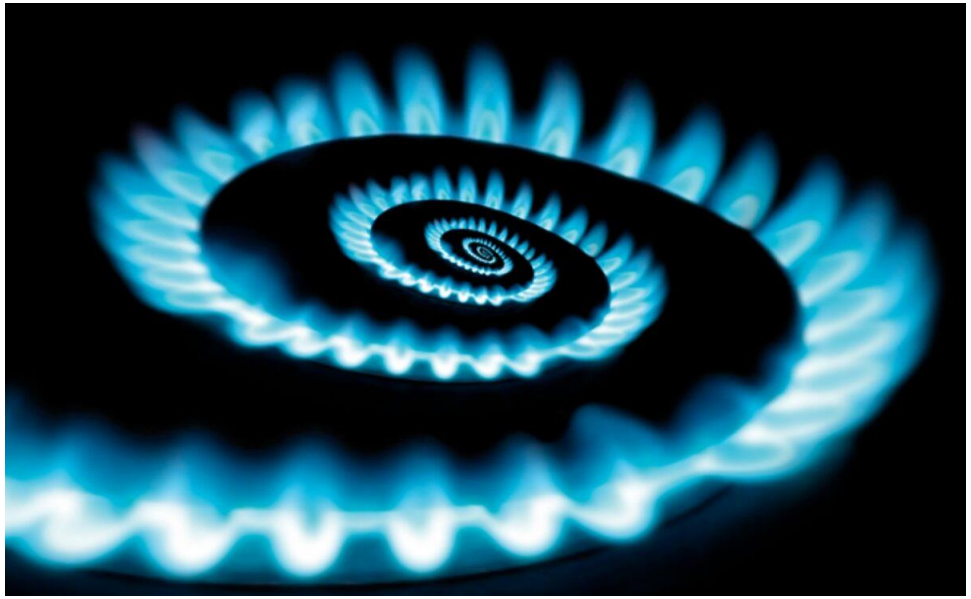
The Role of Natural Gas in Building a Resilient Energy System



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The 11th Session of the Group of Experts on Gas
Committee on Sustainable Energy
Economic Commission for Europe

Geneva, 21th March

JUST Energy Transition is a Key Opportunity to Build a Resilient Energy System

IDEAL Energy Transition

- Carbon net neutrality by 2050
- Too expensive way to transform the existing energy sector
- The possible detriment of other important socio-economic objectives of global development *(incl. the 7th UN Sustainable Development Goal (SDG)*

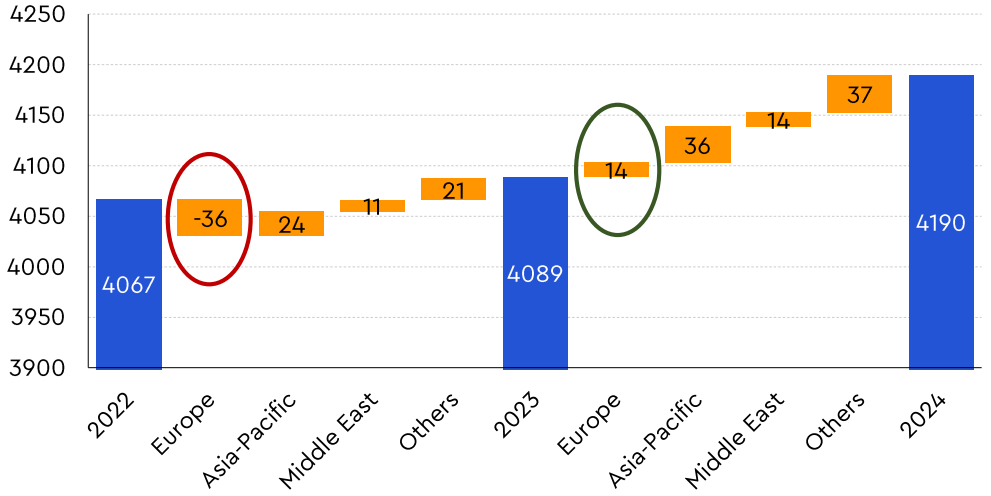
JUST Energy Transition

- Rational Decarbonization
- Improving energy efficiency
- Introducing less carbon-intensive energy technologies

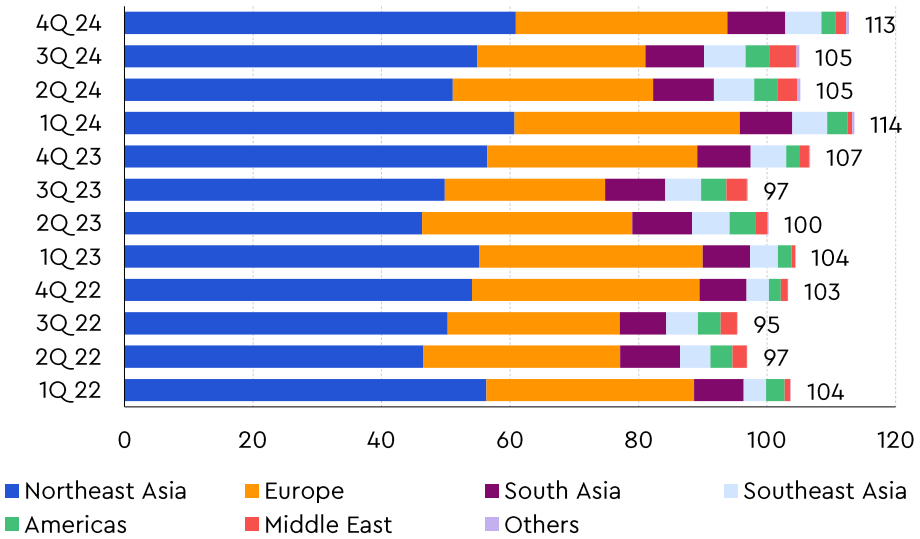
Global Gas Consumption Is Increasing and Will Be Further Increased

- In 2023, consumption growth in the Asia-Pacific region and the Middle East was almost offset by the continued contraction in demand in Europe.
- In 2024, the growth rate of NG consumption may be 5 times higher than in 2023, even in Europe.
- Global LNG demand is accelerating by 5% (YoY) by 2024.
- International pipeline gas trade growth is limited mainly by non-economic reasons (especially in Europe).

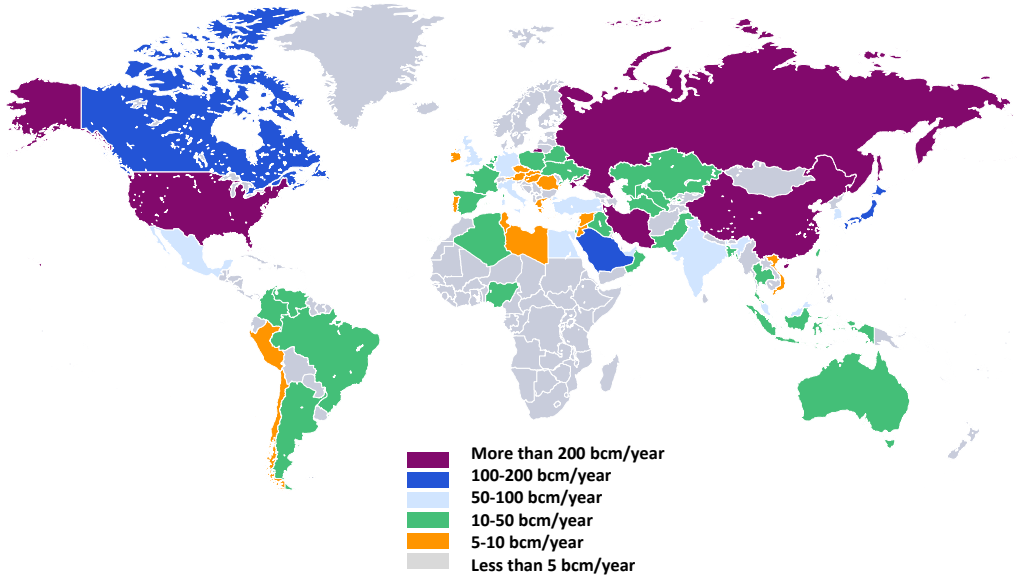
Natural gas consumption by the regions, 2023-24, bcm



Global LNG demand, mln t/quarter



The largest natural gas consuming countries, 2023

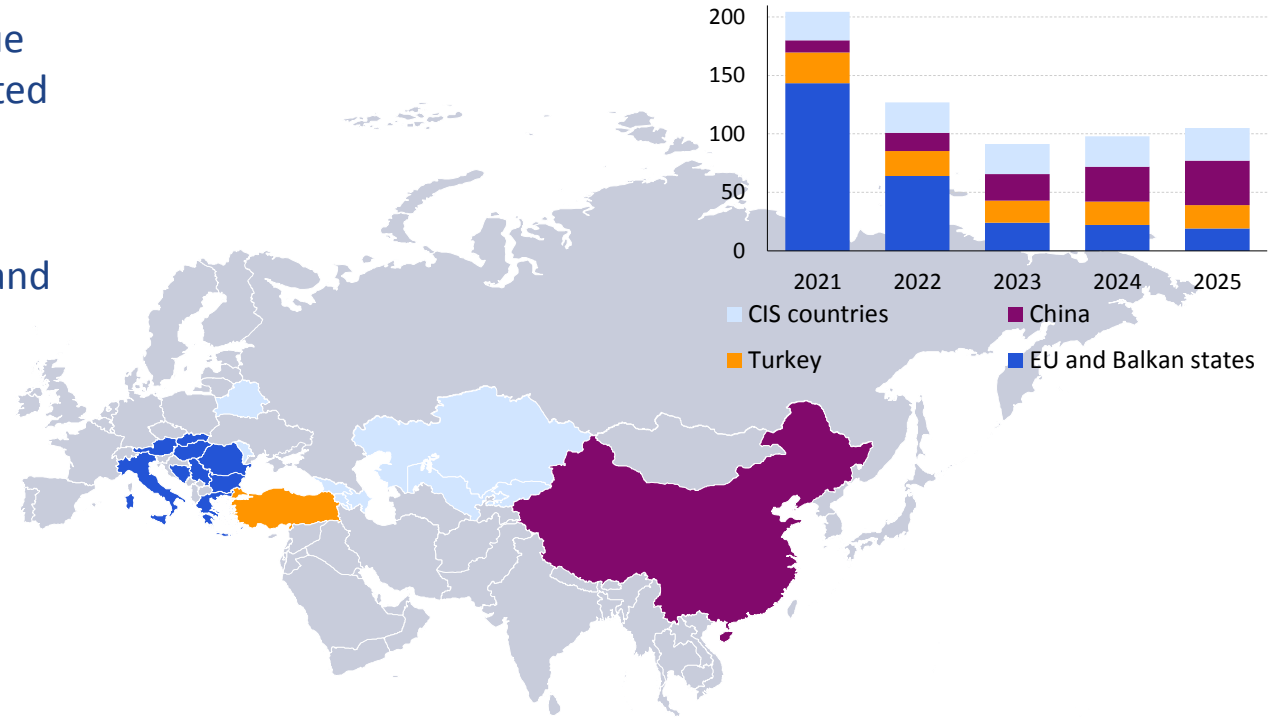


Source: Institute for Energy and Finance based on IEA, The Energy Institute, and EIA data

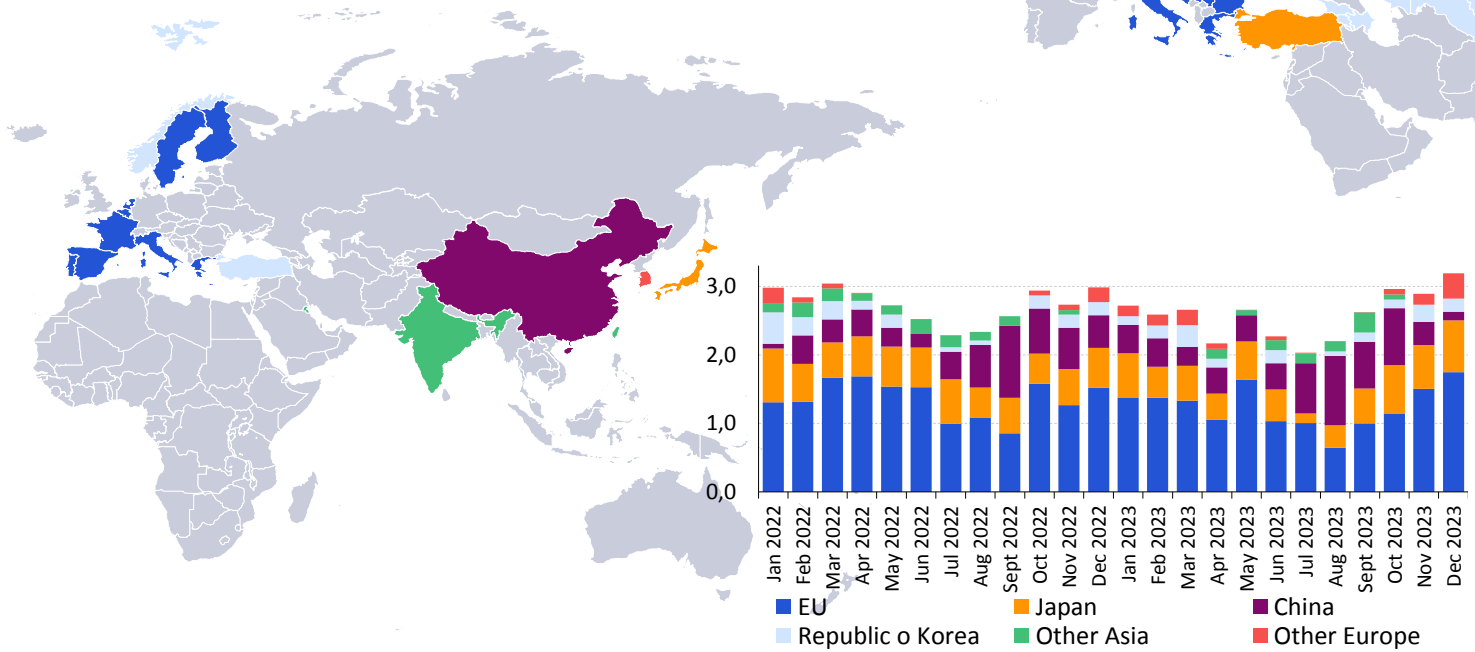
Russia Remains Its Role of Important Gas Supplier

- Despite the decline in Russian pipeline gas exports in 2022-23 due to the non-economic reasons, its back to steady growth is expected in 2024-25.
- In 2023, EU countries accounted for 48% of Russian LNG shipments. Japan (19.6%) and China (19.3%) shared the second and third places.

Pipeline gas export from Russia, 2023-25, bcm

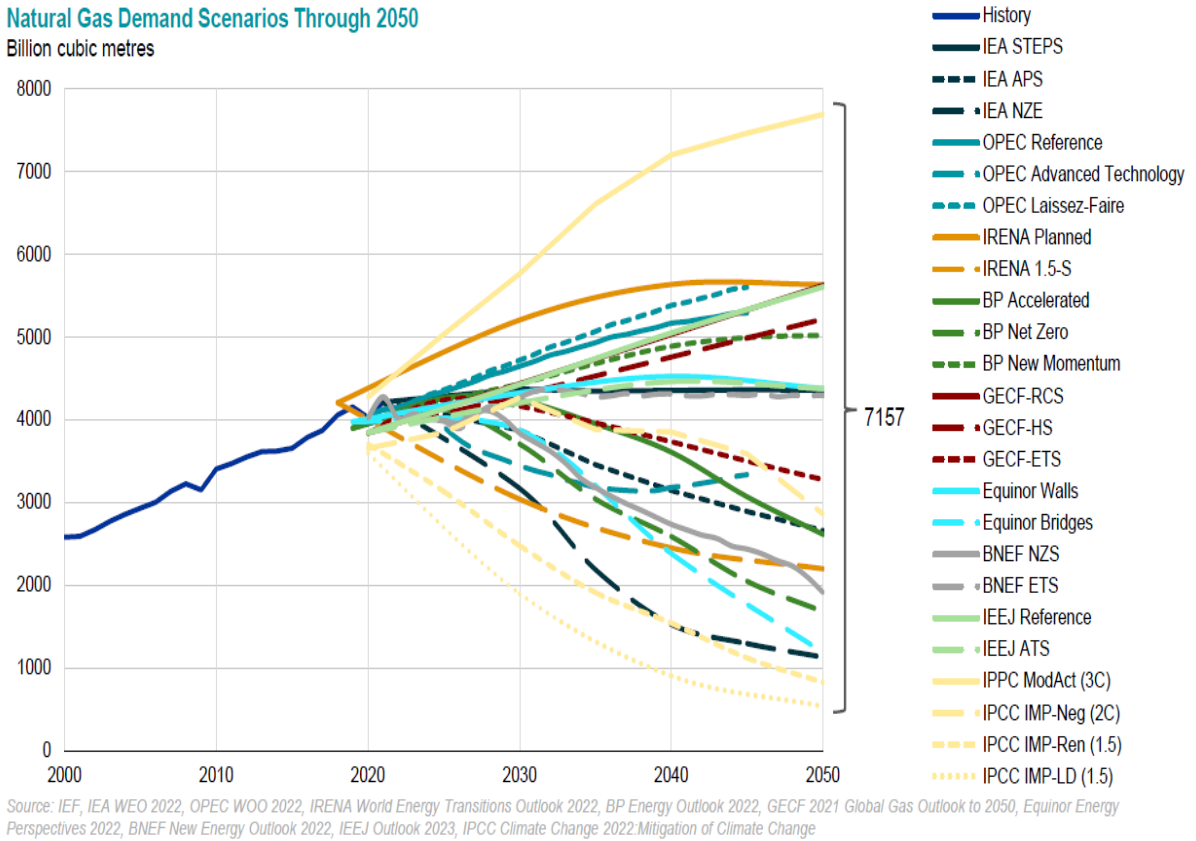


LNG export from Russia, 2023, mln t

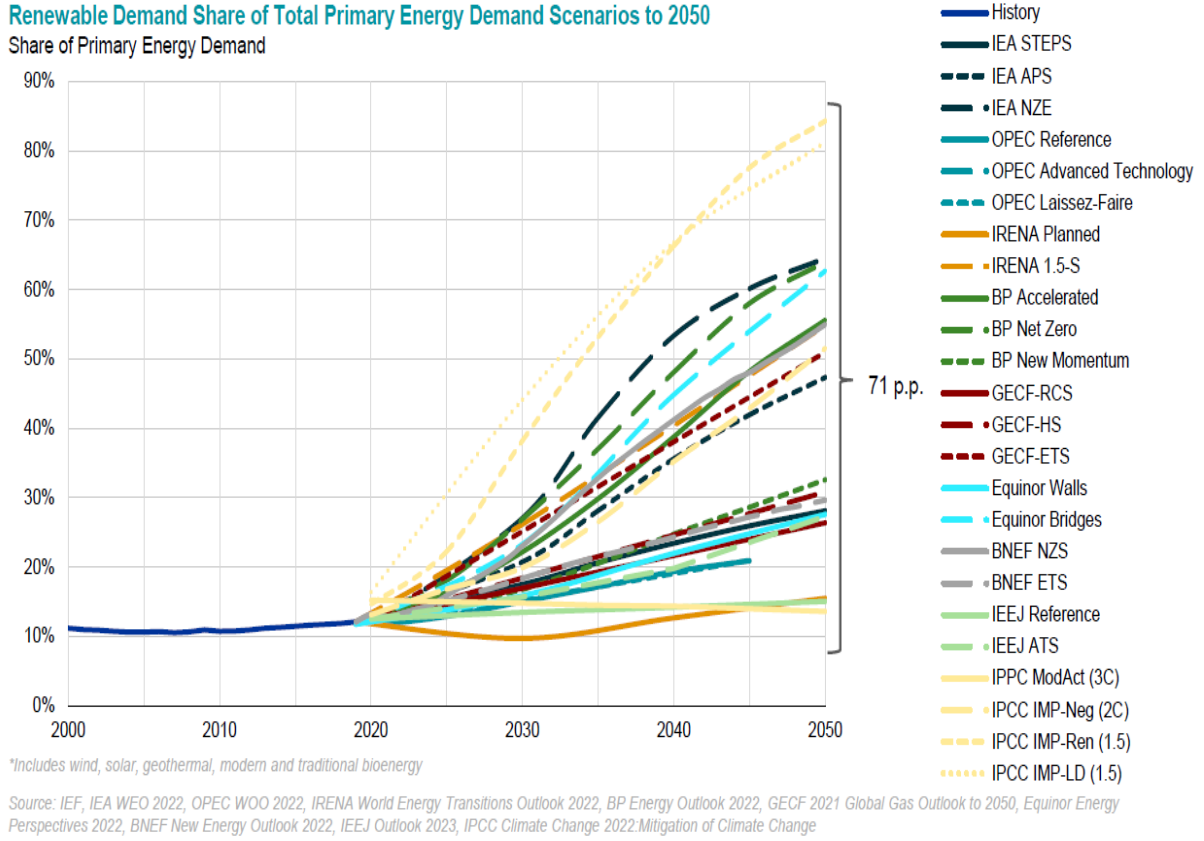


Source: Institute for Energy and Finance based on Refinitiv Eikon, ENTSOG data

What's next?
Existing Global Energy Scenarios Fields Show the Unprecedented Uncertainty



Source: IEF, IEA WEO 2022, OPEC WOO 2022, IRENA World Energy Transitions Outlook 2022, BP Energy Outlook 2022, GECF 2021 Global Gas Outlook to 2050, Equinor Energy Perspectives 2022, BNEF New Energy Outlook 2022, IEEJ Outlook 2023, IPCC Climate Change 2022:Mitigation of Climate Change



*Includes wind, solar, geothermal, modern and traditional bioenergy

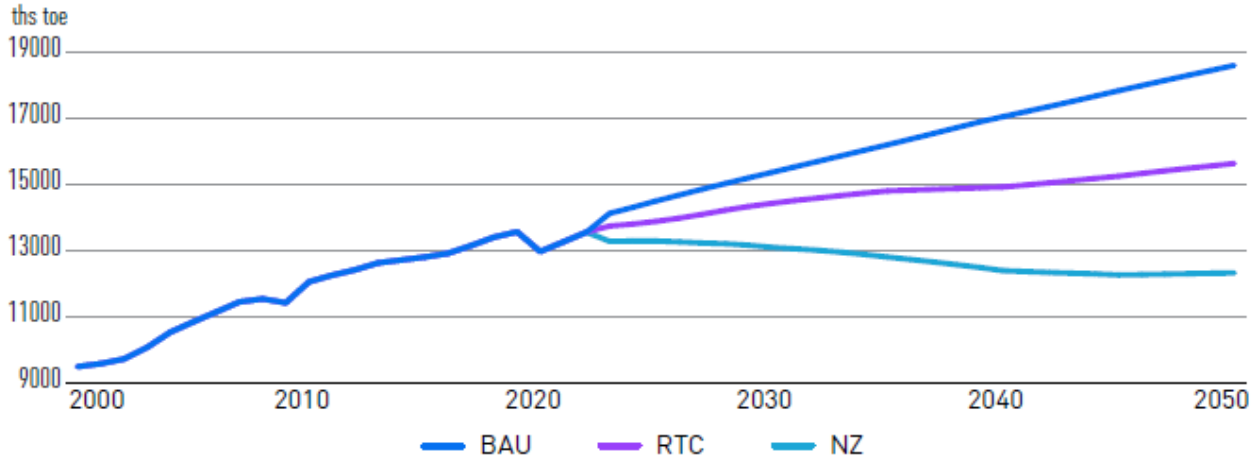
Source: IEF, IEA WEO 2022, OPEC WOO 2022, IRENA World Energy Transitions Outlook 2022, BP Energy Outlook 2022, GECF 2021 Global Gas Outlook to 2050, Equinor Energy Perspectives 2022, BNEF New Energy Outlook 2022, IEEJ Outlook 2023, IPCC Climate Change 2022:Mitigation of Climate Change

- In possible natural gas consumption by 2050 the difference between the extreme scenarios is more than 5 trillion bcm. This exceeds current global gas consumption almost twice.
- The difference in the possible share of renewables in the primary energy consumption amounts to 71 p.p. by 2050. Accordingly, the difference in the possible share of fossil fuels in 2050 reaches 72 p.p.: from 15 % to 87%.

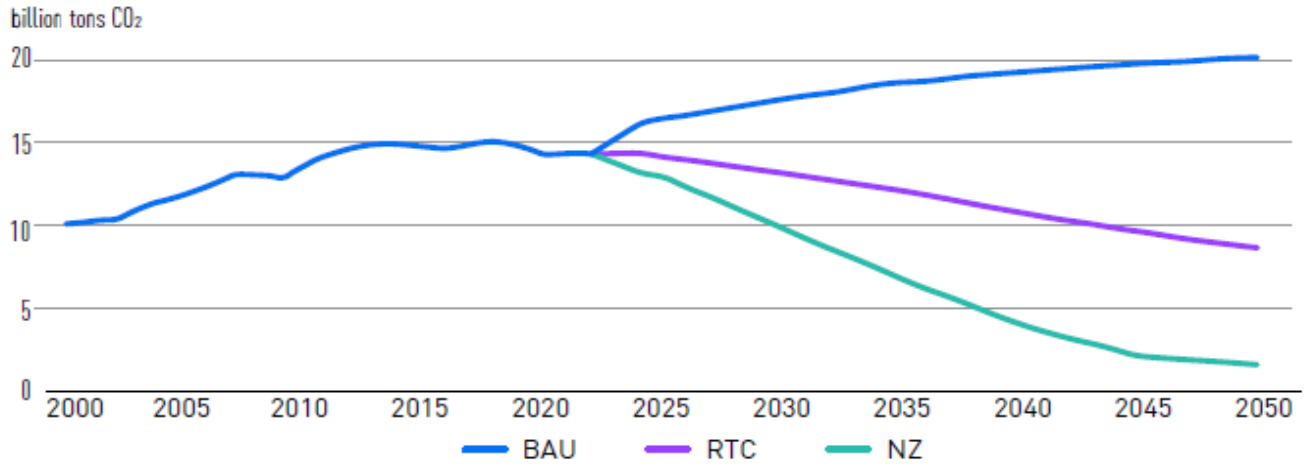
Global Energy Scenarios to 2050: View from Russia

- In 2024 Russian Energy Agency has developed its own version of possible energy transition scenarios with “self-explanatory” names: “Business as Usual” (**BAU**), “Net Zero” (**NZ**) and “Rational Technological Choice” (**RTC**).
- The differences between these scenarios primarily relate to:
  - **the rate of dissemination of low-carbon energy technologies** (learning curve), and **the corresponding shifts in global energy mix**
  - **the required changes in price of different energy sources**, including price of carbon
  - **the stringency of requirements to reduce emissions** of the main greenhouse gases (CO_2 and methane)
  - **the required investment in energy transition**

Primary energy consumption



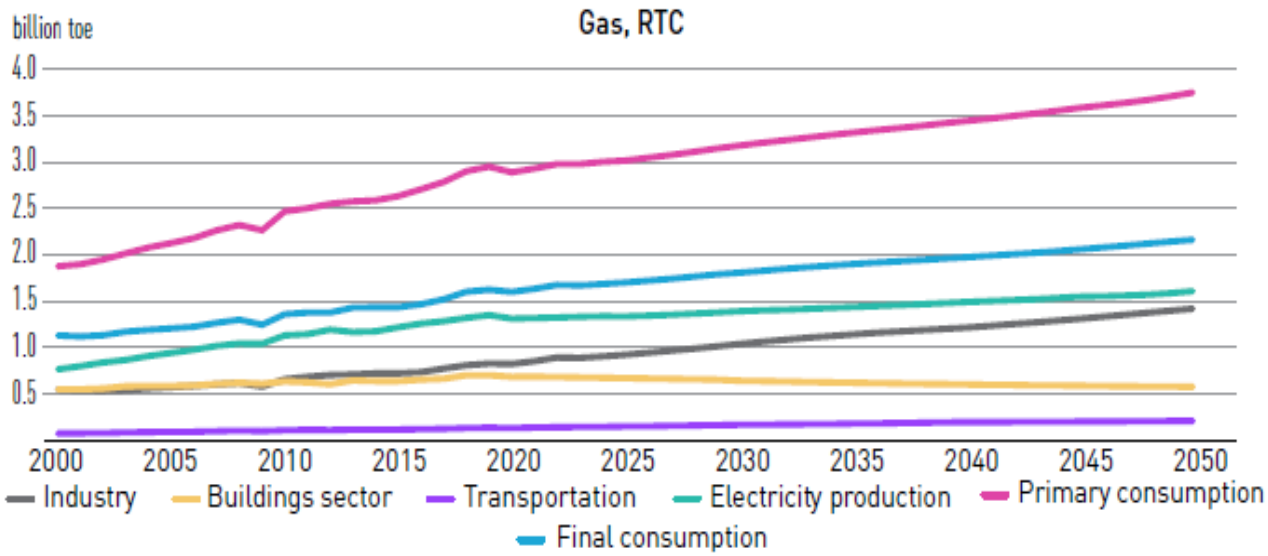
CO_2 emissions in the energy sector

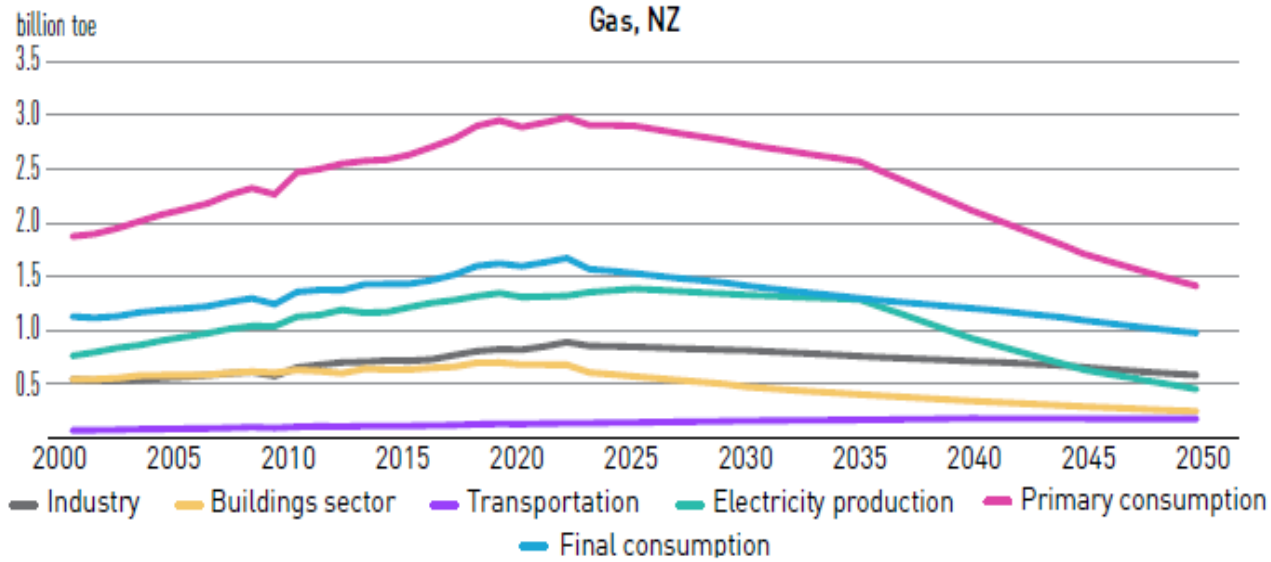


Source: Global Energy: Scenarios to 2050, by Russian Energy Agency, February 2024

Global Natural Gas Consumption: View from Russia

- Primary consumption of natural gas (including as raw material in industry) grows by **56%** (to 4.6 Btoe) over the forecast period in the BAU scenario and by **26%** (to 3.7 Btoe) in the RTC scenario.
- In the NZ scenario, gas consumption could decline by **53%** (to 1.4 Btoe).
- In the RTC scenario, the natural gas could be the leading energy source in the global energy mix (**24% by 2050**).
- The **blue hydrogen production** and **power energy** will be key drivers for global gas demand growth by 2050.
- In the RTC scenario, natural gas consumption is growing most rapidly in **China** (+122% from 2022 to 2050), **India** (+347%), **Sub-Saharan Africa** (+116%) and **other Asia** (+59%). In **Europe** NG consumption will increase by only 9%.
- In the NZ scenario, NG consumption in Europe will fall dramatically by 90%, and will rise only in China (+62%), India (+70%), and Sub-Saharan Africa (+14%).

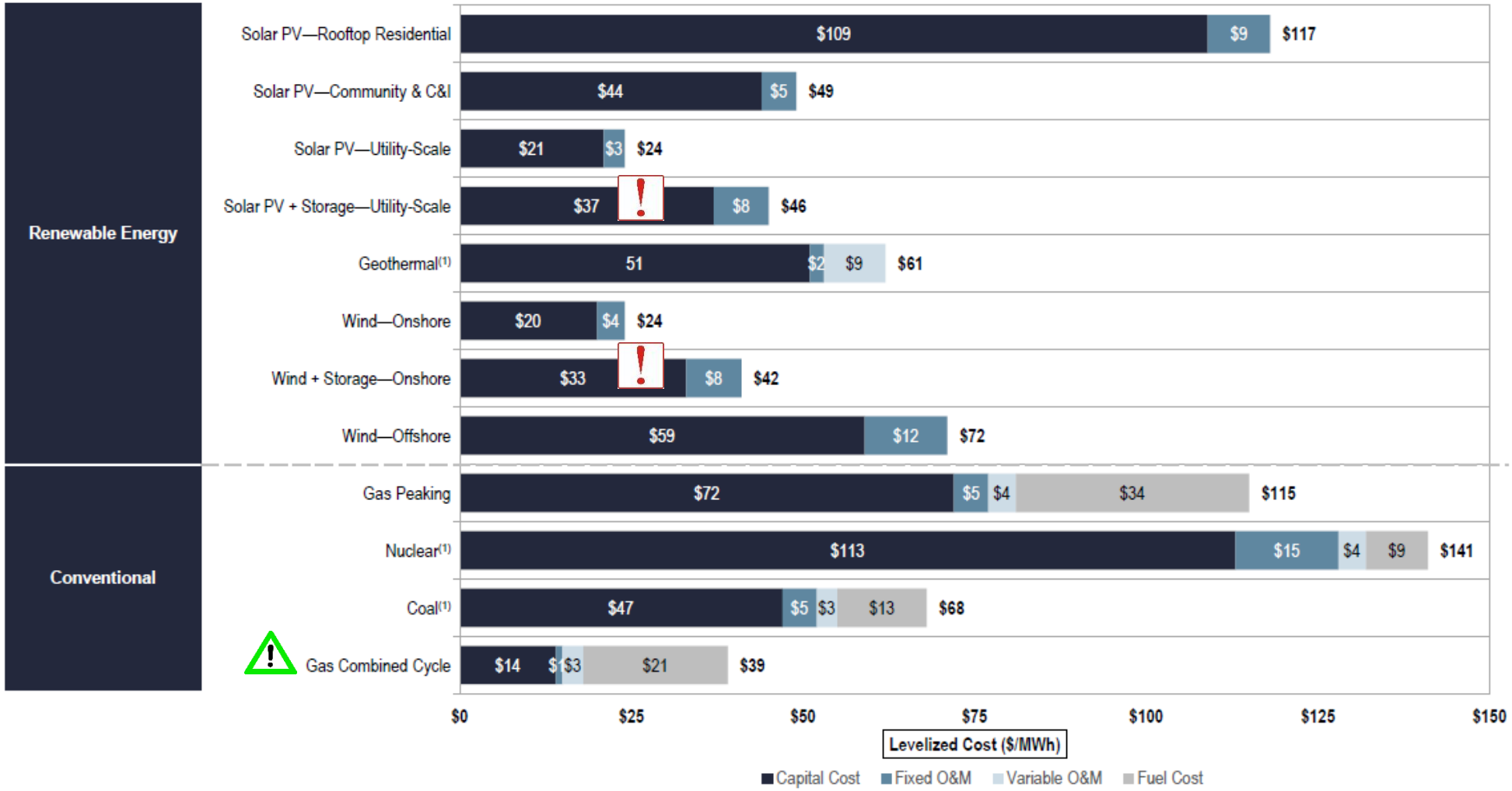




Source: Global Energy: Scenarios to 2050, by Russian Energy Agency, February 2024

Natural Gas Will Continue to Be the Most Efficient Choice for the Global Power Sector

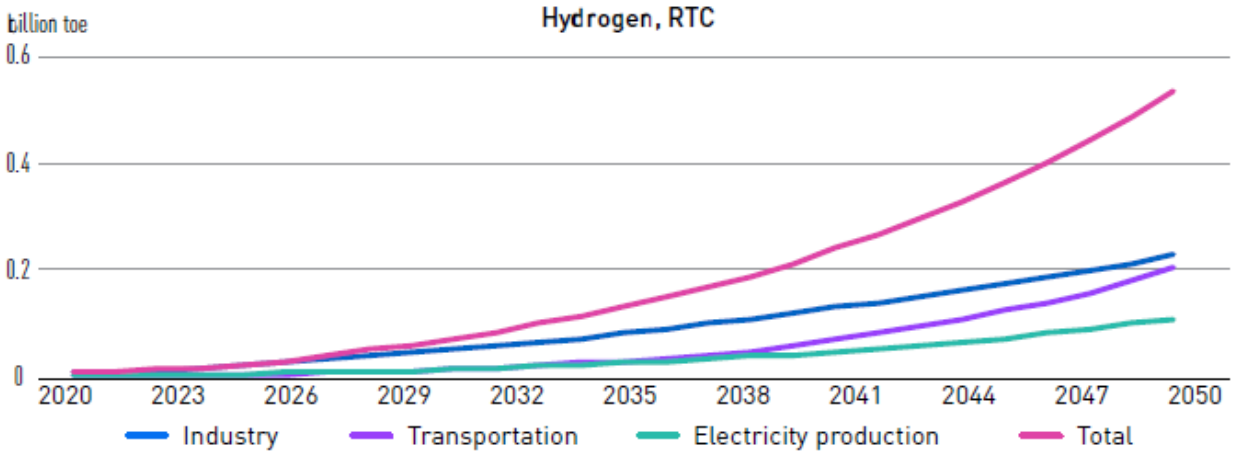
The levelized cost of electricity produced by different types of power stations through their entire life

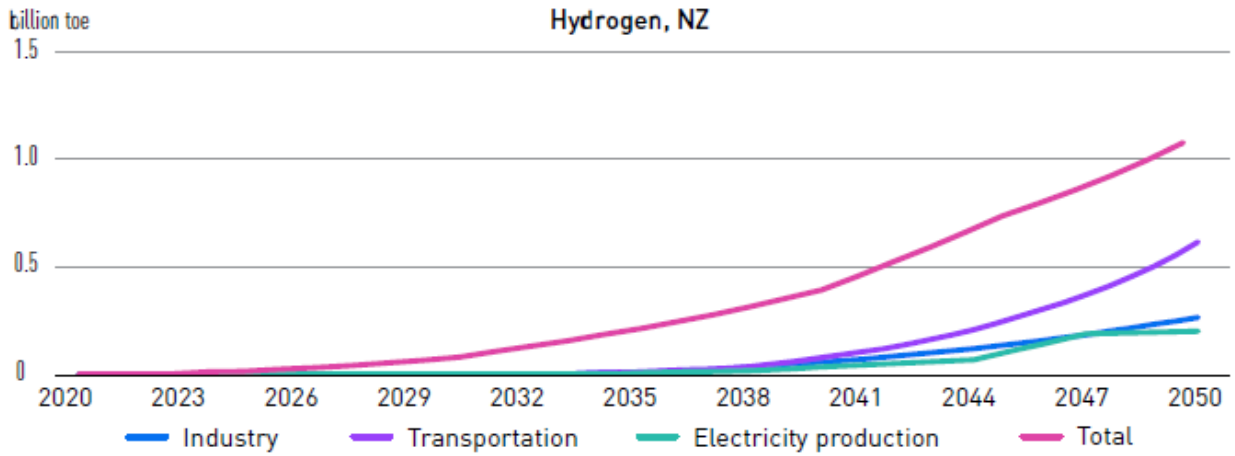


Source: 2023 Levelized Cost Of Energy+, Lazard April 2023

Hydrogen Will Be a Strong Driver for NG Consumption Growth

- In the RTV scenario, hydrogen consumption is growing most significantly in industry (47% of the increase in hydrogen consumption from 2022 to 2050)
- In the NZ scenario, hydrogen consumption is rapidly growing in transport (53% of the increase in hydrogen consumption from 2022 to 2050.
- Total hydrogen consumption will read more than 160 mln t in the RTV scenario and about 330 mln t in the NZ scenario by 2050.
- **The main sources of hydrogen production will be RES and natural gas, using CCUS** (carbon capture, utilization, and storage) technologies.

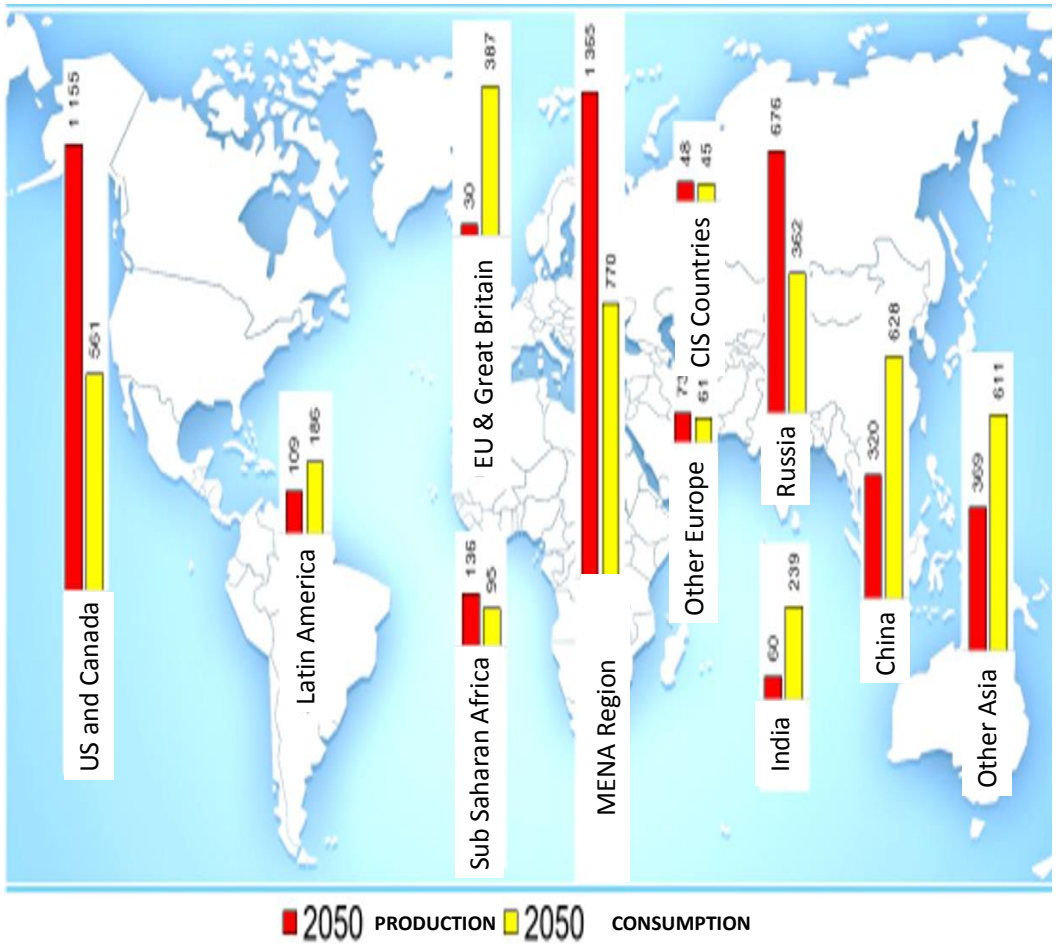




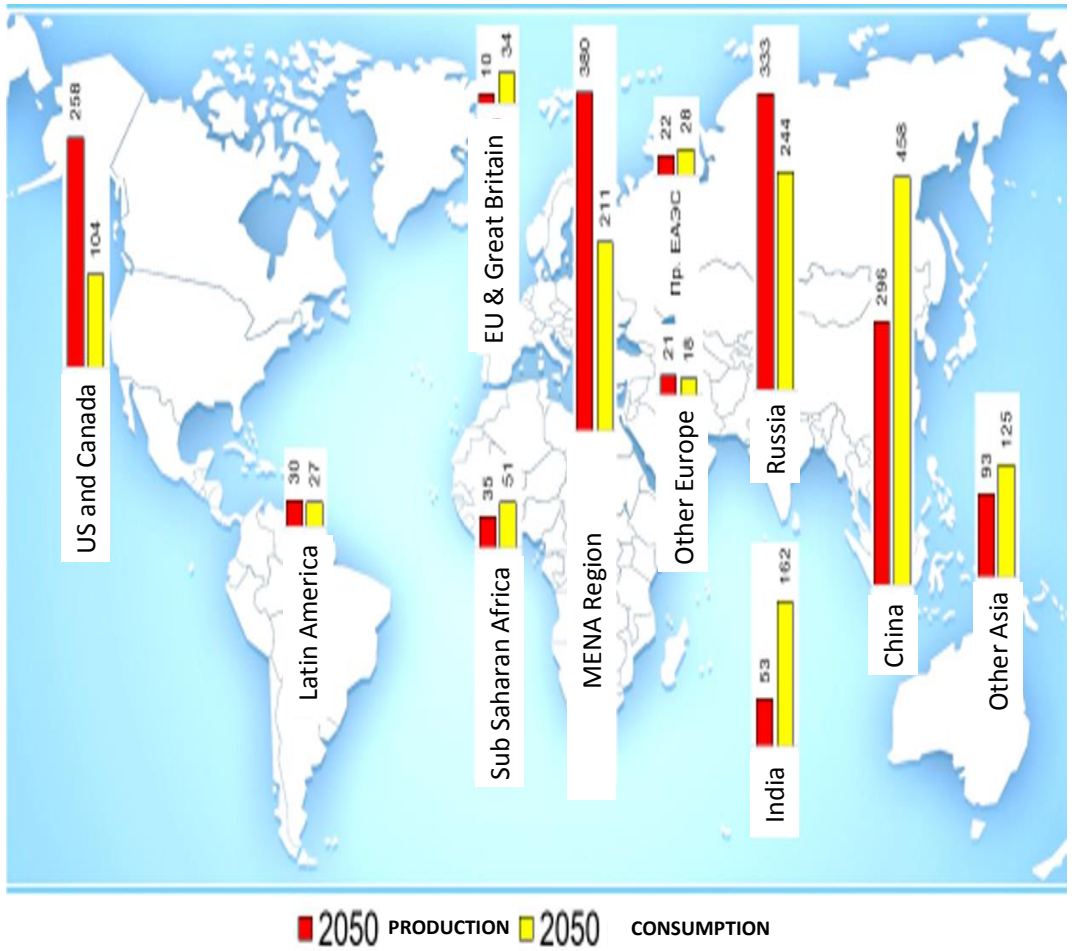
Source: Global Energy: Scenarios to 2050, by Russian Energy Agency, February 2024

Russia Could Continue to Be a Major Exporter of NG until 2050, Regardless of Any Energy Transition Scenarios

RTC Scenario



NZ Scenario



Source: Global Energy: Scenarios to 2050, by Russian Energy Agency, February 2024