Roles of Natural Gas and VRE in Energy Transition of ASEAN

4th East Asia Energy Forum

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13 September 2021

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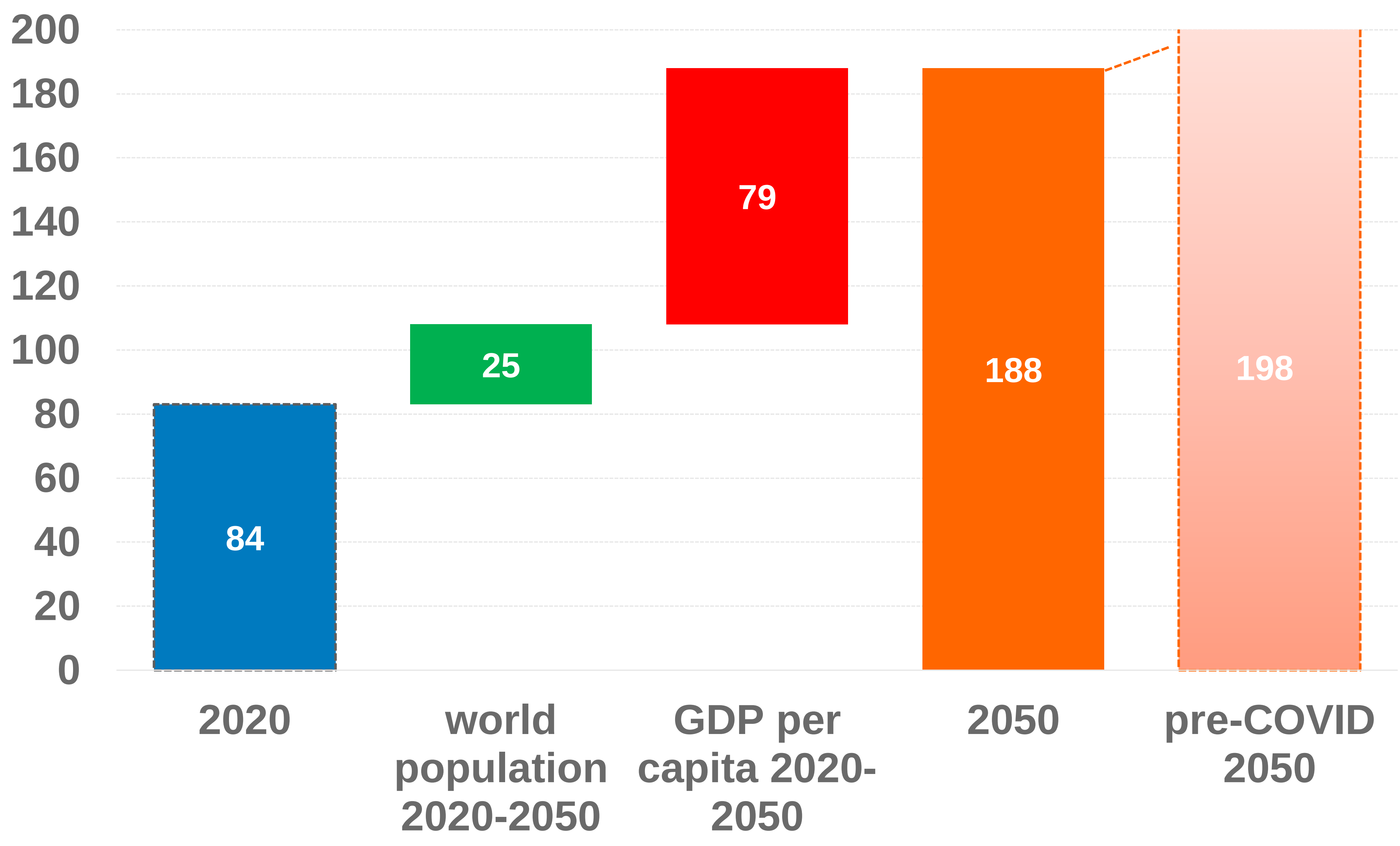
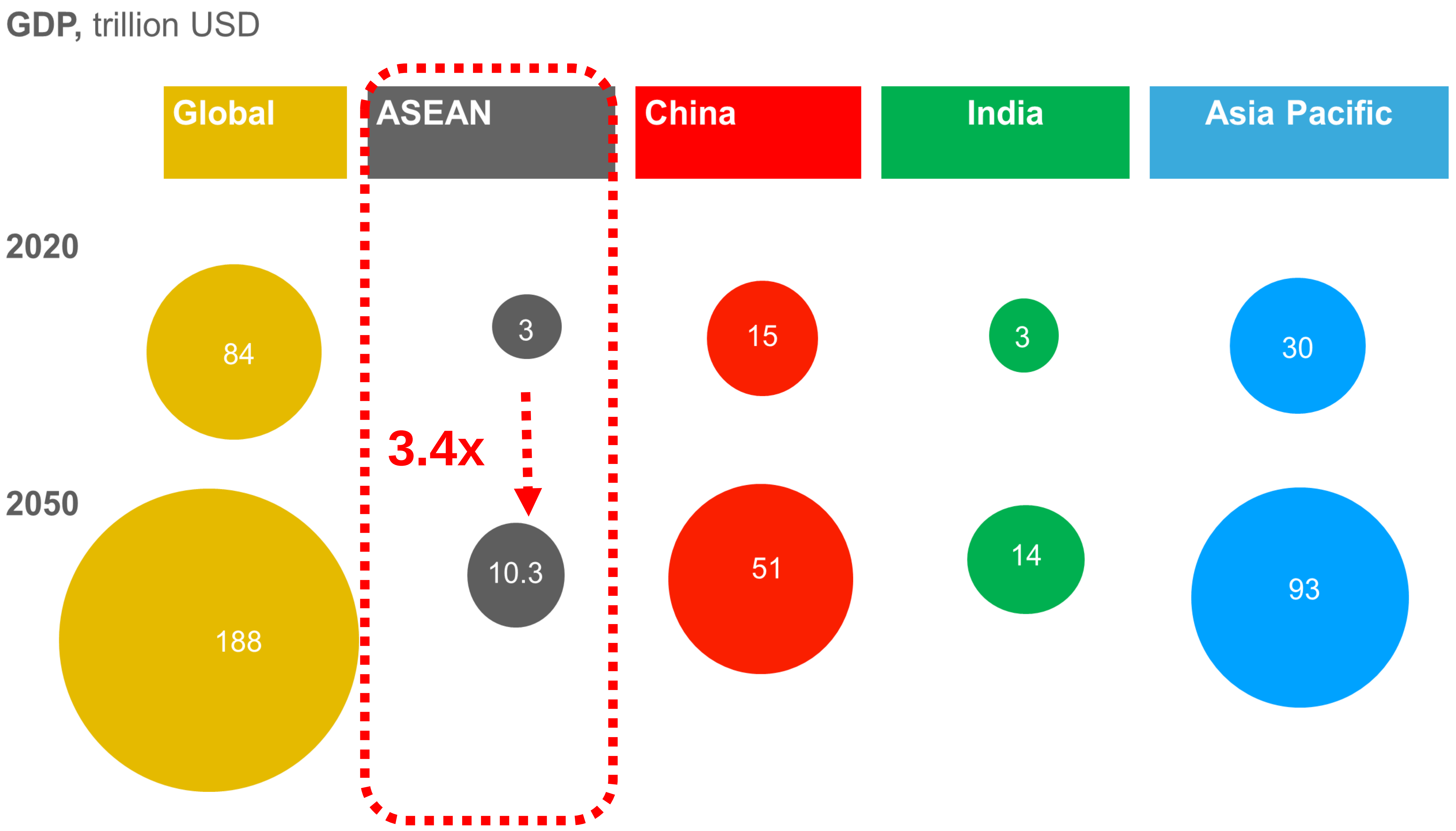
Global economic prospects – ASEAN and the World

- Global economy improved view on recovery but diverged further across developing and advanced economies
- Global GDP growth – 6% in 2021 and 4.9% in 2022
- Asia Pacific – economic growth 'champion' contributing 60% of global real GDP growth over 2020 - 2050

Global Real GDP, 2020 - 2050
trillion USD 2020



Global GDP Growth by Region (%) 2020 - 2050

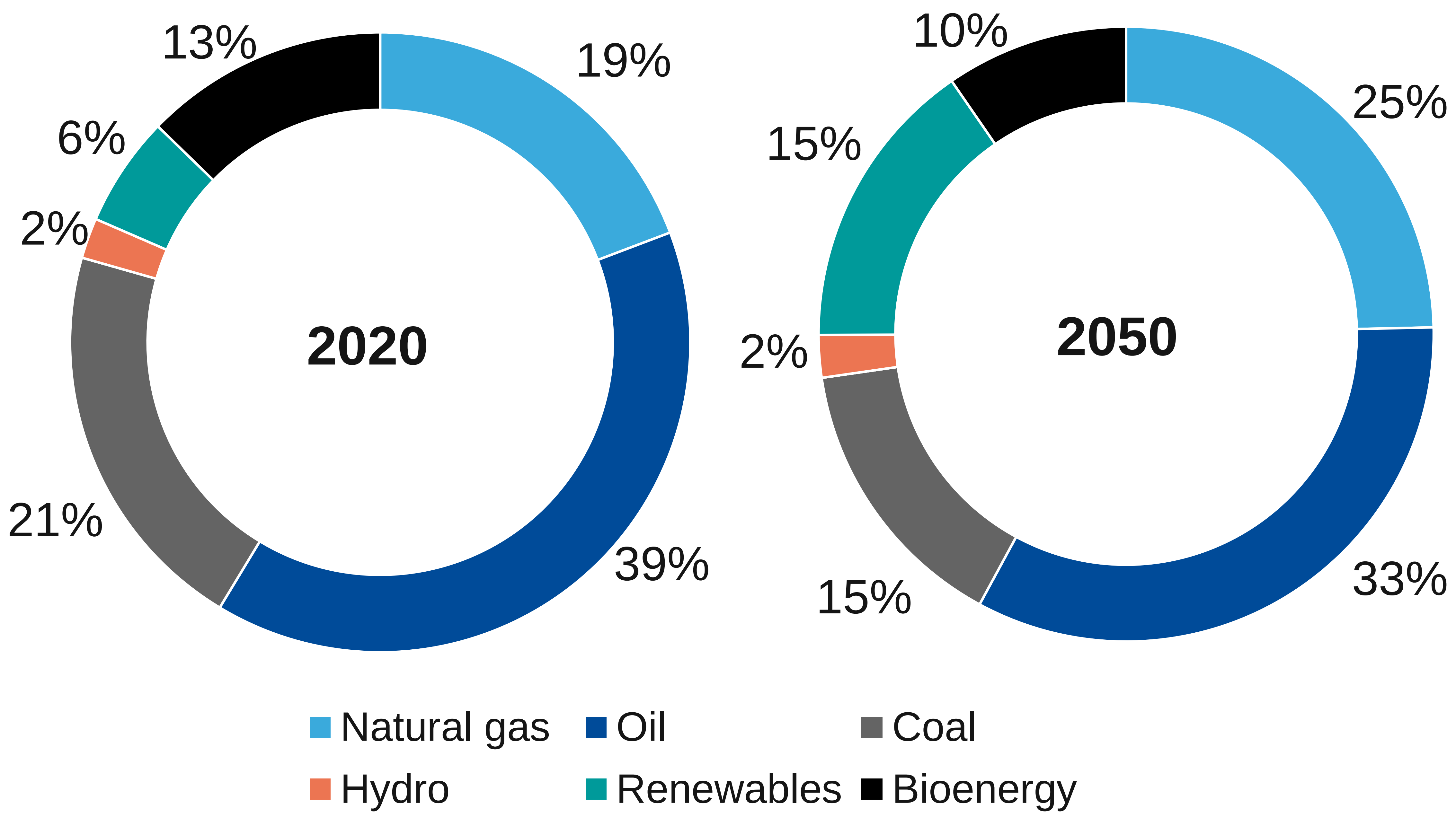


Source: GECF Secretariat based on the GECF Global Gas Model

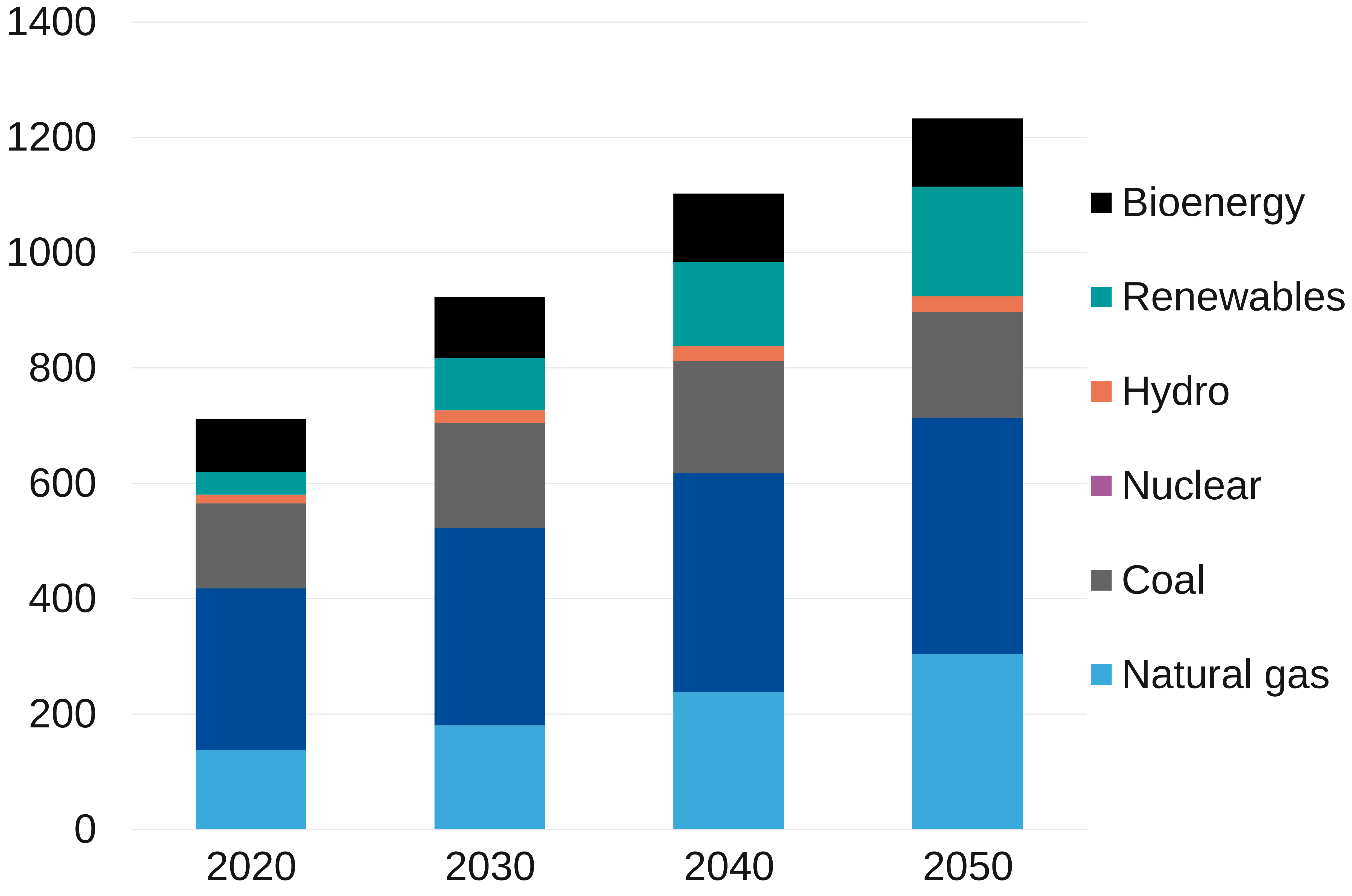
ASEAN energy mix

- Primary energy demand increases by almost 75% between 2020 and 2050 amid sustained economic growth and strong demographic trends
- Mitigating reliance on coal through the diversification of energy sources paves the way for natural gas and scaling-up of renewables

ASEAN energy mix evolution



Energy demand trends by fuel type (Mtoe)

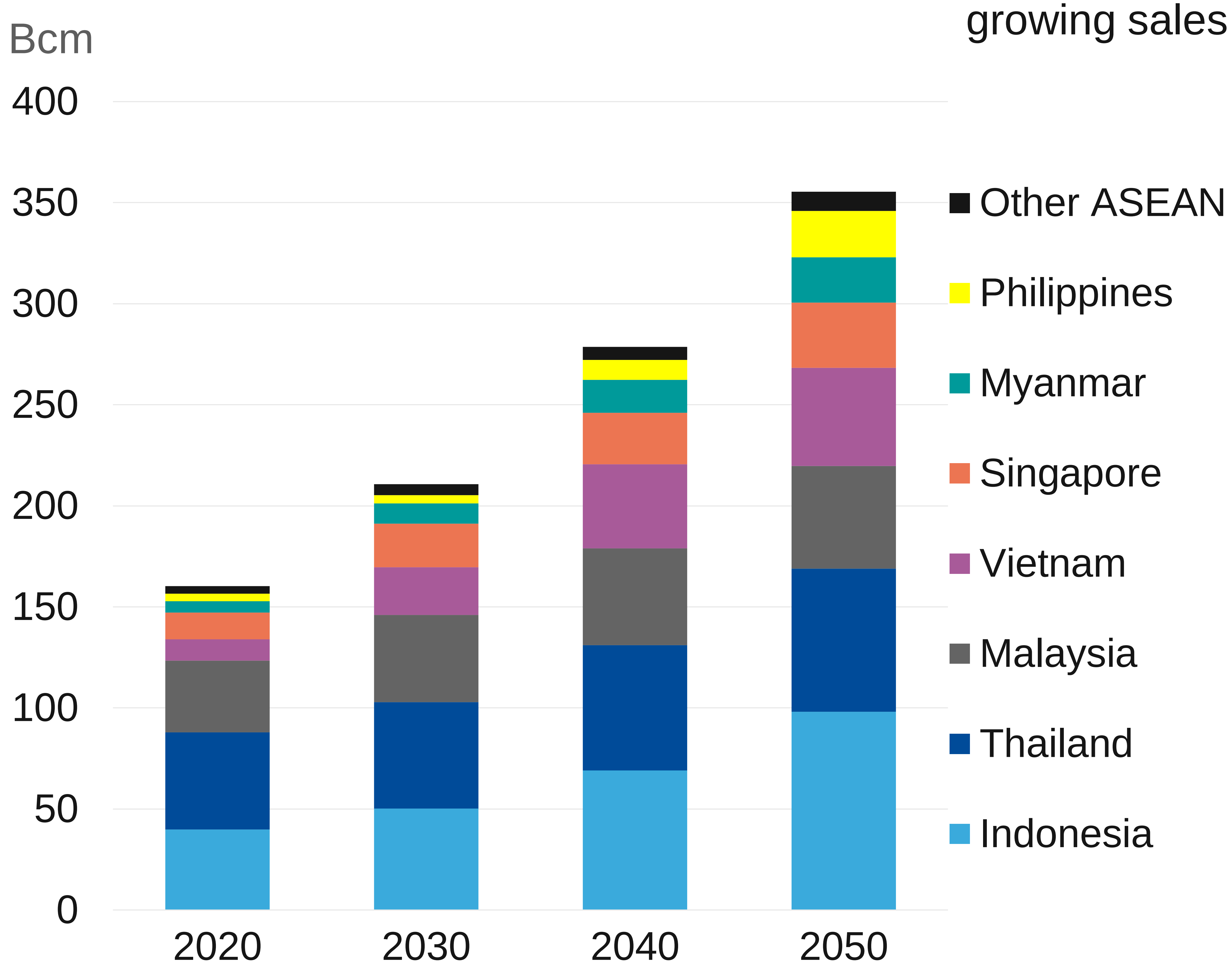


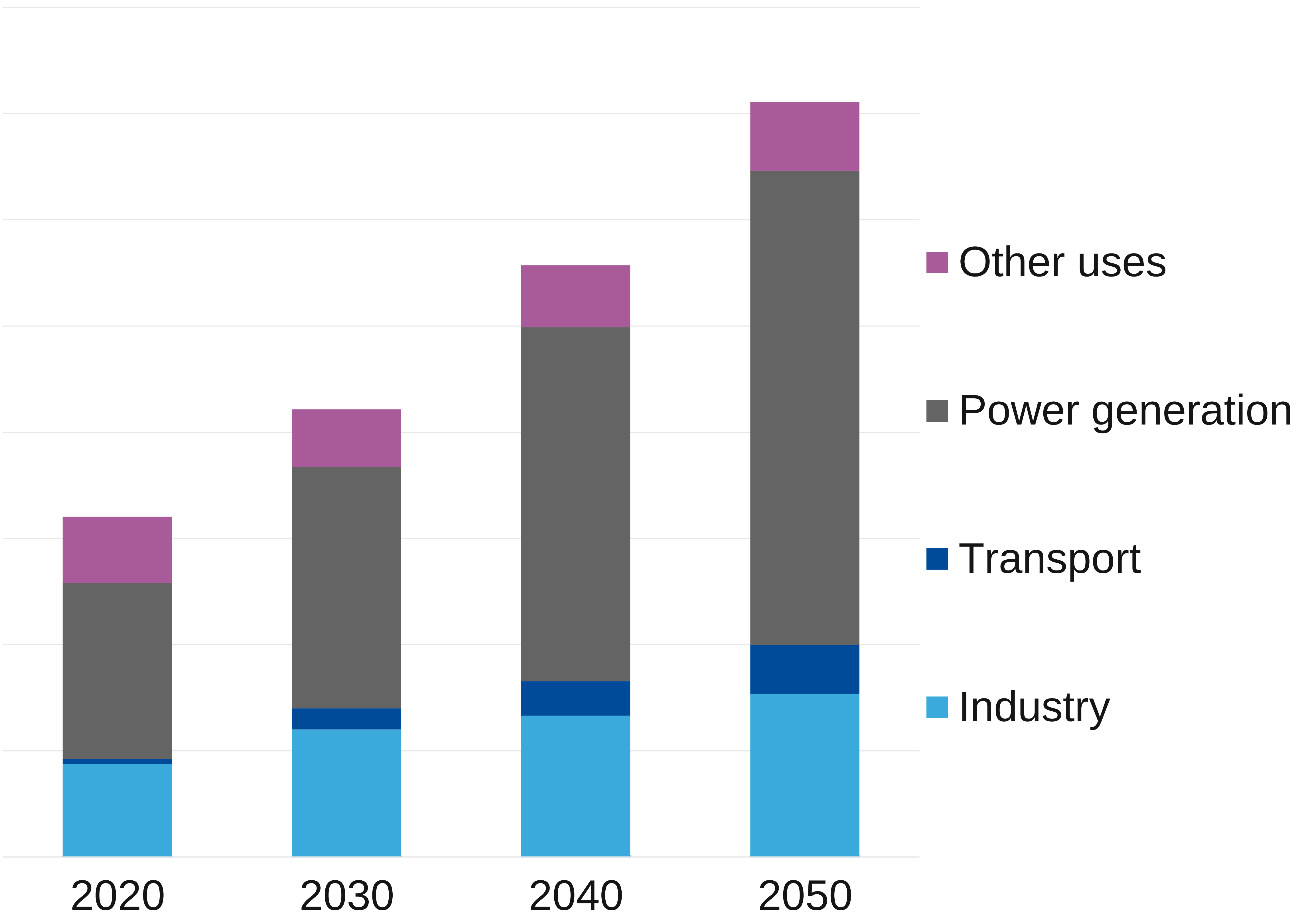
- Natural gas is set to play a major role to underpin countries' energy transition strategies with its share in the energy mix rising to 25% in 2050

Source: GECF Secretariat based on the GECF Global Gas Model

Natural gas demand prospects in ASEAN

- Natural gas demand more than doubles, reaching 355 bcm by 2050. Indonesia, Vietnam, Thailand, the Philippines, and Singapore lead the increase, together responsible for 80% of incremental volumes
- Natural gas demand will be power-driven. The construction of gas-fired generation takes priority and numerous LNG-to-power projects have been approved or planned
- Gas demand in transport takes off, driven by the expansion of the NGV fleet and growing sales of LNG for international bunkering



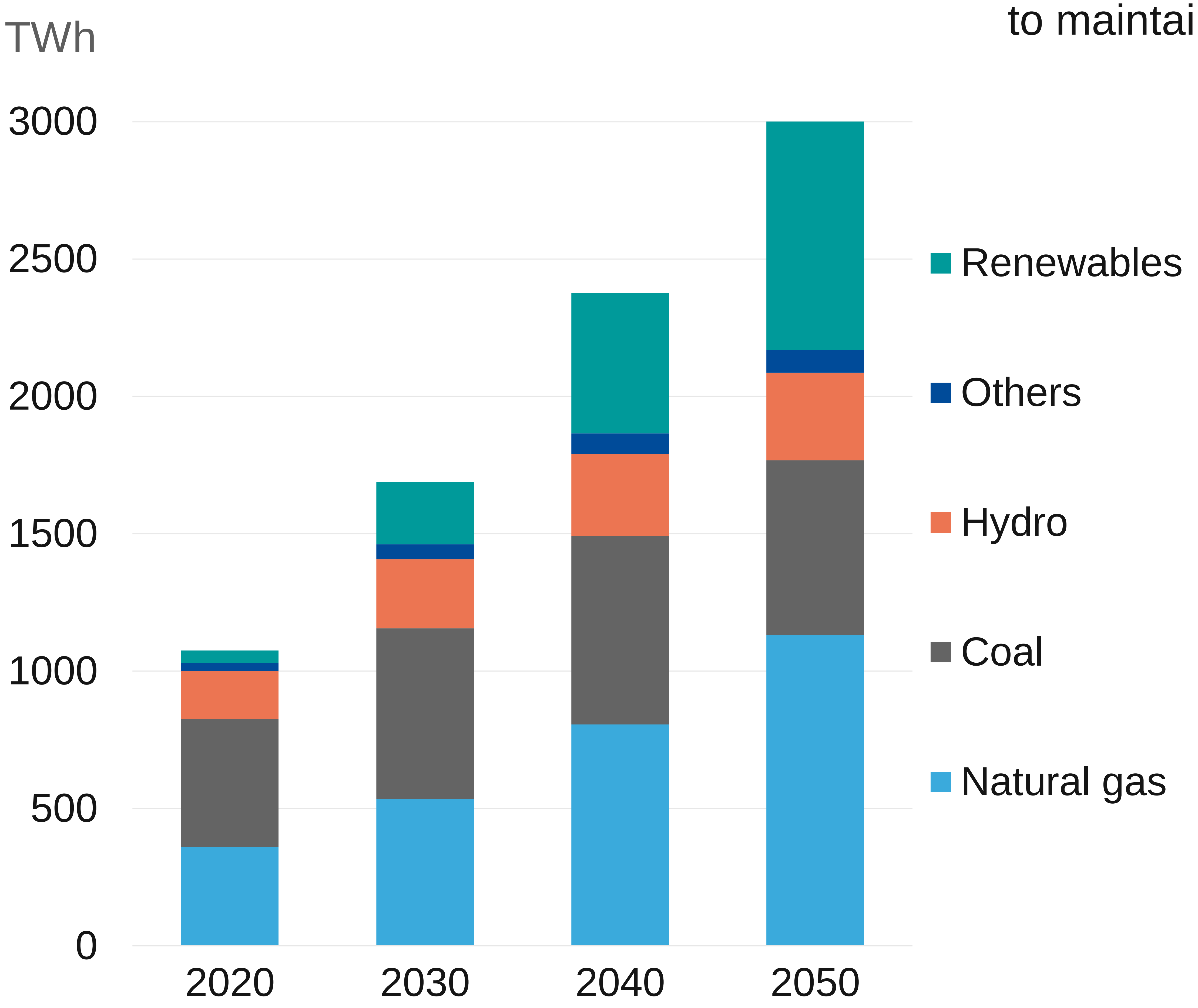


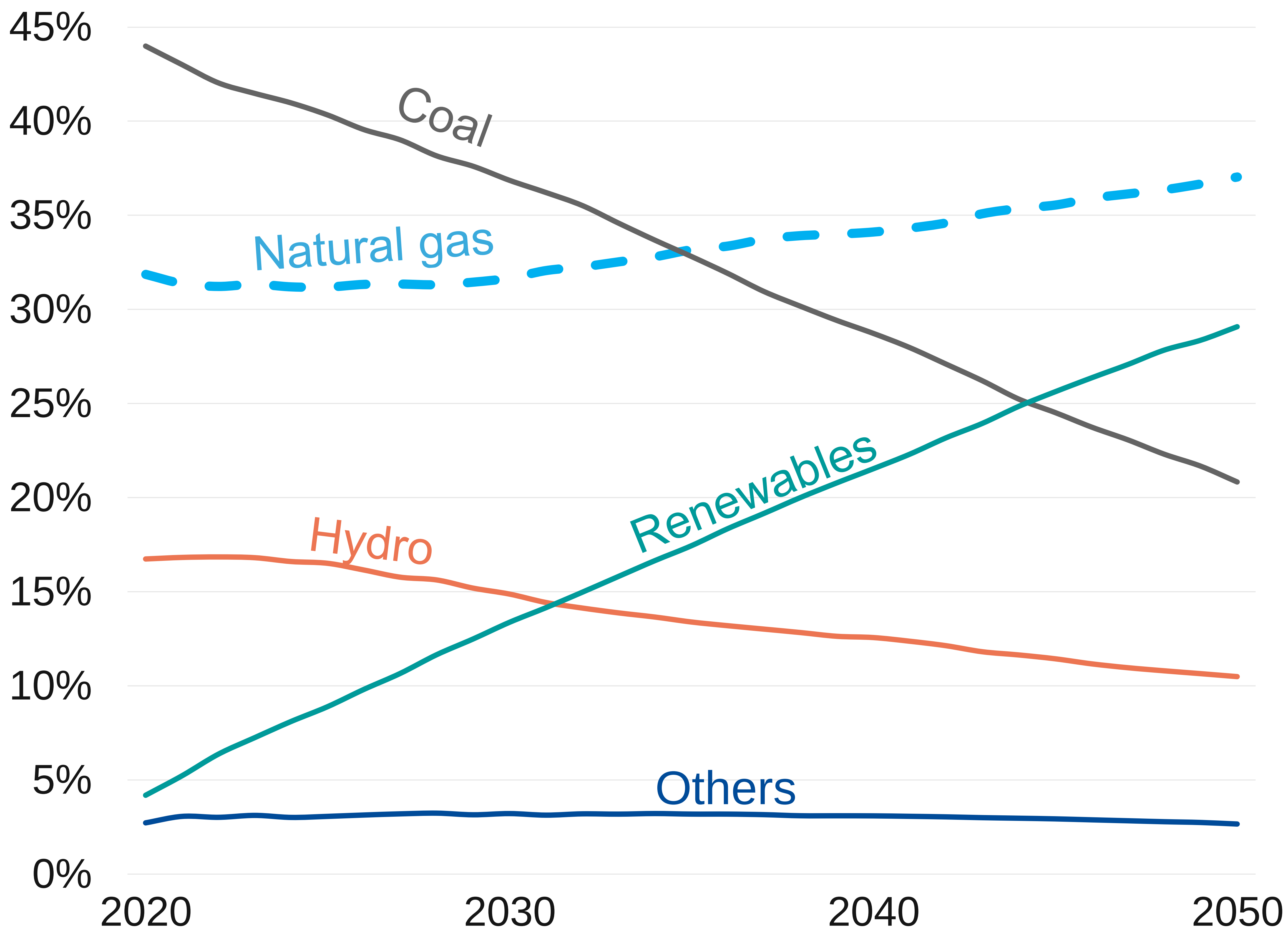
Source: GECF Secretariat based on the GECF Global Gas Model

Note: 1) Industry includes gas used as an energy fuel and feedstock as well as for hydrogen generation and the production of liquid fuels; 2) Other uses include gas demand for energy industry own use

The future of ASEAN's power sector

- The power sector is slated to undergo a profound transformation to achieve sustainability goals
- Gas-fired power plants will play a critical role regionally, being a significant component for the transition away from coal-fired generation, while complementing variable renewables and stabilizing ever-more complex grids
- Gas-fired generation, based on indigenous gas production and LNG imports, is set to maintain a strong foothold and provide above 35% of generation mix after 2040





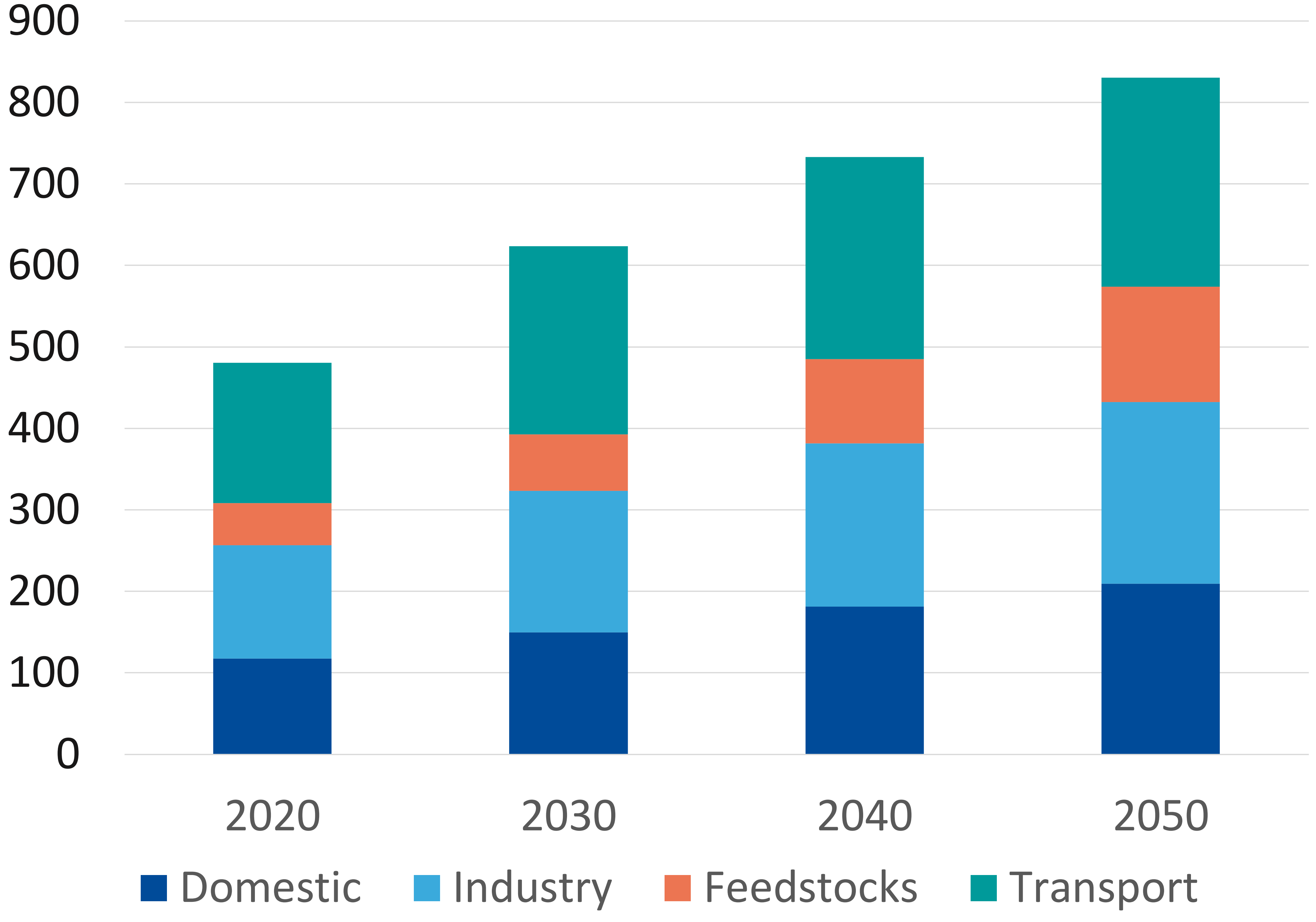
Note: 1) Others include oil and bioenergy

Source: GECF Secretariat based on the GECF Global Gas Model

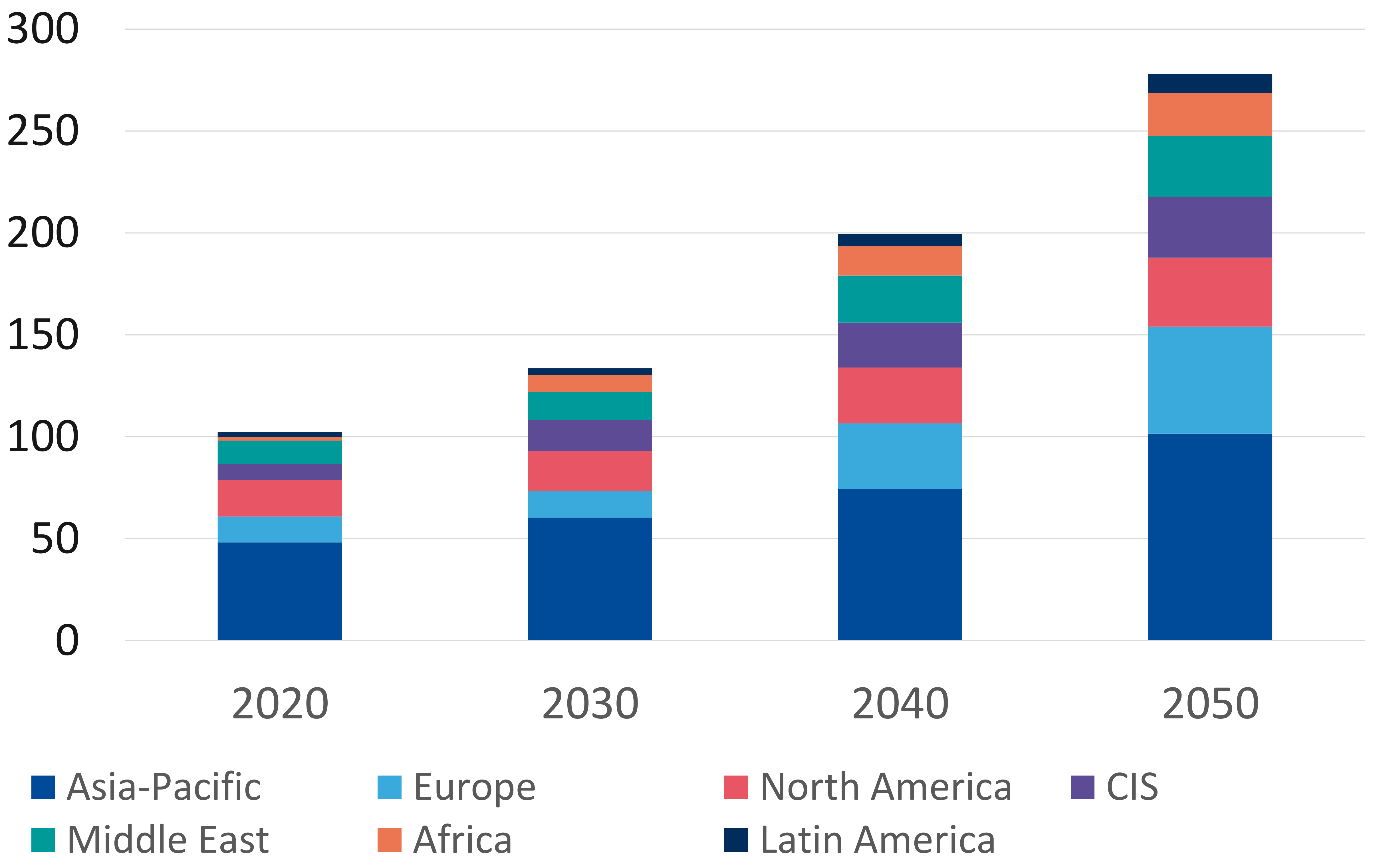
ASEAN's final energy expansion and the pathways through carbon neutrality

- With the significant expansion of final energy demand in ASEAN decarbonization of the energy sector is an inevitable part of the all efforts through carbon neutrality
- Hydrogen is assumed to be a very promising pathway considering the vast potential of the neighboring Asia-Pacific countries such as Australia to export to the ASEAN

ASEAN Final Energy Demand Outlook by sector (Mtoe)



Global Hydrogen Production Outlook by region* (Mt of H2)



*) The chart demonstrates the results of GECF Reference Case Scenario. The level of hydrogen production in GECF Hydrogen Scenario is even much higher

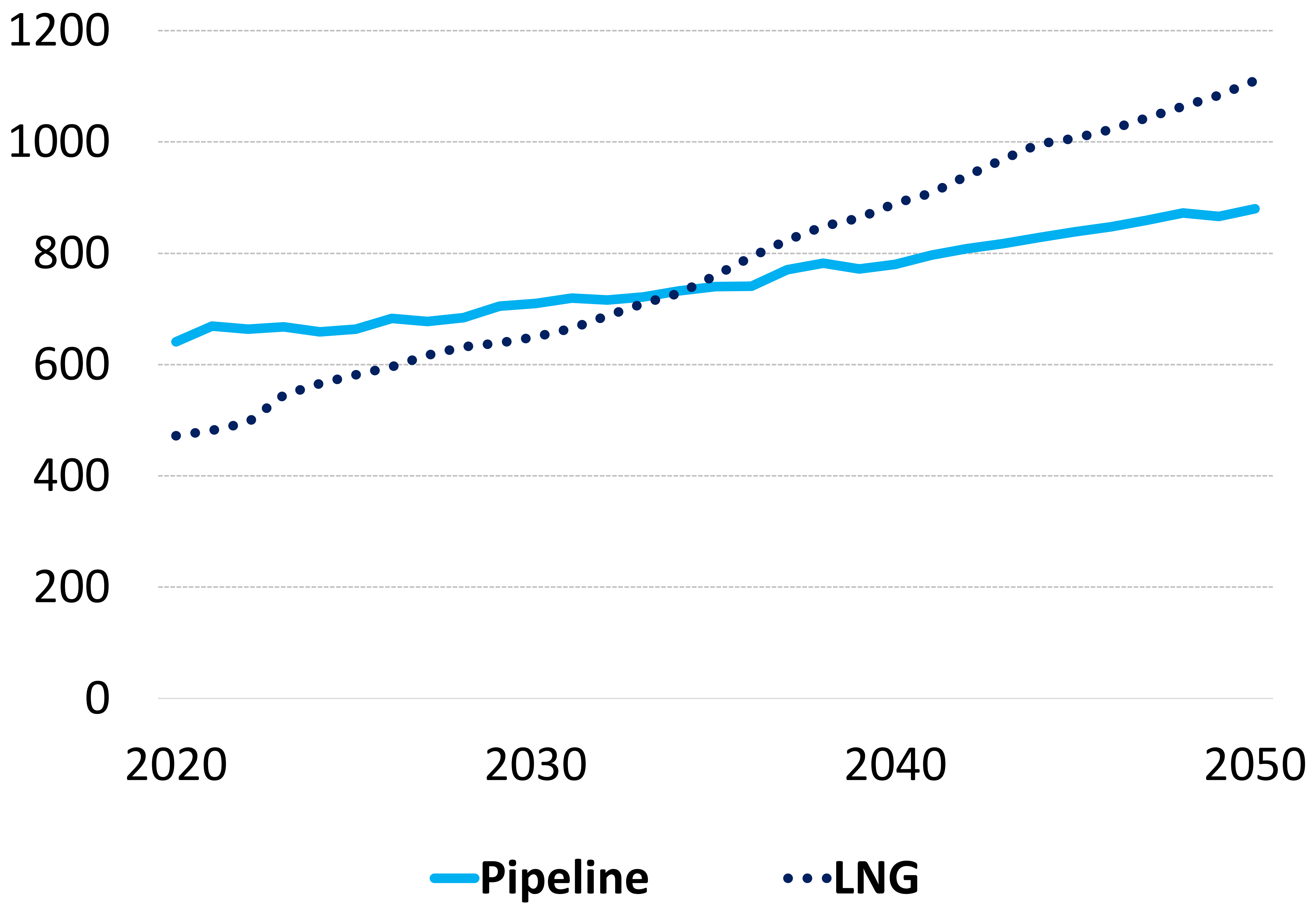
Source: GECF Secretariat based on the GECF Global Gas Model

Global natural gas trade prospects

- Global gas trade will reach 1,990 bcm by 2050
- Global LNG trade by 2050 is 820 mt (1,110 bcm)
- LNG trade will overtake pipeline trade in mid 2030s with Asia-Pacific – key LNG importing region
- Introduction of green LNG

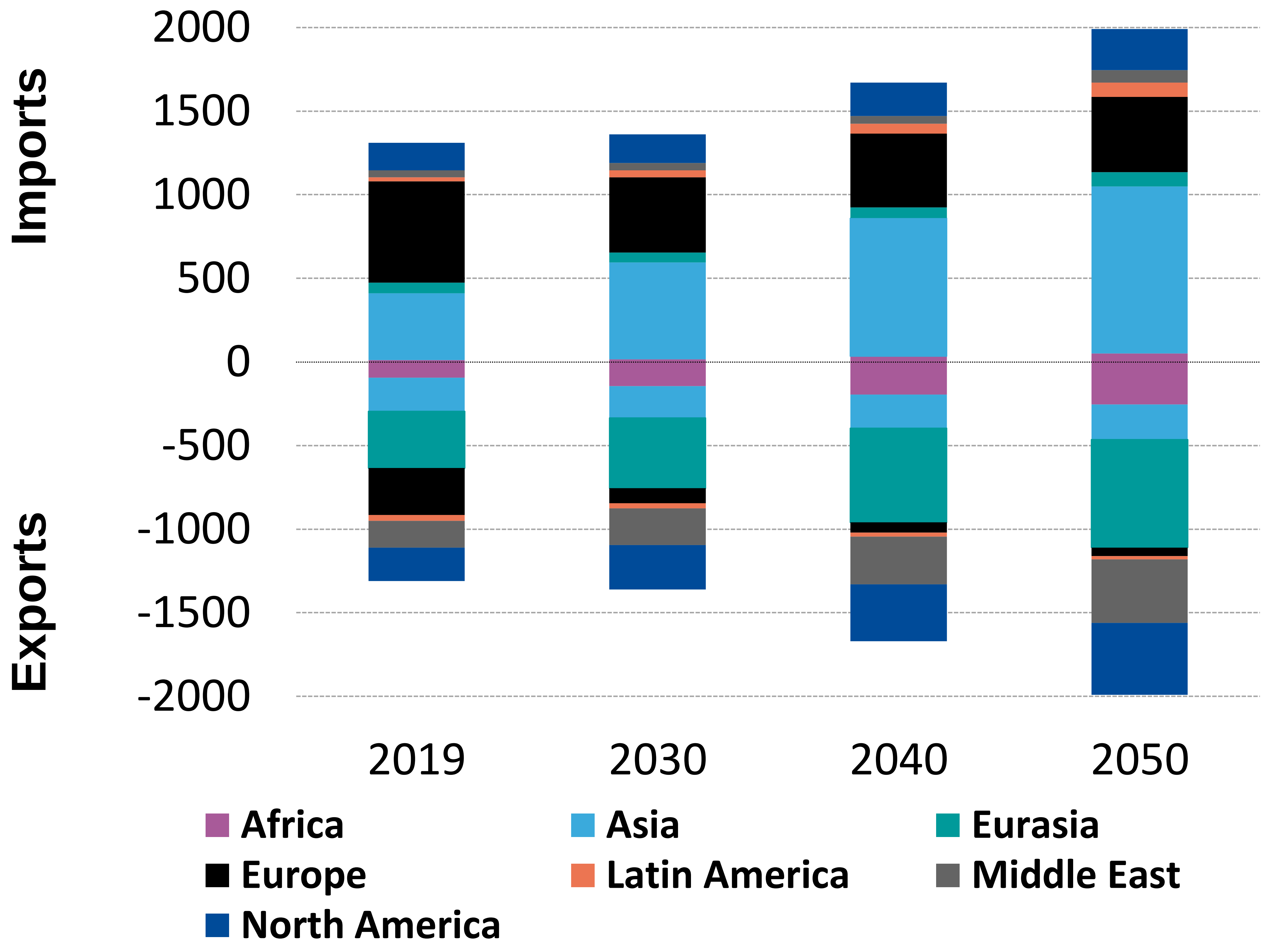
Global natural gas trade by flow type

Bcm



Global natural gas trade by region

Bcm



Source: GECF Secretariat based on data from the GECF Global Gas Model

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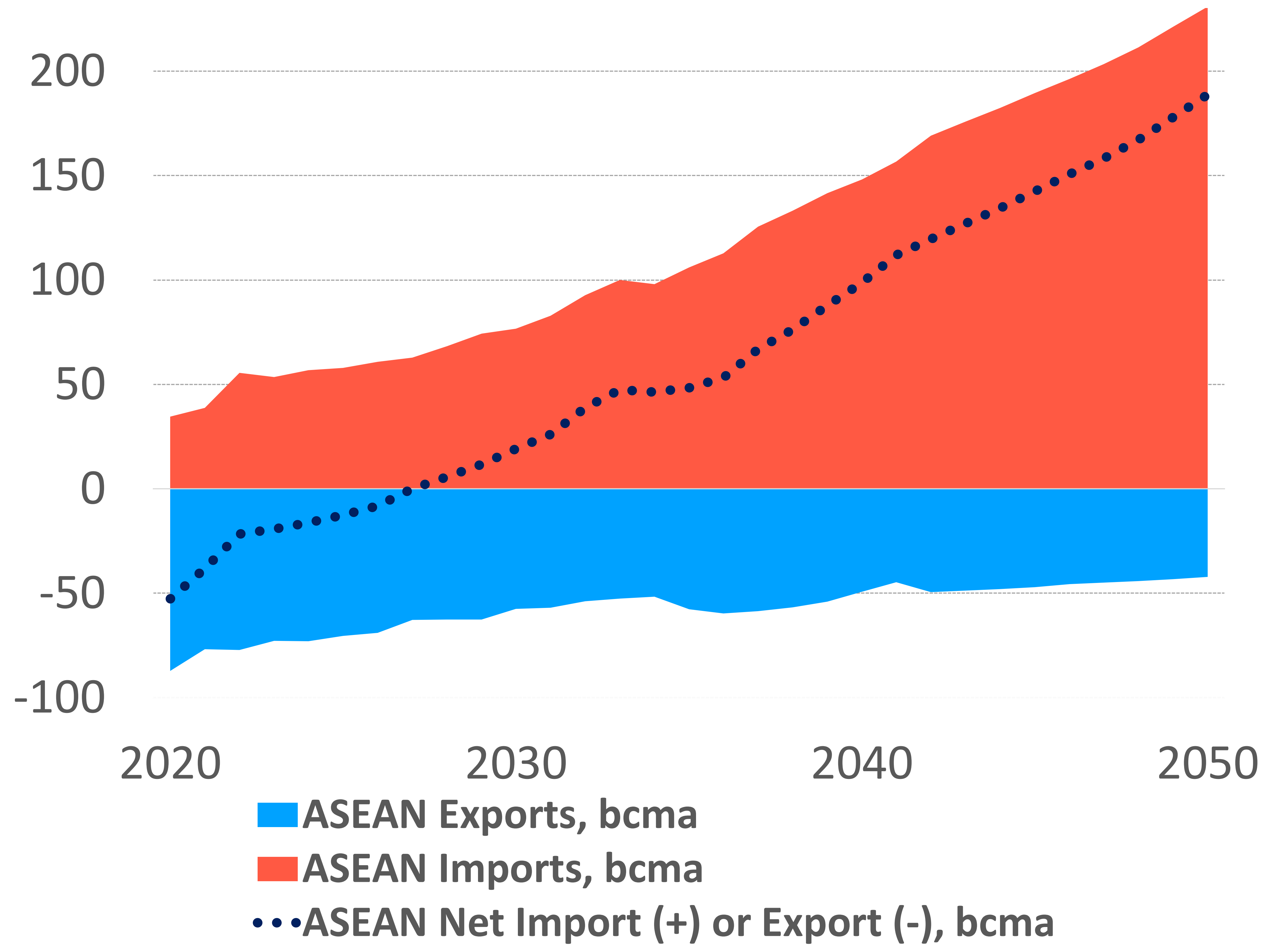
Natural gas trade prospects for ASEAN

- The Asia Pacific led LNG demand in 2020 accounting for 70% of imported volumes
- Natural gas net imports into ASEAN are likely to reach 189 bcma by 2050, up from zero at late 20's
- More than half of the LNG demand growth over 2020-50 will come from Thailand
- Vietnam will be the second after Thailand in LNG demand growth

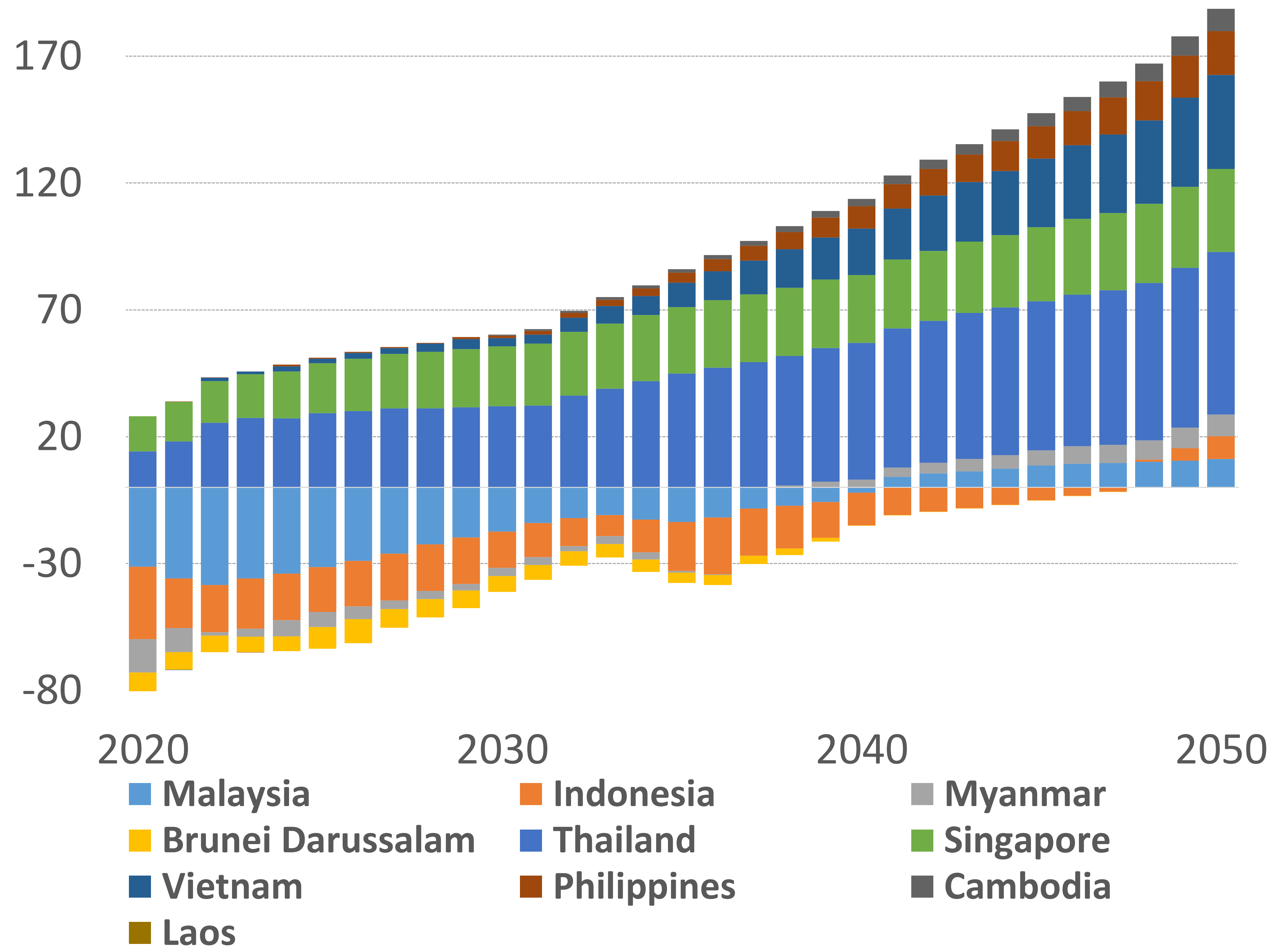
ASEAN natural gas imports vs exports

Bcm



ASEAN gas net imports(+)/exports(-) by country

Bcm



Source: GECF Secretariat based on the GECF Global Gas Model

THANK YOU

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