Asia-Pacific Economic Cooperation

APERC Asia Pacific Energy Research Centre

12a. Oil and Gas Security Study 21 (OGSS21): The Energy Security Implications of Declining LNG Investment

The 70th Meeting of APEC Energy Working Group (EWG70)

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Outline of presentation

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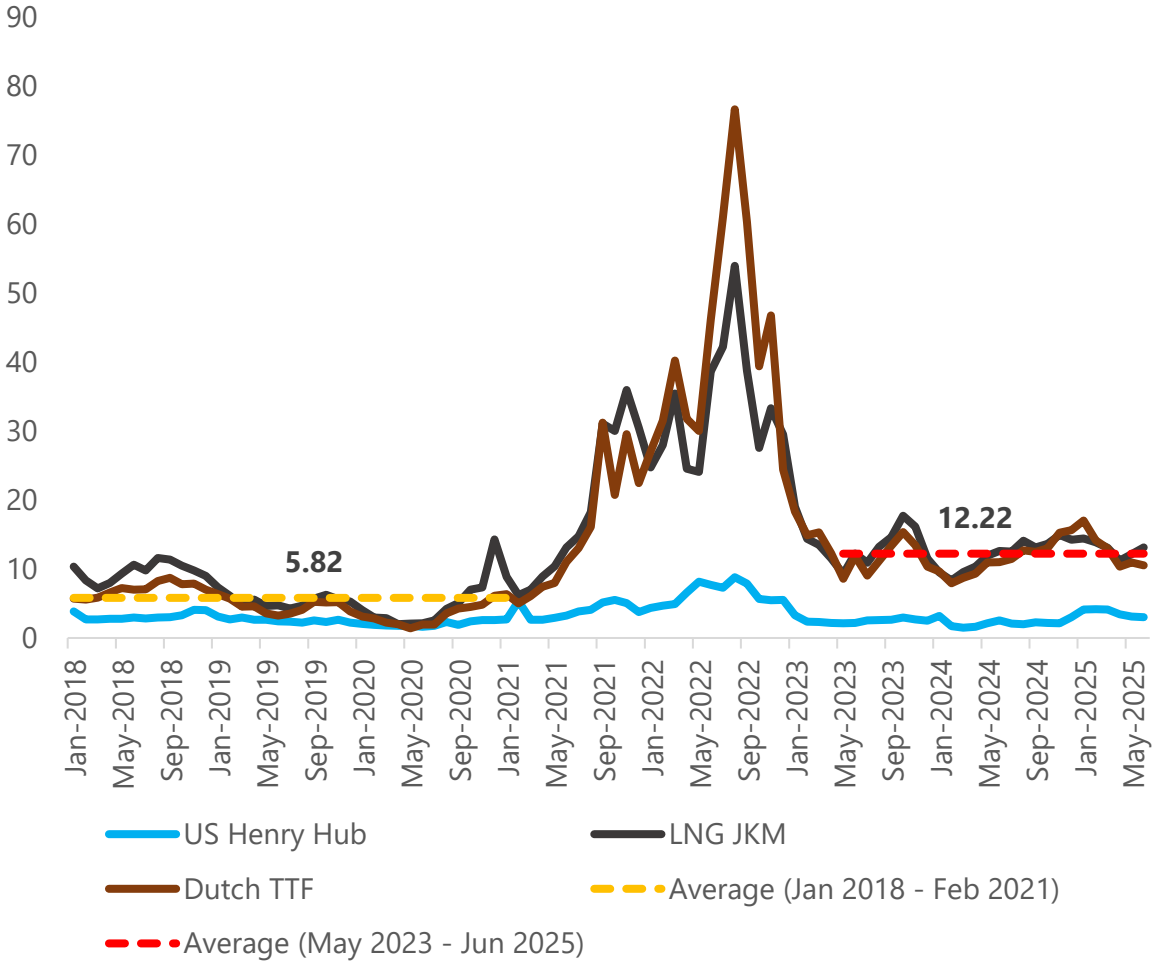
  - Proved gas reserves
  - LNG trade
- **Future trends and anticipated challenges**
  - Gas demand
  - LNG trade
  - LNG liquefaction capacity
  - LNG supply-demand gap
  - Long-term LNG contracts
  - Additional investments needed
- **Potential actions to address the energy security concerns from declining LNG investments**
- **Summary**

Historical trends

Gas price volatility highlights importance of adequate supplies

Monthly natural gas prices, Jan 2018 - Jun 2025 (USD per MMBTu)

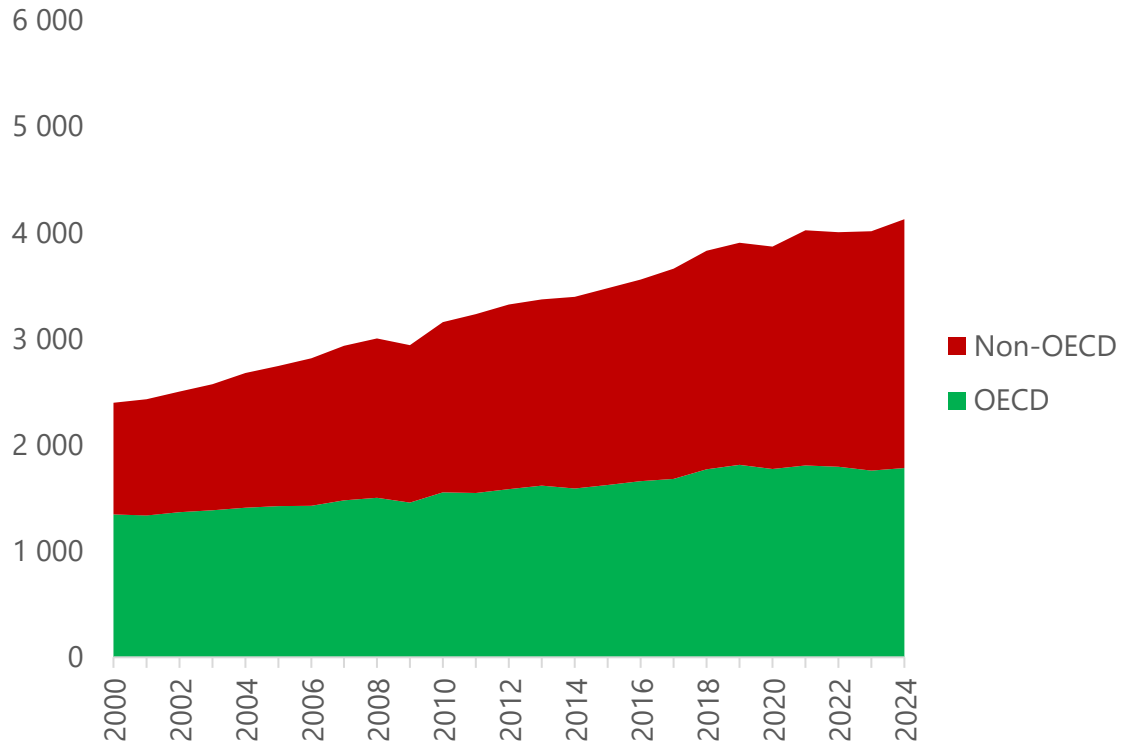


Source: EIA (2025), Investing (2025)

- Various factors influence gas prices, but **weather and geopolitics** have been the most dominant **drivers of volatility** in recent years.
- Lower global supply exacerbated by **loss of Russian gas supply** caused European and Asian gas prices to spike in 2022.
- The average gas price from **May 2023 to Jun 2025** was **significantly higher** than the average price between **Jan 2018 and Feb 2021**.

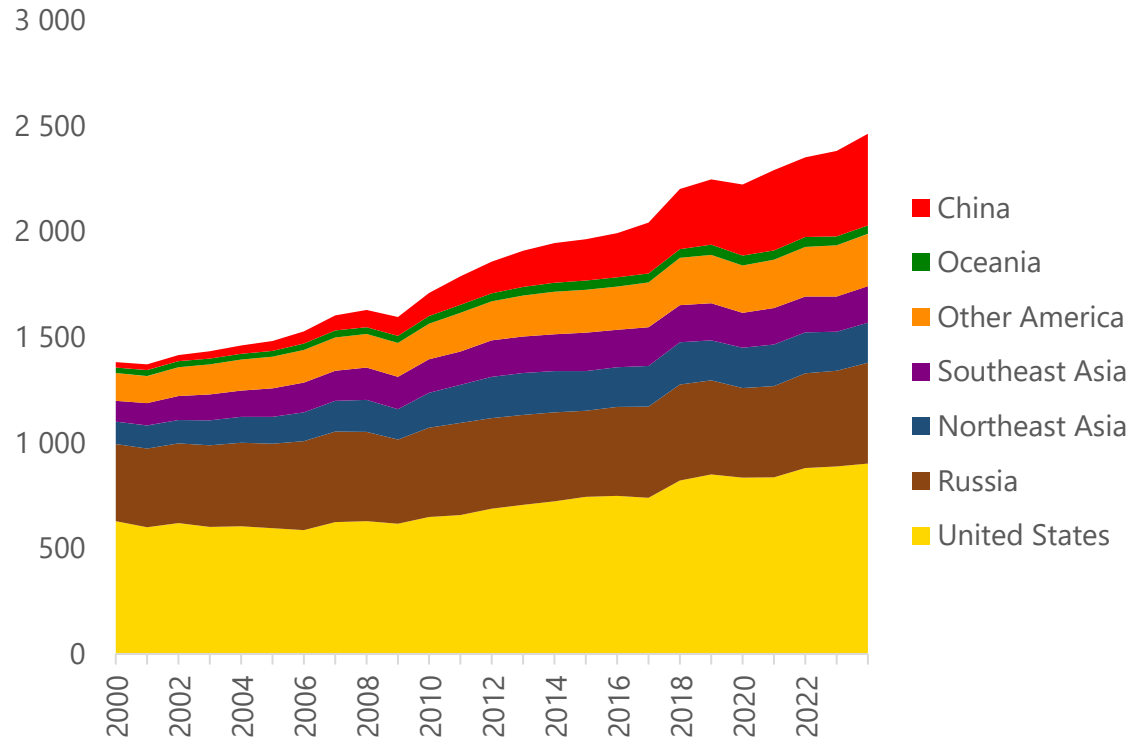
Non-OECD economies, particularly China, continued to drive global gas demand in 2024

Global gas demand, 2000 – 2024 (bcm)



Source: EI (2025)

APEC gas demand, 2000 – 2024 (bcm)

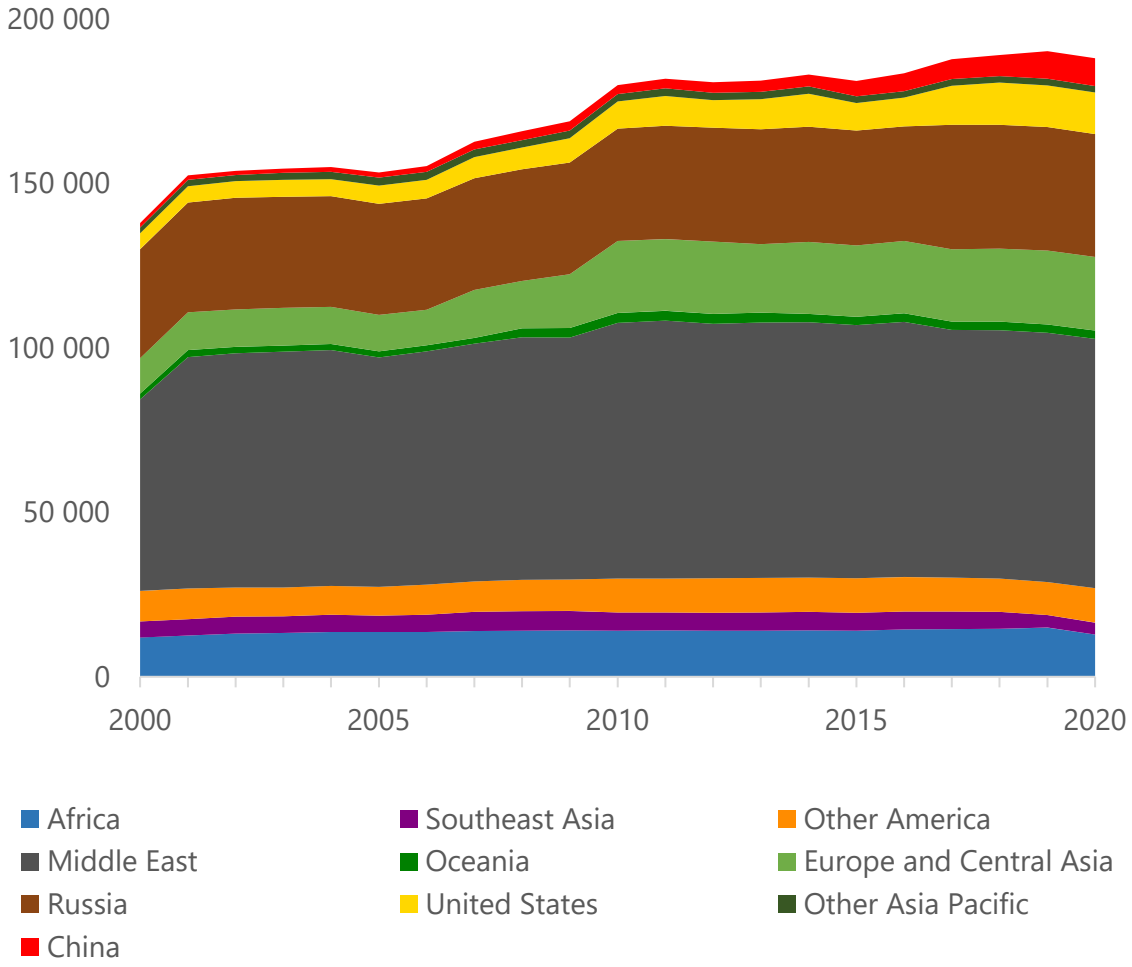


Source: EGEDA (2024), EI (2025)

- Gas demand in non-OECD grew by **4% between 2023 and 2024**, while that of OECD remained stable.
- Within APEC, **China's gas demand grew 7% in 2024**, well above the average non-OECD increase.

Despite growth in gas demand, global proved gas reserves have also increased

Global proved gas reserves, 2000 - 2020 (bcm)

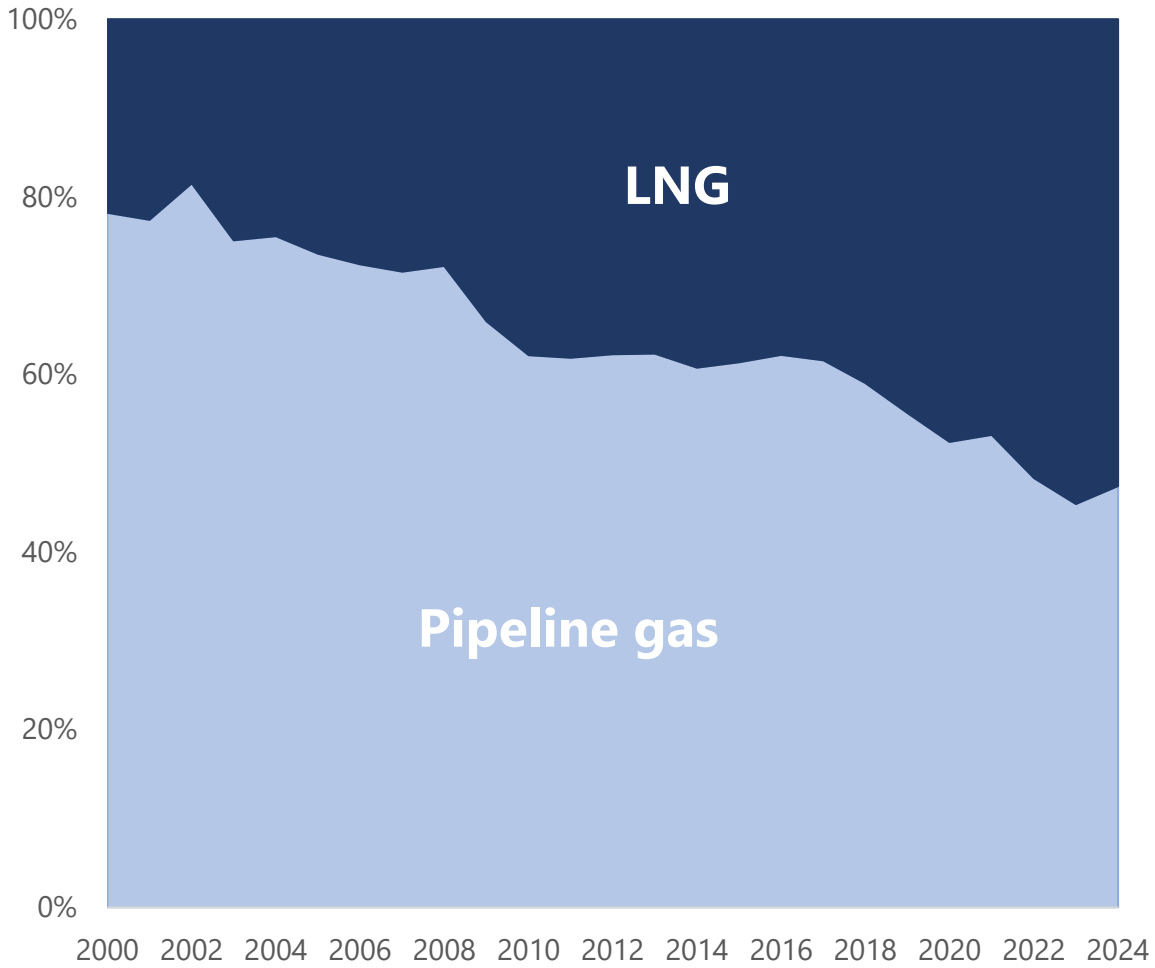


Source: EI (2025)

- The **Middle East and Russia held 40% and 20%** of the global **proved gas reserves** in 2020, respectively.
- Technology advancements, successful exploration, and favourable natural gas prices have transformed previously uneconomic natural gas resources into proved reserves.
- **Proved gas reserves** are central to LNG investment decisions, as they **provide confidence** in the availability of gas for LNG projects.

LNG trade is becoming more important than pipeline gas trade

Shares of LNG and pipeline gas trades, 2000 – 2024 (%)

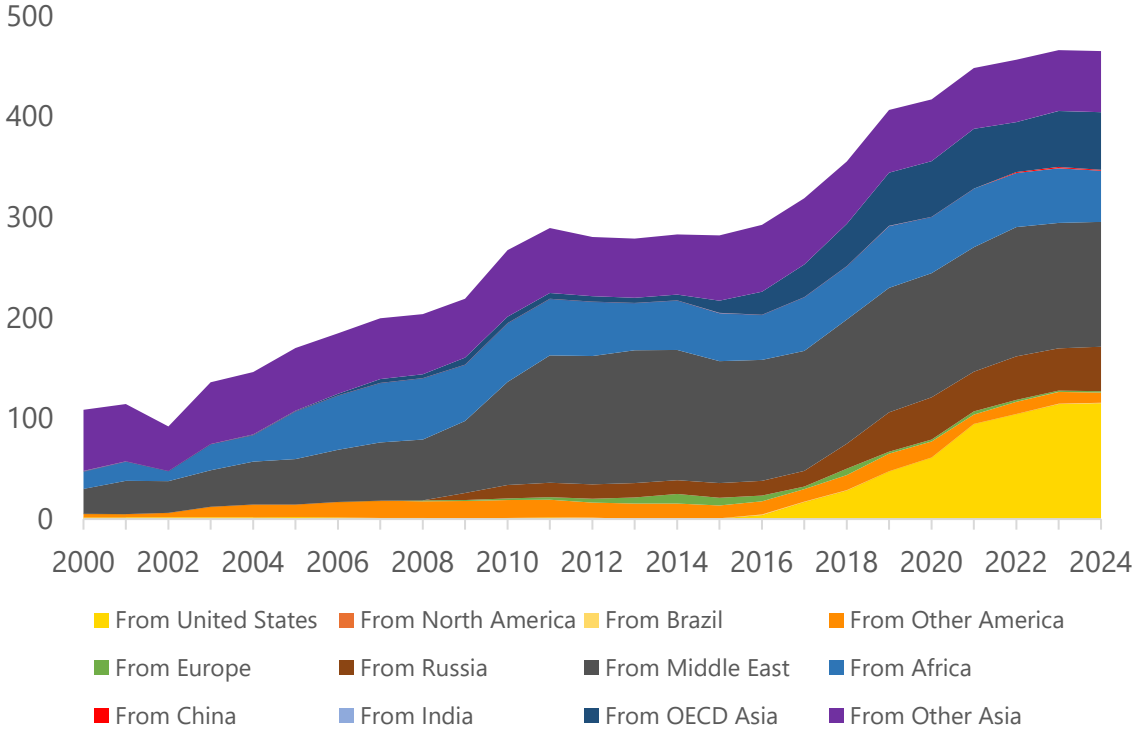


Source: EI (2025)

- The share of **LNG trade rose from 22% to 53%** between 2000 and 2024.
- **Destination flexibility** with LNG allows for wider market reach, unlike pipeline gas that is constrained by geography and inflexibility.
- The United States is engaged in a **significant buildout of LNG infrastructure**, which will increase LNG trade.
- **Rising demand for gas in Asia** will be met mostly by LNG since the region has fewer gas pipelines than other regions.
- Europe has **significantly reduced** its reliance on **Russian pipeline gas**, which has caused its LNG imports to increase.

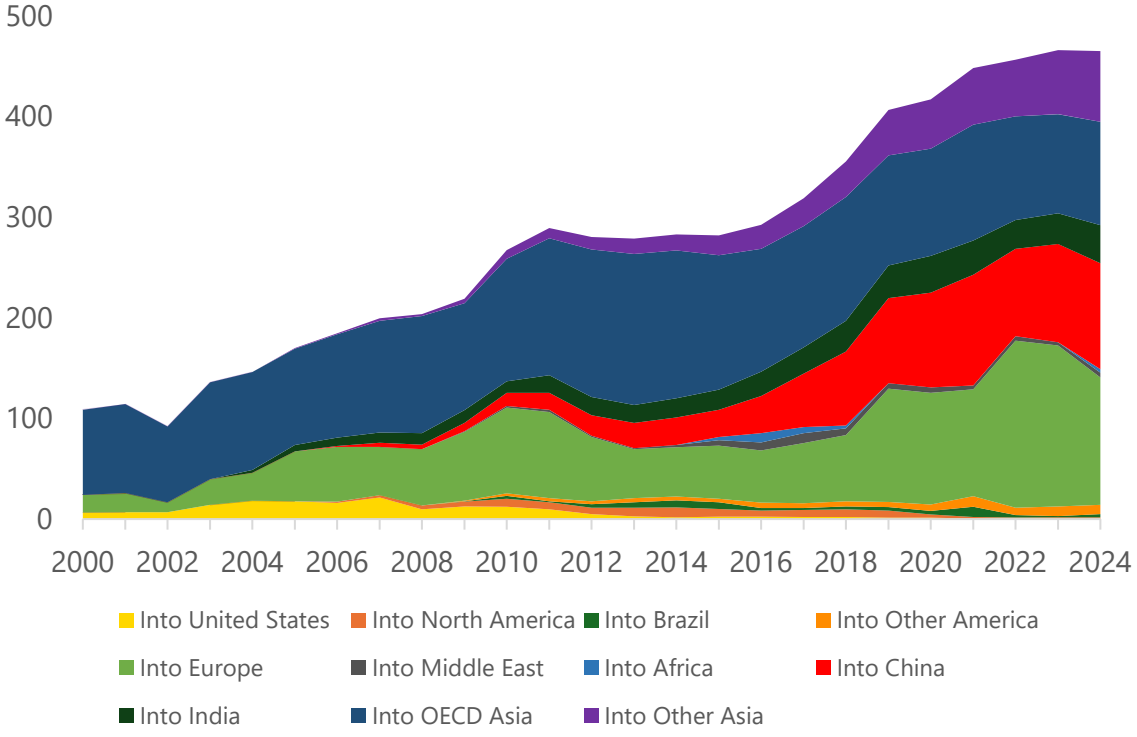
Global LNG trade remained relatively flat in 2024

Global LNG exports, 2000 – 2024 (bcm)



Source: EI (2025)

Global LNG imports, 2000 – 2024 (bcm)



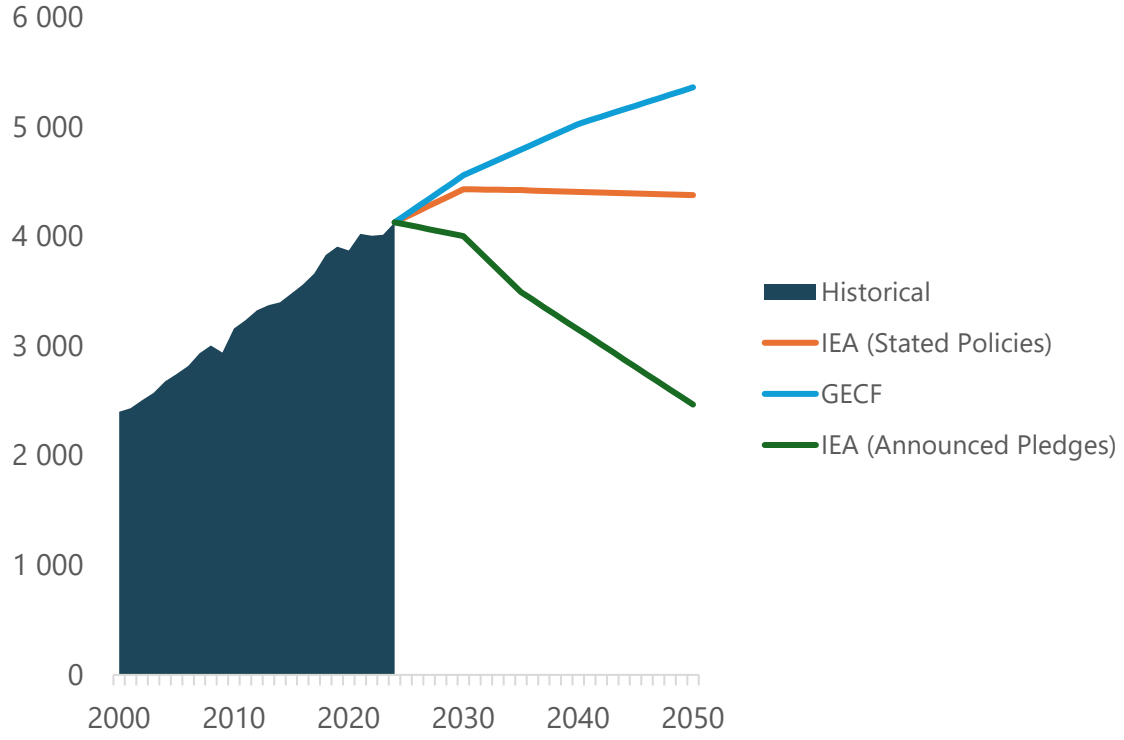
Source: EI (2025)

- The Middle East was the largest LNG exporter in 2024, followed closely by the United States.
- China increased its LNG imports by 7%, but Europe's imports fell by 21% in 2024, with the latter driven by renewable energy additions.

Future trends and anticipated challenges

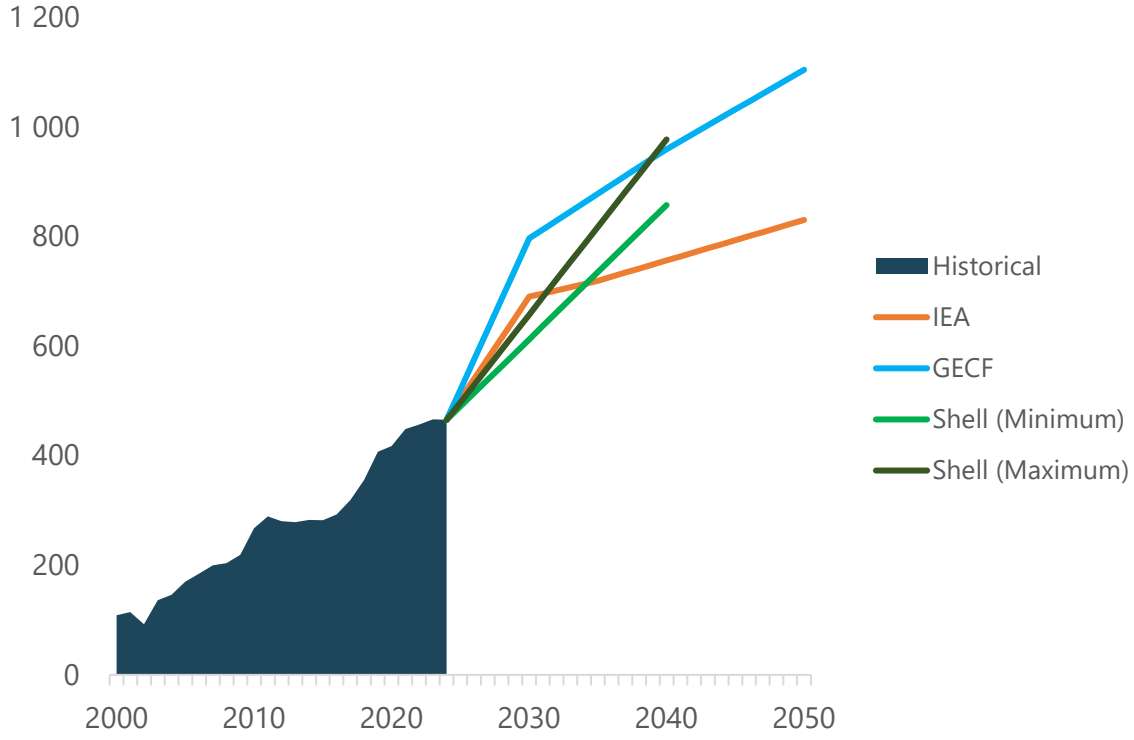
Global gas demand and LNG imports are projected to increase

Global gas demand, 2000 – 2050 (bcm)



Source: EI (2025), IEA (2024), GECF (2025)

Global LNG imports, 2000 – 2024 (bcm)

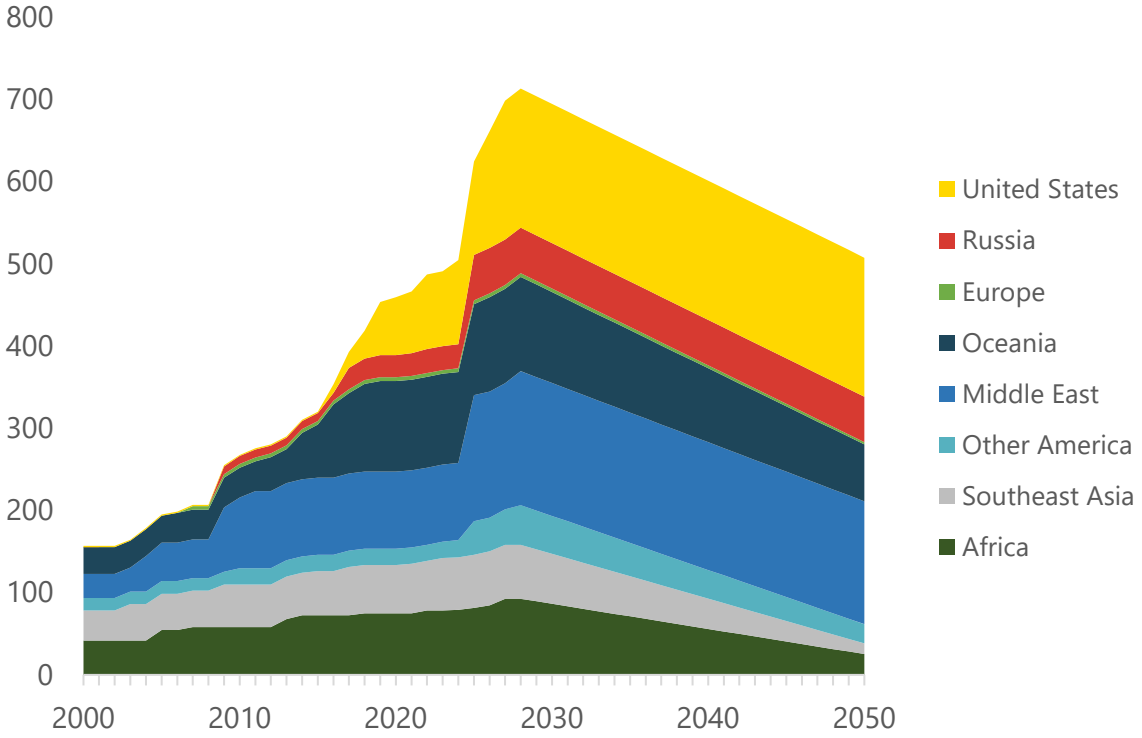


Source: EI (2025), IEA (2024), GECF (2025), Shell (2025)

- GECF and IEA forecast annual gas demand to grow by **7%-10% per year to 2030**.
- Demand forecasts diverge after 2030; **GECF is bullish, IEA is bearish**.
- IEA, GECF, and Shell anticipate annual LNG imports to grow by **78%-137% by 2050** from 2024 levels.

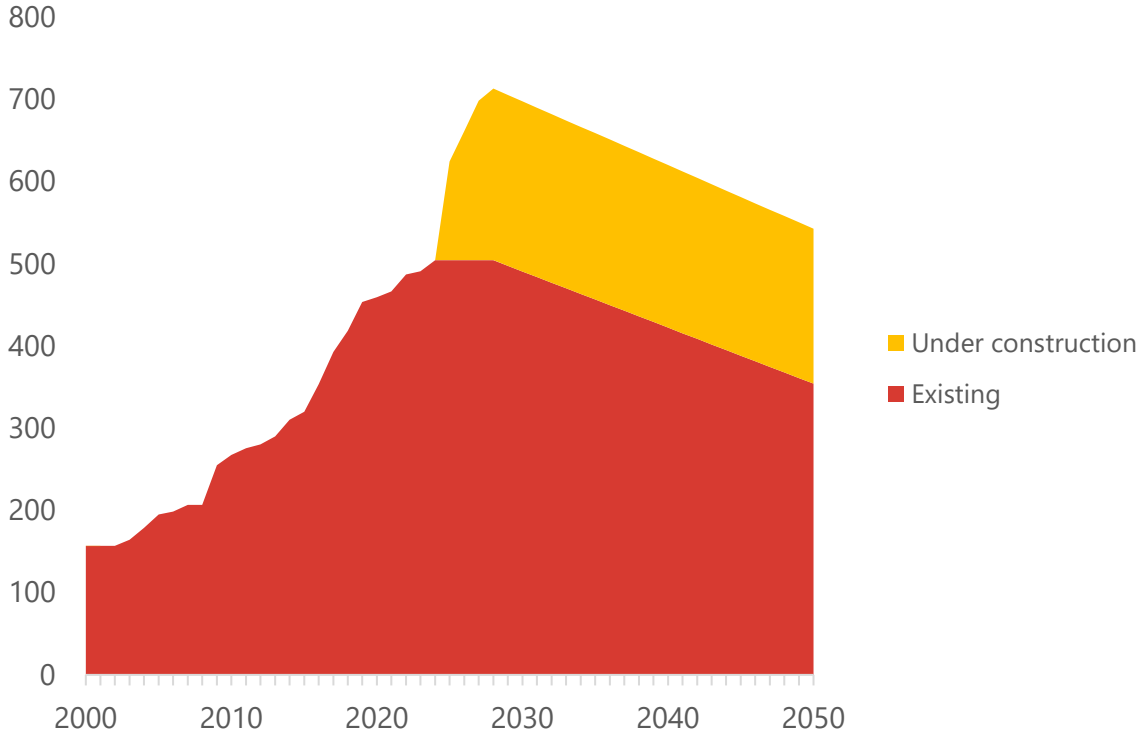
Global liquefaction capacity set to reach over 700 million tonnes by 2028

Global liquefaction capacity, 2000 – 2050 (million tonnes)



Source: CEDIGAZ (2025)

Global liquefaction capacity, 2000 – 2050 (million tonnes)

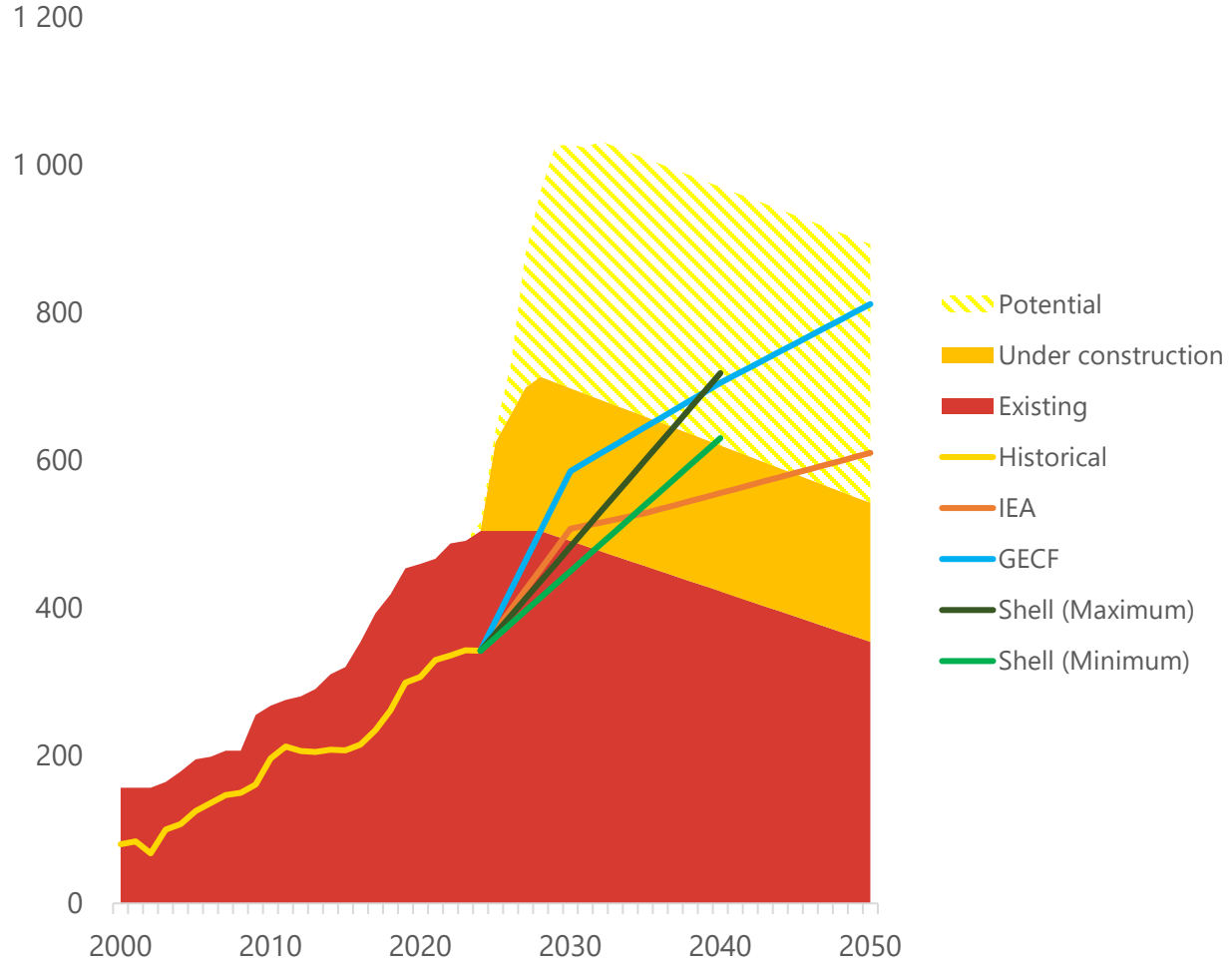


Source: CEDIGAZ (2025)

- United States and Middle East (Qatar) are projected to lead **a new wave capacity additions** now under construction.

LNG supply could become tighter after 2035

Global liquefaction capacity and LNG demand scenarios, 2000 – 2050 (million tonnes)

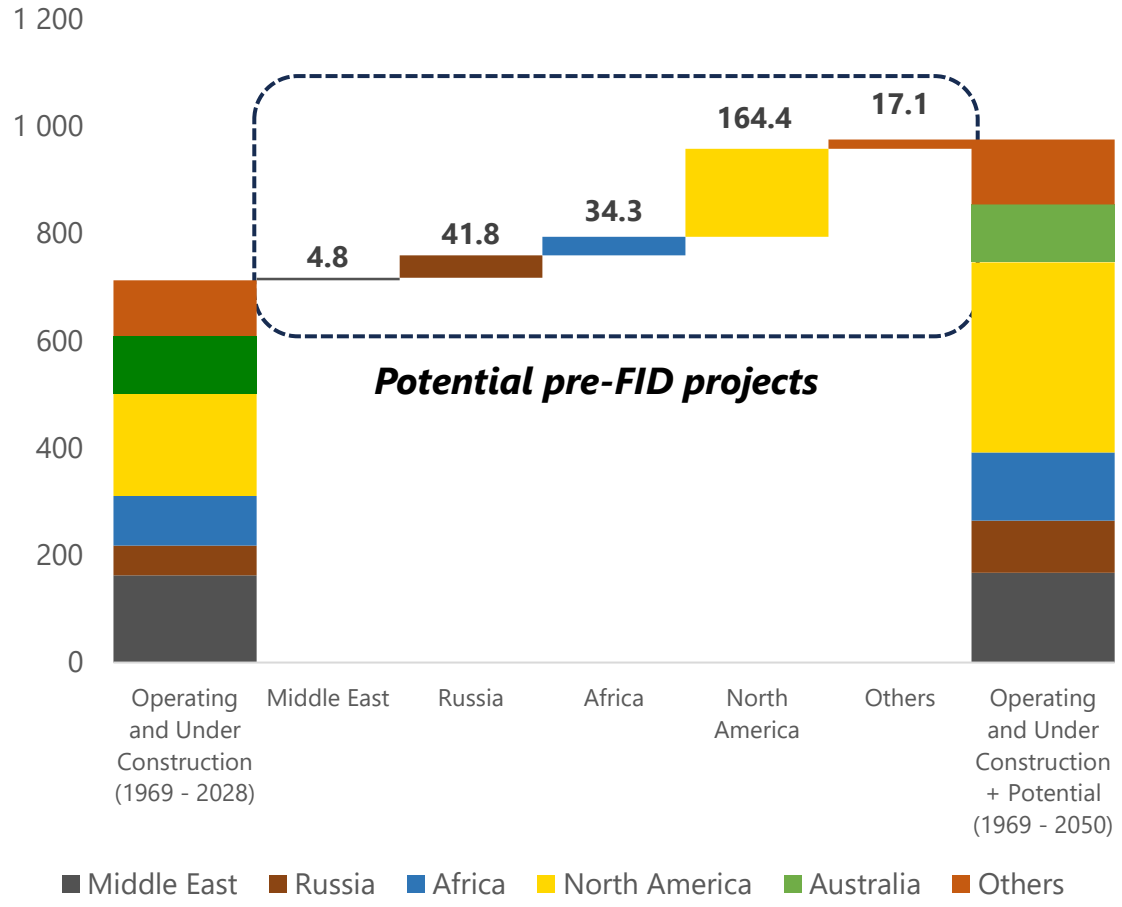


- Significant additions from United States and Qatar are expected to create **an LNG glut** between now and 2035.
- Under high-demand scenarios, demand could outweigh supply beyond 2035.
- Additional liquefaction capacity of **262 million tonnes** will be required by 2050 (based on GECF demand).
- CEDIGAZ estimated that there are **potential** cumulative capacities of **350 million tonnes**, contingent on financial commitments and approvals.

Source: EI (2025), IEA (2024), GECF (2025), Shell (2025), CEDIGAZ (2024)

North America could realise most of its potential liquefaction projects

Potential new LNG projects (pre-FID) by 2050 (million tonnes)



Source: CEDIGAZ (2025)

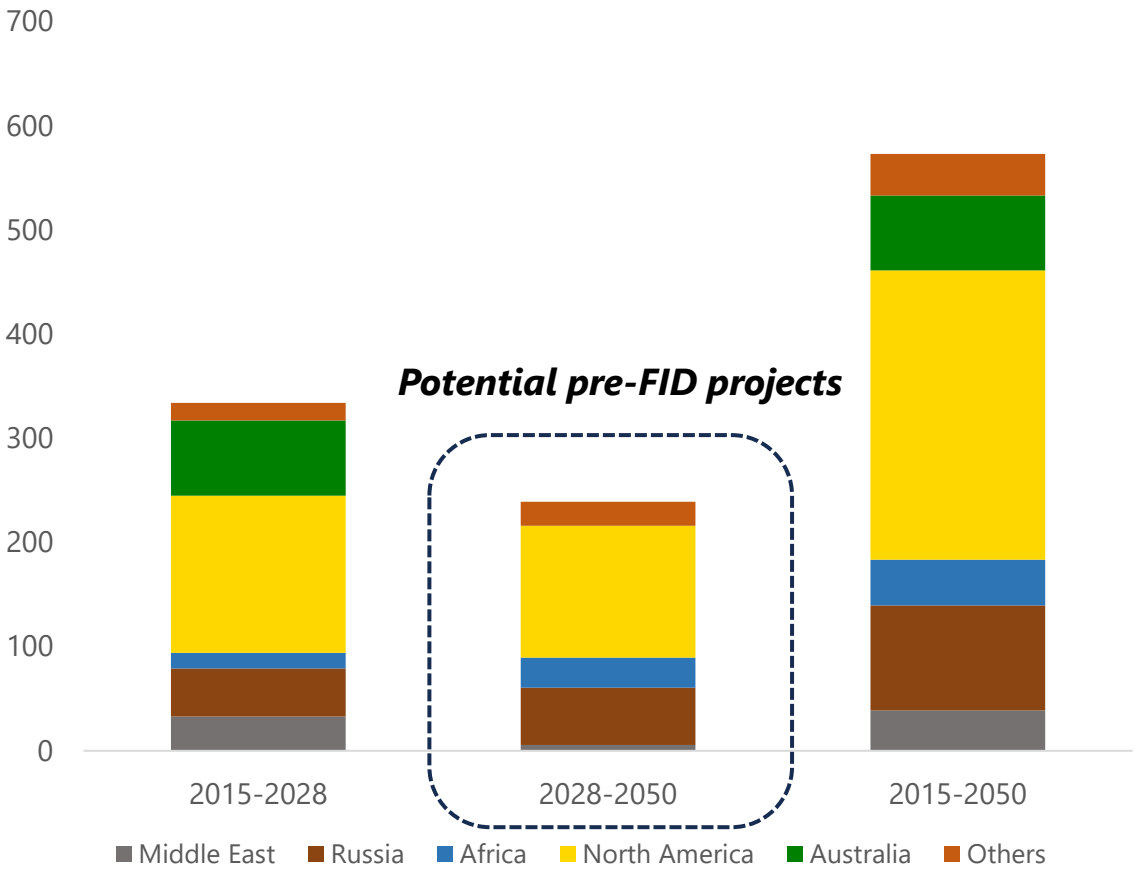
Notes: 1) North America includes Canada, Mexico and United States

2) Others include Papua New Guinea, Indonesia and Argentina

- Several potential projects (pre-FID) have the potential to meet the **262 million tonnes supply gap**.
- **North America could contribute** to filling the gap by 2050 (164 million tonnes). Of that, United States could contribute 148 million tonnes.
- **Russia's contribution** to the gap could include the Arctic LNG 1 project.
- **Africa's potential** projects could include the major 18 million tonnes Rovuma LNG project in Mozambique.

Substantial additional investment could be needed by 2050

Cumulative liquefaction capital investment, 2015 – 2050 (billion USD)



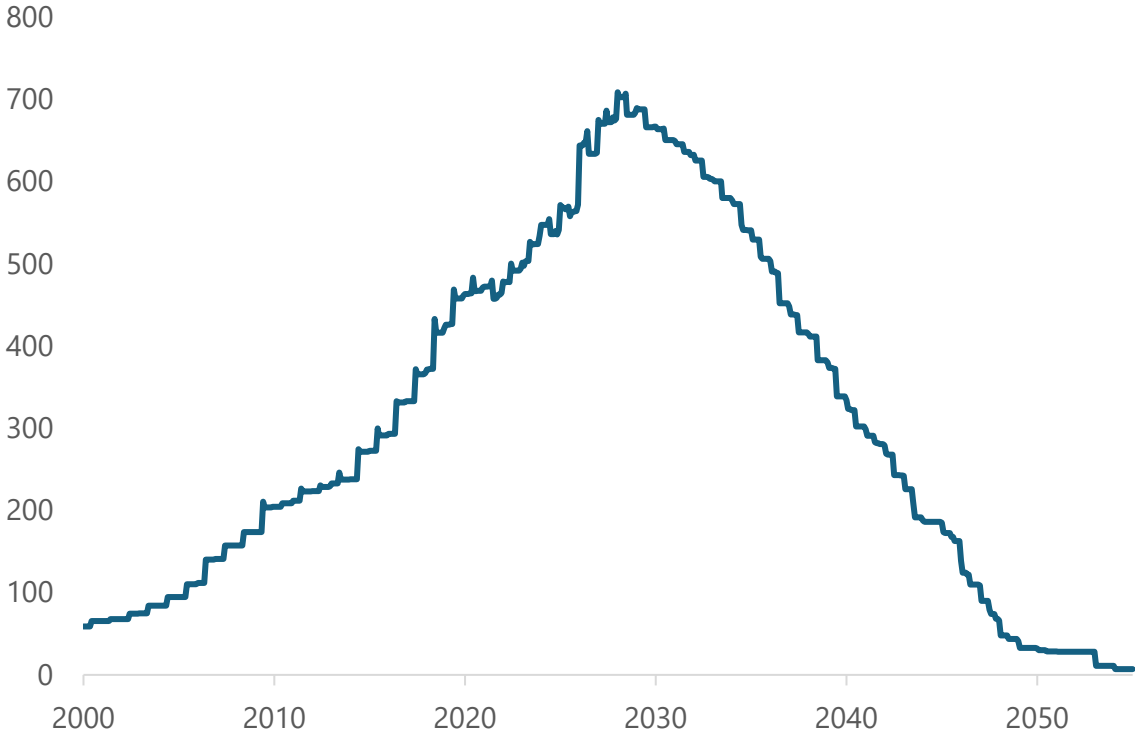
Source: IEA (2024), CEDIGAZ (2025), Zou et. al (2021)

- IEA expects cumulative **LNG investment** to reach **USD 334 billion** in 2030s.
- An **additional investment of USD 239 billion** would be required globally to meet the supply gap of 262 million tonnes by 2050.
- **North America and Russia** could contribute **46% and 23%** of additional investments needed, respectively.

Region	Average Liquefaction unit investment cost (USD/tonne of LNG)
United States	729
Russia	1,313

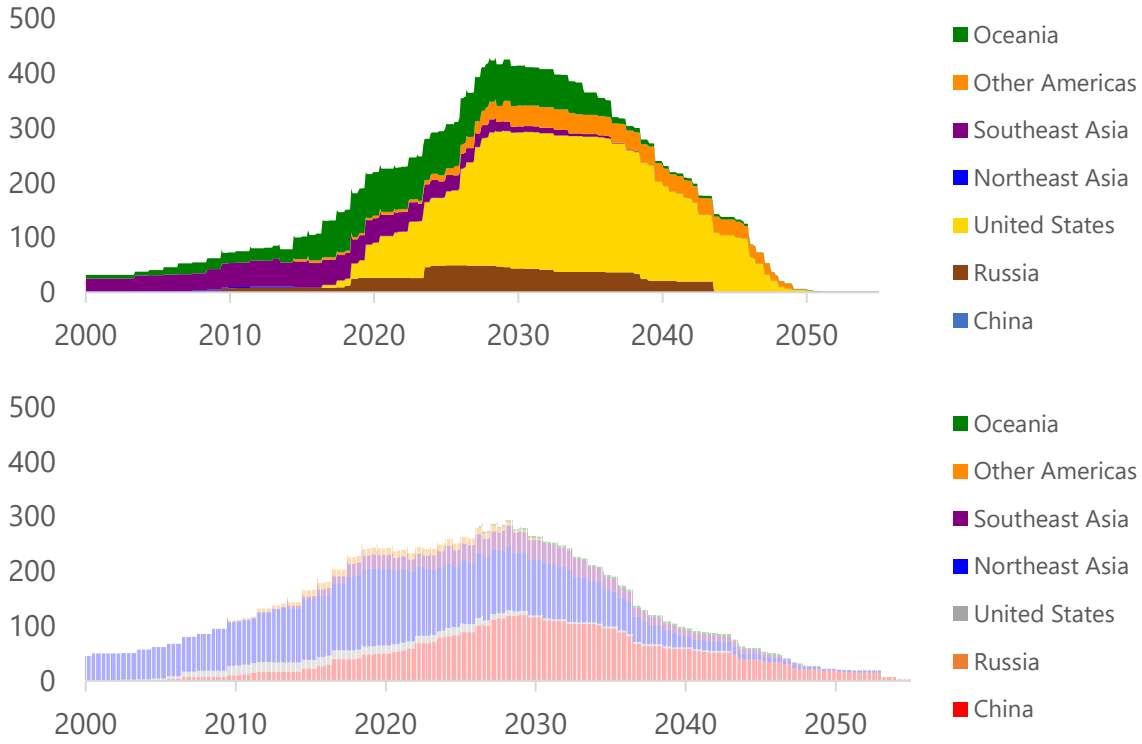
Declining long-term LNG contracts are a risk to needed investment

Global monthly LNG contracted volumes, 2000 - 2055 (million tonnes)



Source: CEDIGAZ (2025)

APEC monthly LNG contracted export (top) and import (bottom) volumes, 2000 - 2055 (million tonnes)



Source: CEDIGAZ (2025)

- **Long-term LNG contracts** remain crucial for **securing financing** for incremental LNG capacity.
- However, it is estimated that the **share of long-term contracts will fall** as buyers seek for more flexibility (shorter durations, allowing resales, etc).

Potential actions for APEC economies to address the energy security concerns from declining LNG investments

- **Improve gas demand forecasts to reduce uncertainty.** Leveraging machine learning and AI models to conduct forecasts that consider market dynamics. Better forecasts give encouraging signals to investors in the midstream as well as upstream.
- **Streamline permitting processes and remove regulatory risks.** Regulators can accelerate issuing permits for new LNG projects to reduce delays and costs.
- **Diversify LNG supply sources.** Encourage investments in new liquefaction projects in emerging exporting economies to reduce supply disruption risks and guard against over-reliance on dominant players such as United States and Qatar.
- **Invest in flexible liquefaction infrastructure in strategic locations.** Economies could consider developing floating liquefaction plant (FLNG) and small-scale LNG plants for strategic market reach and minimise cost associated with large-scale onshore liquefaction projects.
- **Establish strategic gas storage systems**. Economies could consider investing in new storage systems that can act as a buffer against supply disruptions.
- **Seek long-term LNG contracts with suppliers.** Long-term contracts provide assurance on the stability of supplies to importers during market disruptions.

Summary

- Lower global supply of gas **increases gas price volatility** and **undermine energy security**.
- **Global proved gas reserves are central to LNG investment decisions**, as they provide confidence in the availability of gas for LNG projects.
- There remains **significant uncertainty about the future gas demand** beyond 2030 between outlooks.
- **United States and Middle East (Qatar)** are projected to lead a new wave of post-Final Investment Decision (FID) capacity additions.
- Under high-demand scenarios, **demand could outweigh supply beyond 2035**.
- **North America, particularly the United States, followed by Russia and Africa** could all help address a supply shortfall by 2050,.
- **The share of long-term contracts is estimated to fall** as buyers seek for **more flexibility**.
- APEC economies can **take a number of actions to reduce future LNG supply risks**.

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