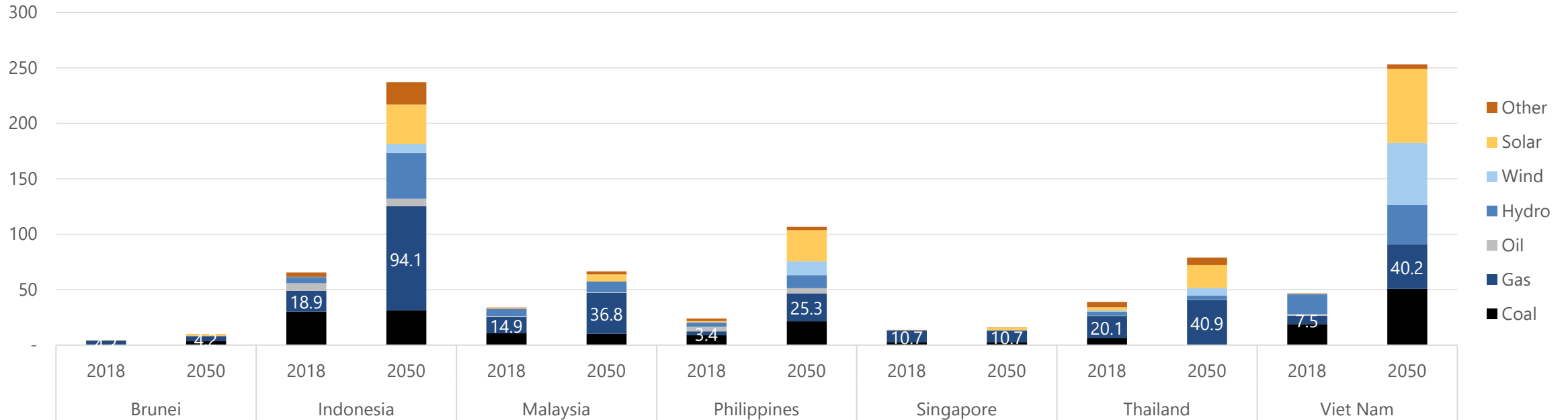


Source: APEC Energy Demand and Supply Outlook 8th Edition

- APEC SEA electricity generation will triple by 2050 to meet increased demand in all sectors.
- Power sector gas demand will increase 3.9 times by 2050, compared to 2018, as gas and renewables will replace the declining coal and meet significant growth in electricity demand.
- Gas will replace coal as the main fuel for electricity generation by 2050 in the APEC SEA region.

APEC SEA region expected to require additional 172 GW of gas-fired power plants by 2050

APEC SEA generation capacity in REF, 2018 and 2050 (GW)

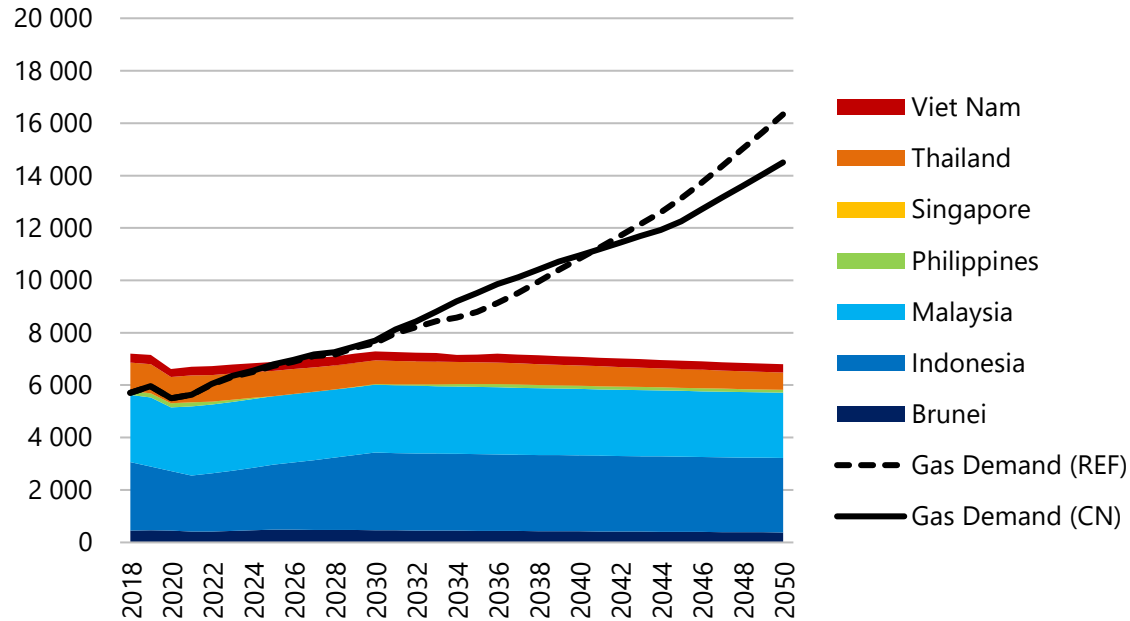


Source: APEC Energy Demand and Supply Outlook 8th Edition

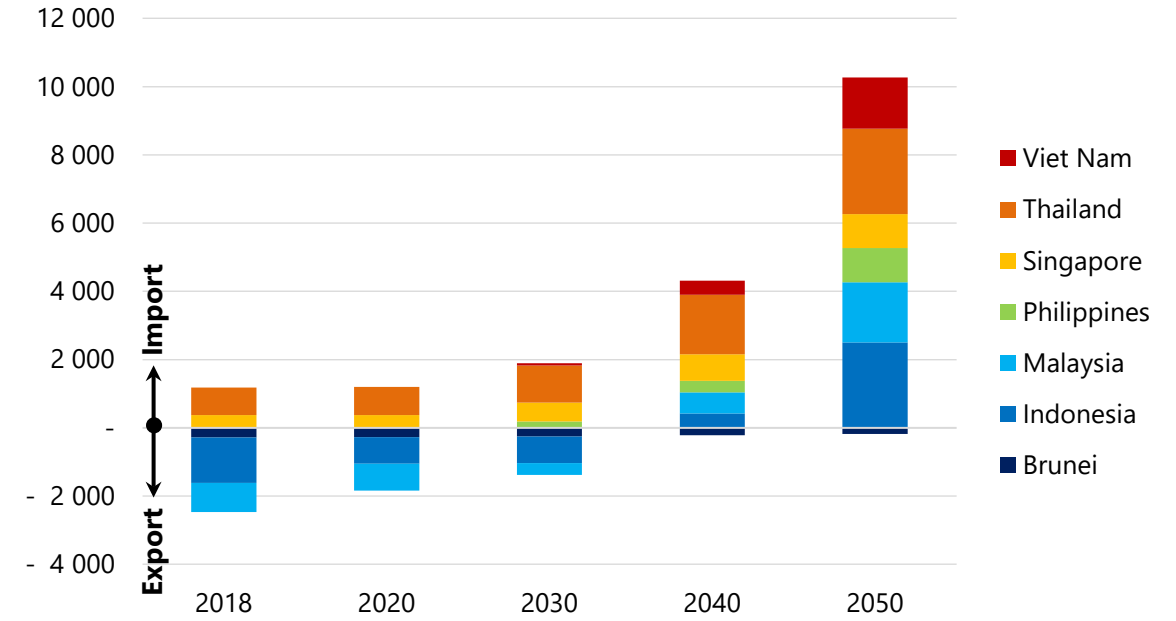
- 75 GW or 44% of additional gas-fired power plants will be built in Indonesia by 2050.
- Gas-fired power plants will have the largest share of APEC SEA generation capacity by 2050, except for the Philippines and Viet Nam.

LNG imports into APEC SEA are expected to grow by 2050

APEC SEA gas production and demand, 2018-2050 (PJ)



Net natural gas trade in APEC SEA economies in REF, 2018-2050 (PJ)

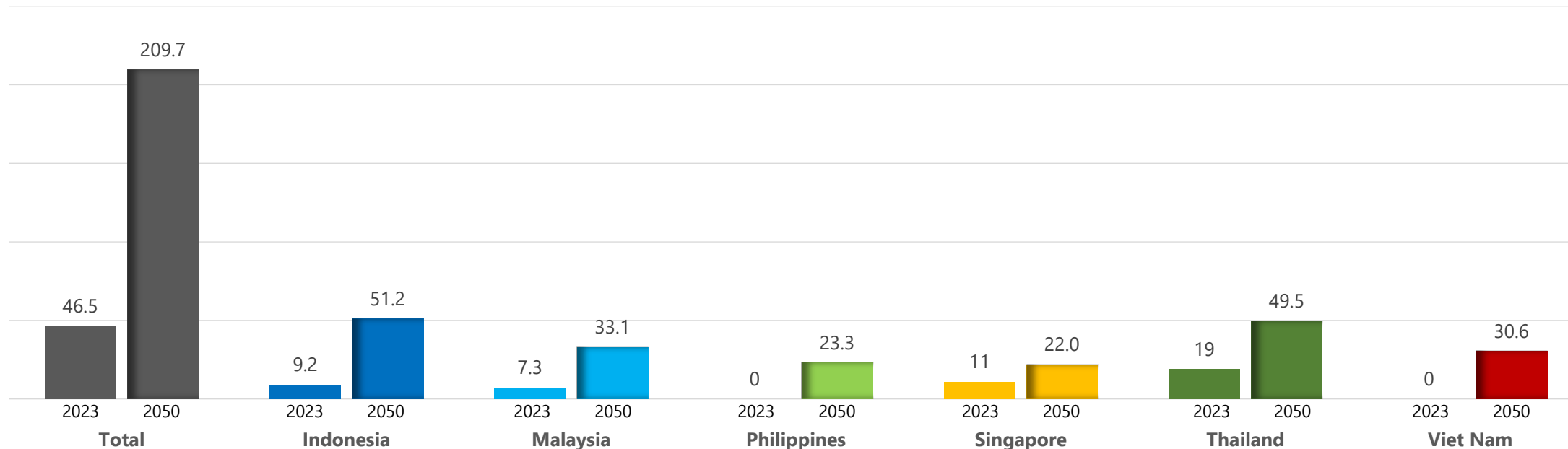


Source: APEC Energy Demand and Supply Outlook 8th Edition

- APEC SEA gas production will decline slightly by 2050 even though gas demand is increasing substantially, pushing the region to import more gas over the years.
- APEC SEA region will become a net gas importer in 2026.
- Except for Brunei, all other APEC SEA economies are net gas importers in 2035.

APEC SEA requires a substantial investment in LNG-receiving terminals through 2050

LNG receiving terminal capacity in APEC SEA, March 2023 and 2050 (Mtpa)

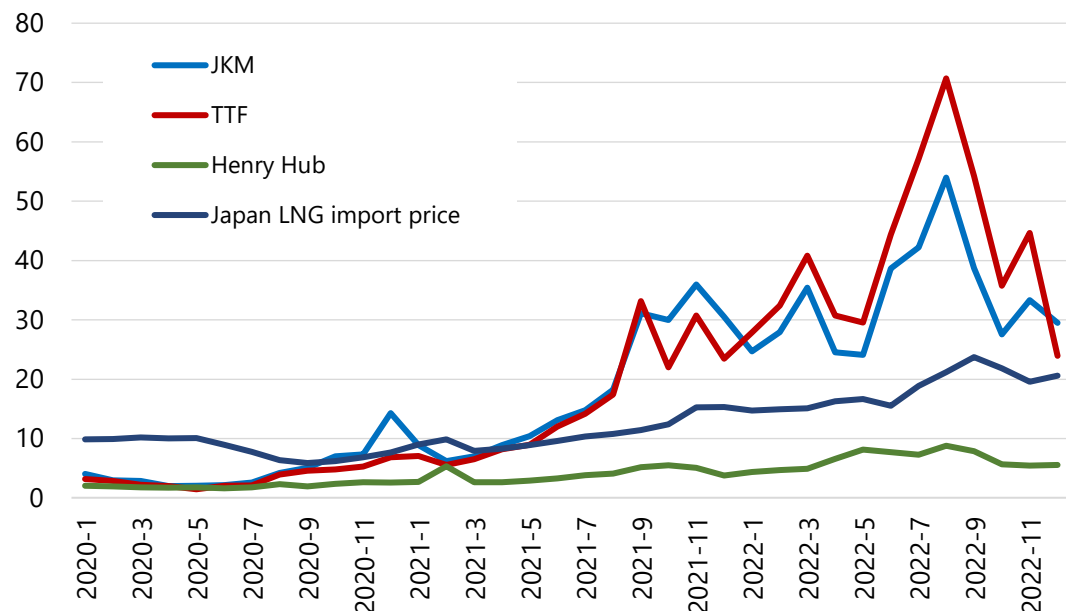


Source: CEDIGAZ, APEC Energy Demand and Supply Outlook 8th Edition

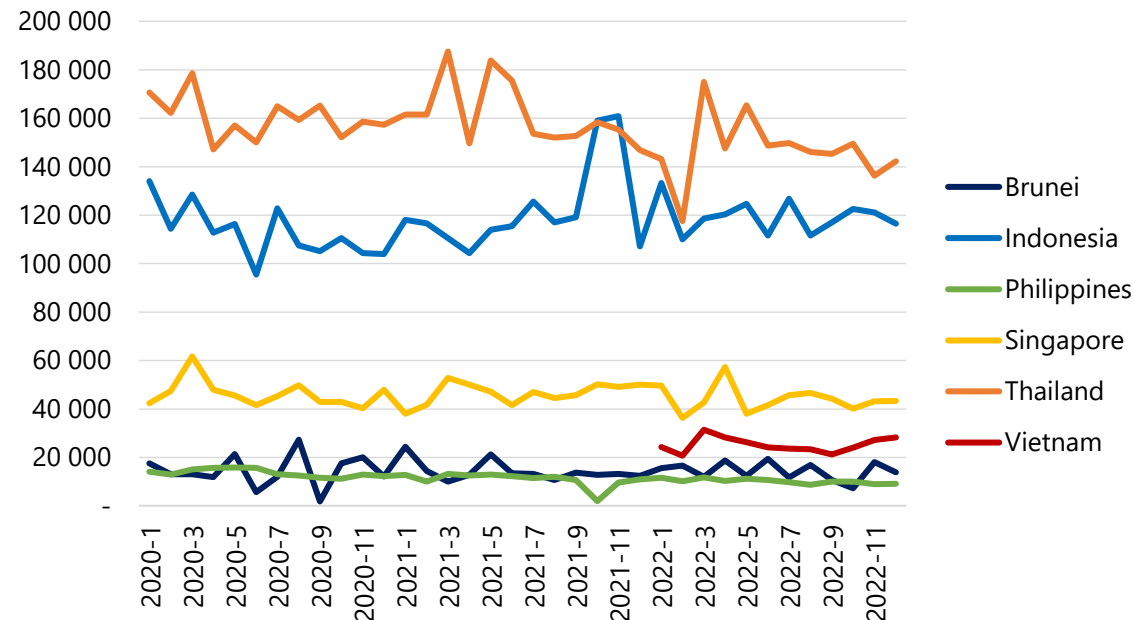
- APEC SEA region requires additional 177 Mtpa LNG terminals by 2050.
- The first Philippines LNG terminal (LFC) received its first LNG cargo on 9 April 2023. The terminal is scheduled to start its full operation in June 2023. The second and third LNG receiving terminals are expected to start operation in June 2023 and December 2023, respectively.
- The operation of Viet Nam's first LNG terminal is pending LNG price negotiation between PetroVietnam Gas JSC and suppliers.

High natural gas prices slowed natural gas demand growth in APEC SEA region

LNG spot and import prices, 2020-2022 (USD/mmBtu)



Gas gross inland deliveries in APEC SEA economies, 2020-2022 (TJ)



Source: Investing.com, y-charts.com, JodiGaS

- Actual gas demand growth in the APEC SEA region is lower than projected growth in recent years due to high gas prices.
- Singapore and Thailand were the most affected economies in the region by high natural gas prices, as both economies imported about 100% and 38% of total gas supply in 2022, respectively.
- Indonesia's gas demand was less affected by high natural gas prices, as domestic gas prices for power and industry sectors have been fixed by Government for the 2021-2024 period.

High natural gas prices delayed gas infrastructure and power development plans in a few APEC SEA economies

1. Postponement of commissioning and operation date of LNG receiving terminal and new gas power plant

a) In the Philippines,

- the operation date of the first (LFC 3.0 Mtpa) and second (FGEN LNG 5.26 Mtpa) LNG receiving terminals was postponed from 2022 to June 2023¹.
- additional 13.72 Mtpa of LNG receiving terminals will be in operation in stages from December 2025 to April 2026.
- operational of new 3 500 MW gas-fired power plants by 2027 and 7 748 MW by 2030 will be highly dependent on the operation of planned LNG receiving terminals.

b) In Viet Nam,

- the operation date of the first LNG receiving terminal was postponed from 2021² to 2023, depending on the negotiation process, subsequently affecting the operation of a new gas-fired power plant.

2. Revision of gas and power development plan

- a) Viet Nam is revising the National Power Development Plan 8 (PDP8) draft, which comprises future energy mix, and proposed LNG terminals and gas-fired power plant projects³.

Notes:

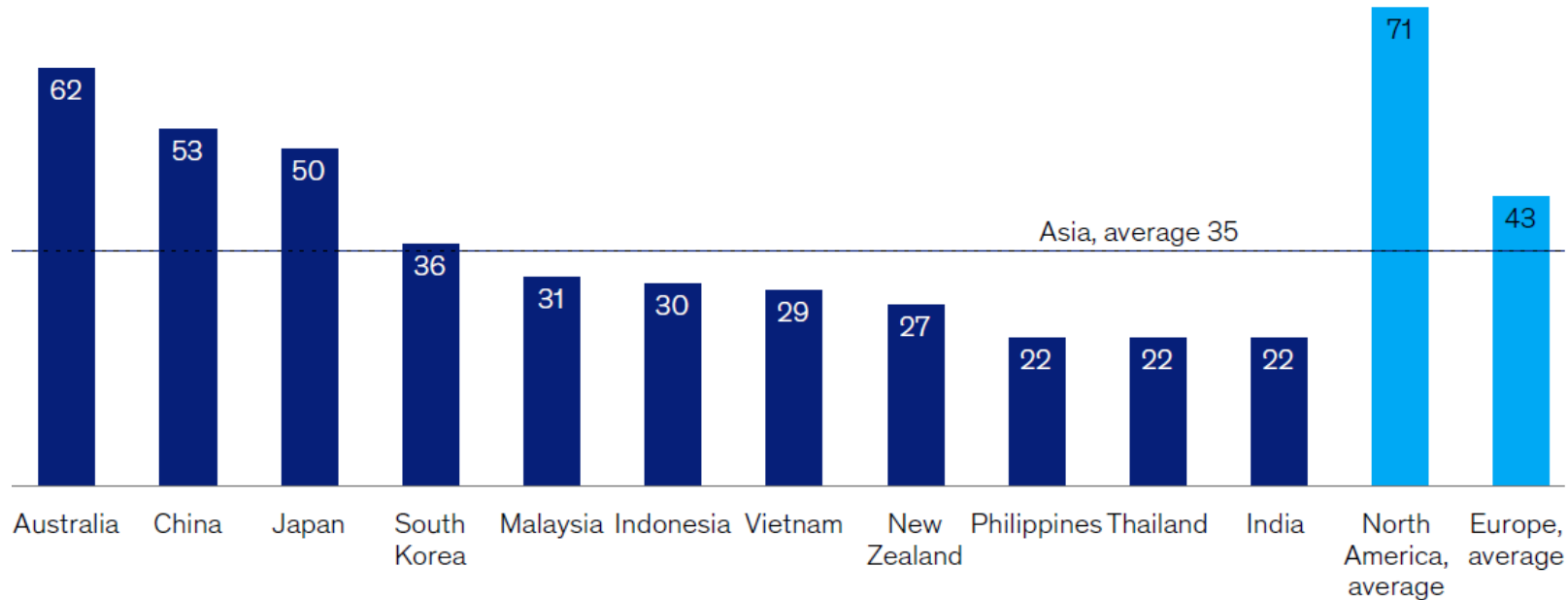
¹ <https://www.enerdata.net/publications/daily-energy-news/philippines-receives-commissioning-cargo-its-first-lng-terminal.html>

² Gas Master Plan issued in 2017

³ <https://theinvestor.vn/new-power-development-plan-needs-quality-more-than-speed-pm-d3579.html>

APEC SEA economies score below other regions on CCS readiness

CCS readiness, by location (index (100=ready))

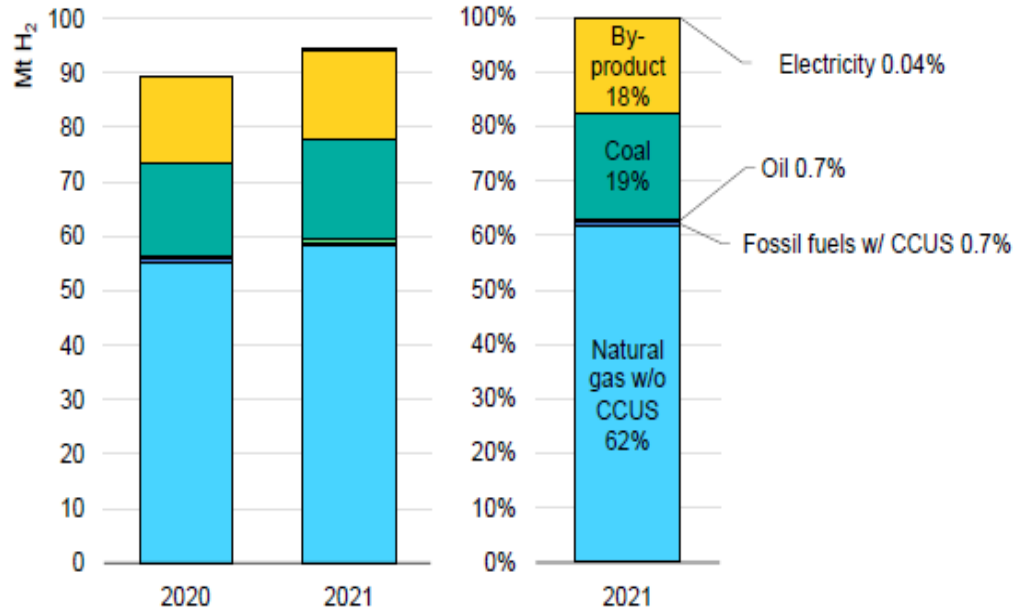


Source: McKinsey.com, Global CCS Institute

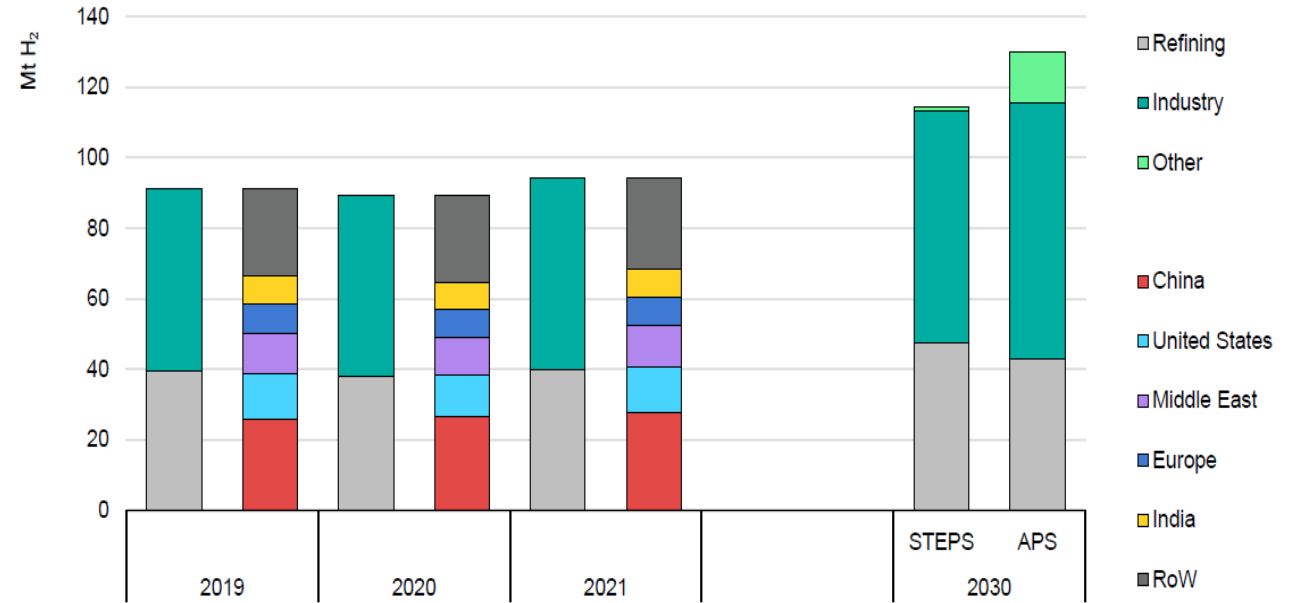
- Most on-going or potential CCS/CCUS projects in APEC SEA economies are concentrated on the upstream oil and gas industry. e.g. Indonesia – Vorwata and Sakekamang, Malaysia – Kasawari and Lang Lebah, Thailand – Arthit
- In March 2023, Indonesia announced the regulation to support the integration of CCS/CCUS projects within upstream exploration and production activities: “MEMR 2/2023: Implementation of Carbon Capture and Storage, as well as Carbon Capture, Utilization and Storage in Upstream Oil and Gas Business Activities”.

Gas is expected to play a significant role in meeting increasing short- and medium-term hydrogen demand

Hydrogen production mix, 2020 and 2021



Hydrogen demand by sector and by region in the Stated Policies and Announced Pledges scenarios, 2019-2030



Source: Global Hydrogen Review 2022 (IEA)

- In 2021, almost all global hydrogen demand was met by hydrogen production from fossil fuels (grey and blue hydrogen), of which 62% was from natural gas.
- Hydrogen demand could increase by 22% and 38% in 2030, compared to the 2021 level in STEPS and APS scenarios by IEA respectively.
- 24 Mt H₂ (about 28% of total H₂ demand) will be produced by low-emission hydrogen technology (green hydrogen) in 2030.

Summary

1. Strong economic growth and climate ambitions are expected to triple gas demand in the APEC SEA region by 2050.
2. In short- and medium-term, gas becomes the balancing fuel between environment, security, and affordability, as few APEC SEA economies own domestic gas resources.
3. Gas is expected to become a transition fuel towards decarbonisation. Coal-to-gas switching in APEC SEA's power sector in the past will continue to happen in future as gas emits lower CO₂ than other fossil fuels and complements renewables by providing stability to the grid system.
4. APEC SEA region will require substantial investment in building gas infrastructures, including LNG receiving terminals and gas-fired power plants.
5. High gas prices could change future demand trends in the APEC SEA region.
6. CCS/CCUS projects could support natural gas decarbonisation, but investment is required.
7. Gas will likely continue as a main fuel for grey or blue hydrogen production in the short- and medium-term due to increasing hydrogen demand and slow development of green hydrogen projects.

Thank you.

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