



# Electricity 2024

Dr. Eren ÇAM – Energy Analyst

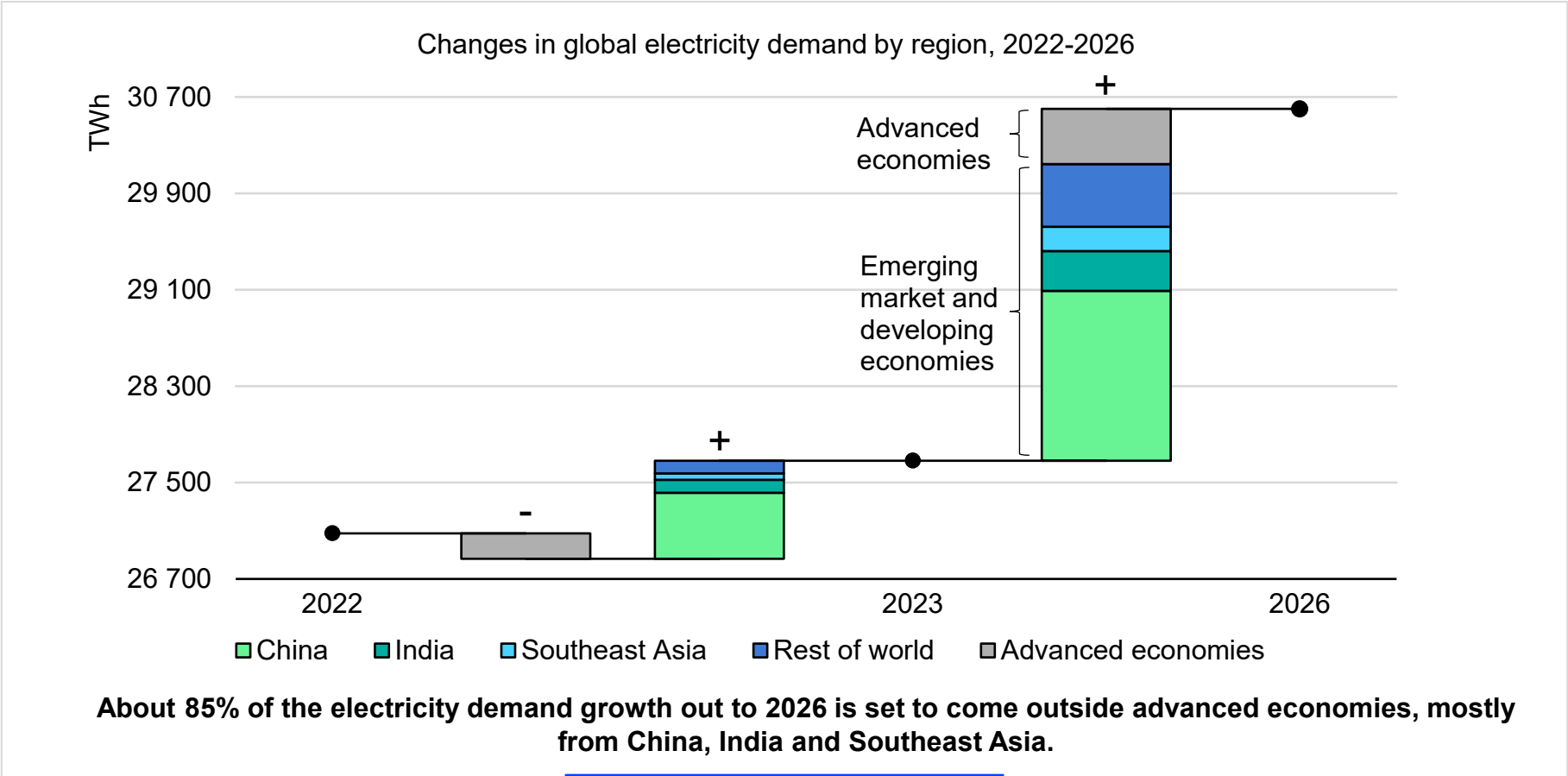
Project Manager & Lead Author of Electricity Report

[eren.cam@iea.org](mailto:eren.cam@iea.org)

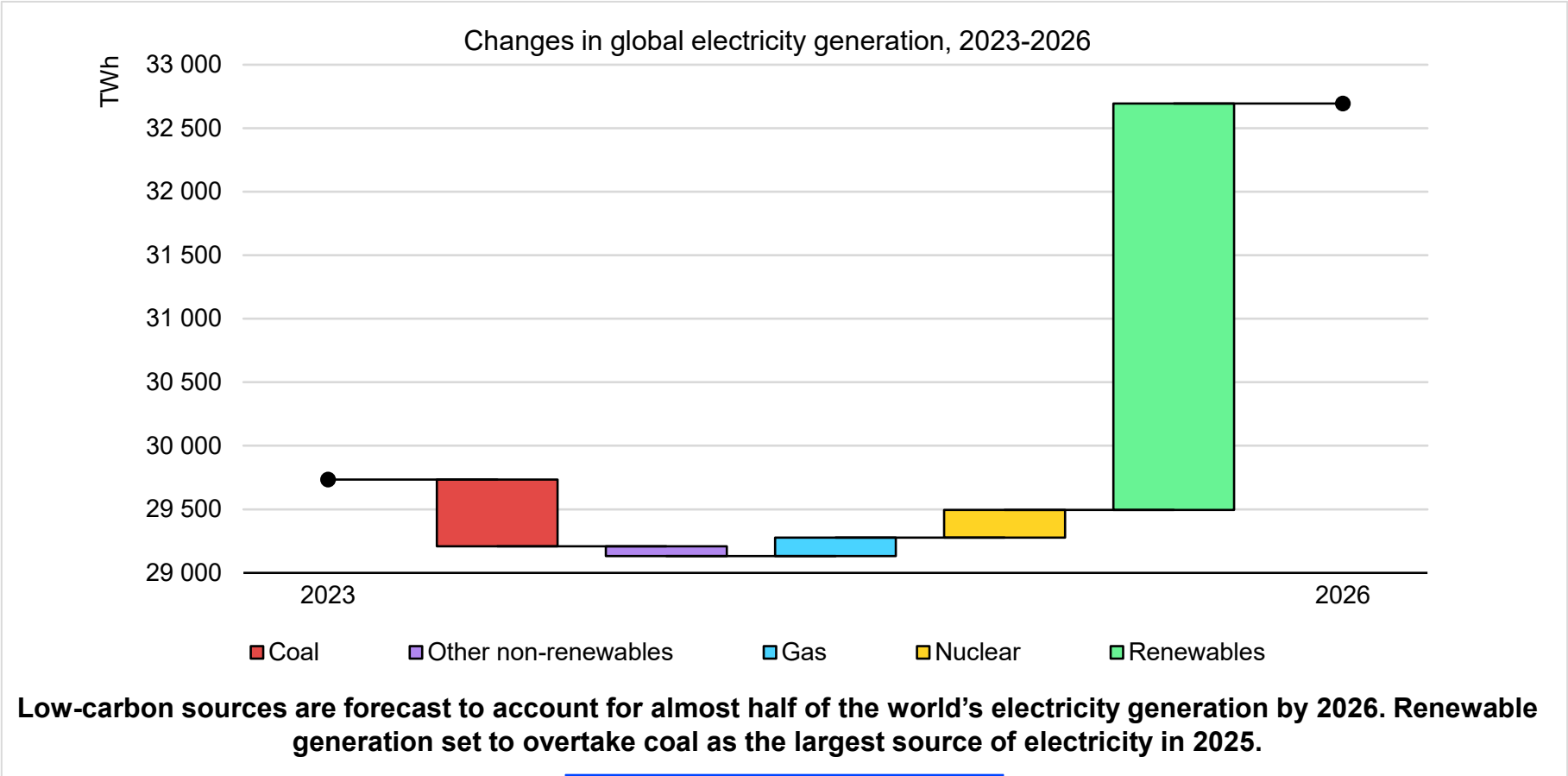
11 March 2024 – Presentation at Enerclub

# 1. Global Trends

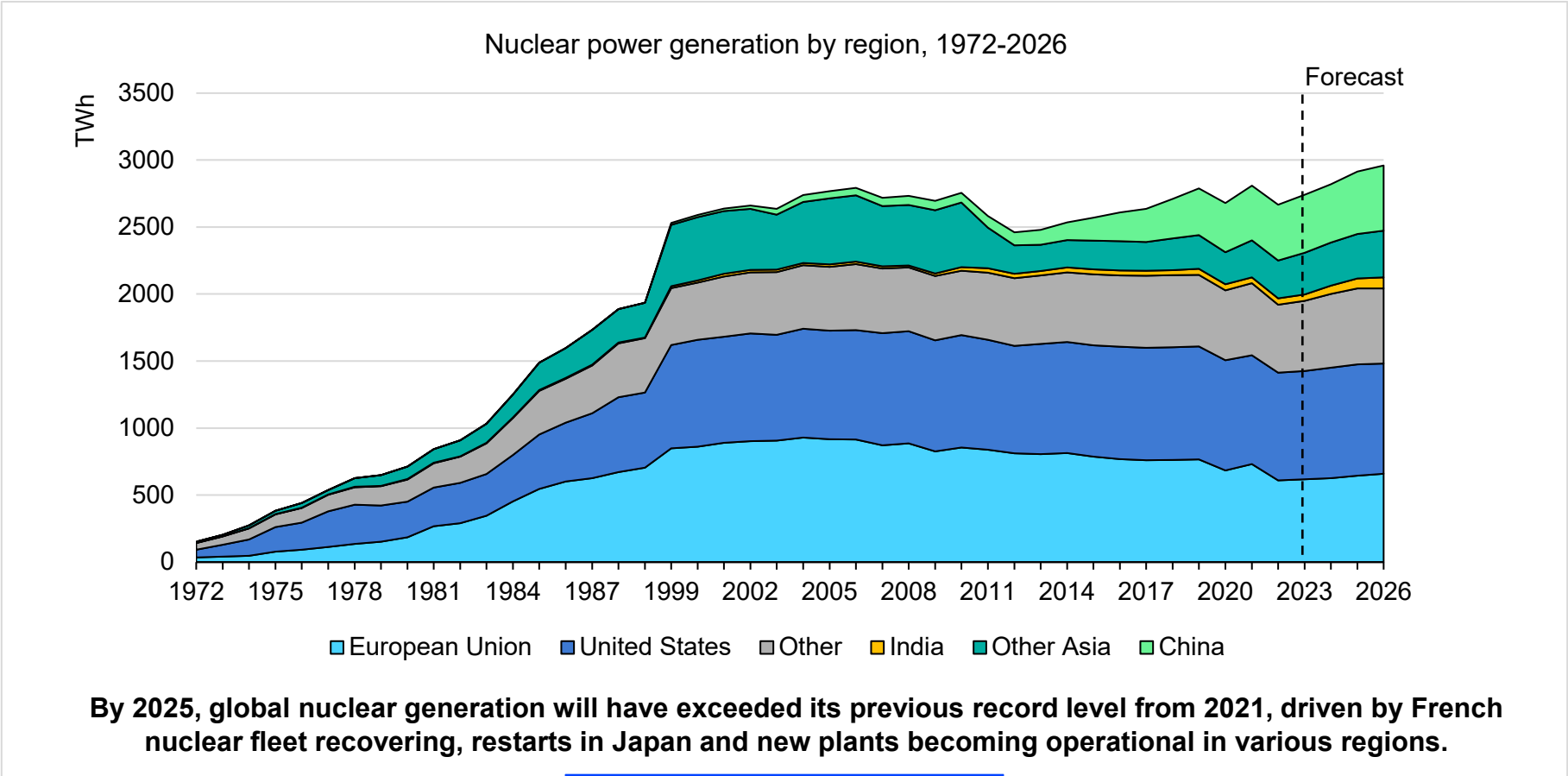
# Emerging economies are the engines of global electricity demand growth



# Clean electricity supply set to meet all additional growth out to 2026

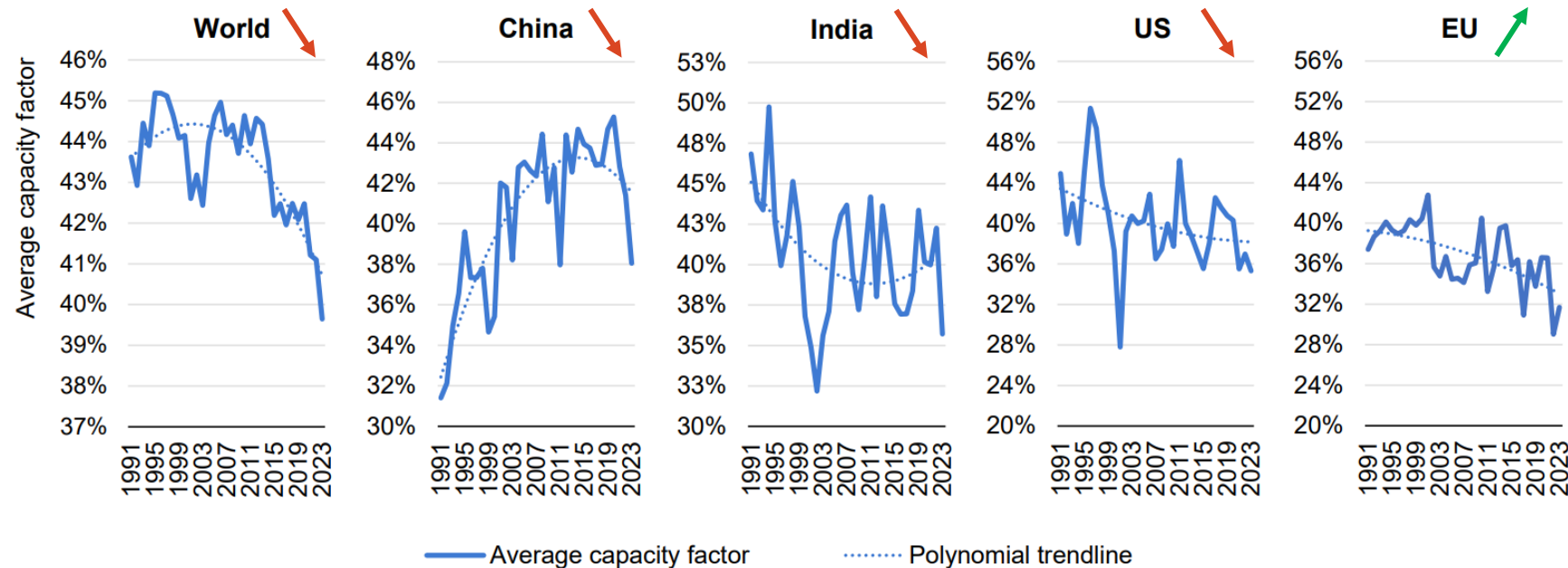


# Global nuclear generation will reach a new record high in 2025



# Reduced hydro output in 2023 in many regions due to weather impacts

Annual hydropower capacity factors in selected regions, 1991-2023

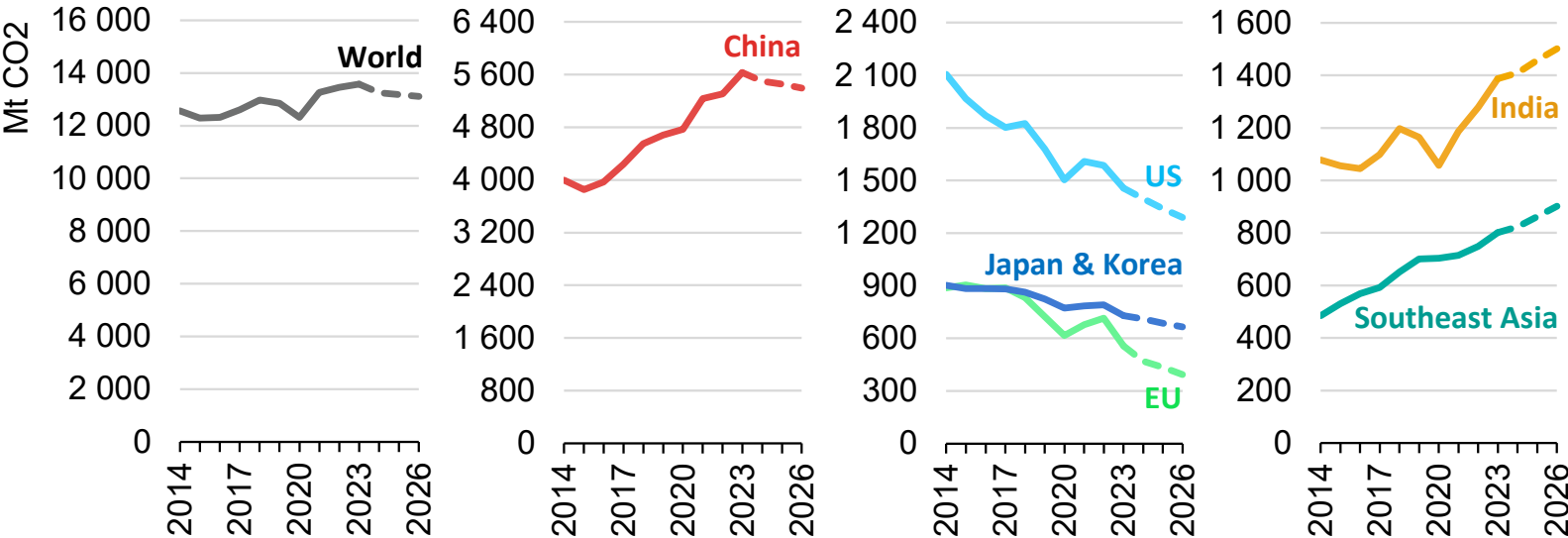


**The global hydropower capacity factor is estimated to have fallen to below 40%, lowest value recorded since at least three decades.**

# Global emissions from electricity generation are entering a structural decline



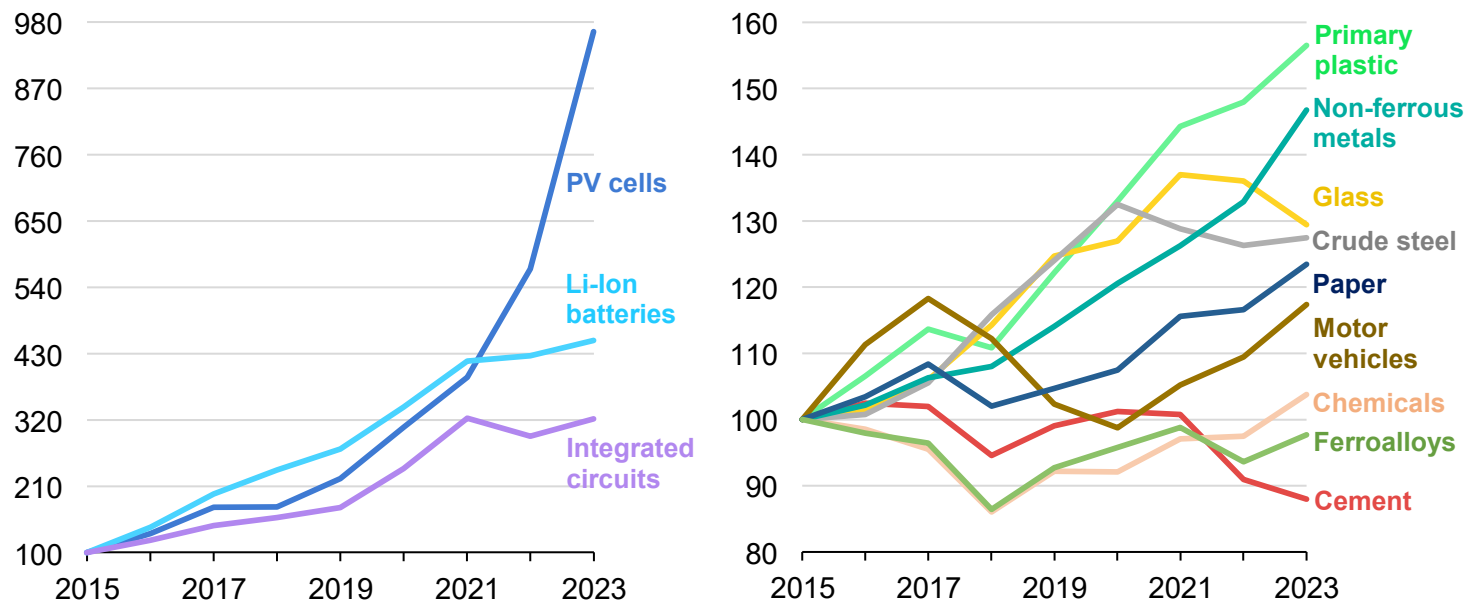
CO<sub>2</sub> emissions from electricity generation in selected regions, 2014-2026



**Rapidly expanding renewables are putting downward pressure on power sector emissions. Emissions are expected to fall by 2.4% in 2024 under normal weather assumptions, followed by small declines of 0.5% in 2025-2026.**

# China's economic growth shifting away from heavy industry to new industries

Indexed production output in selected industries in China, 2015-2023

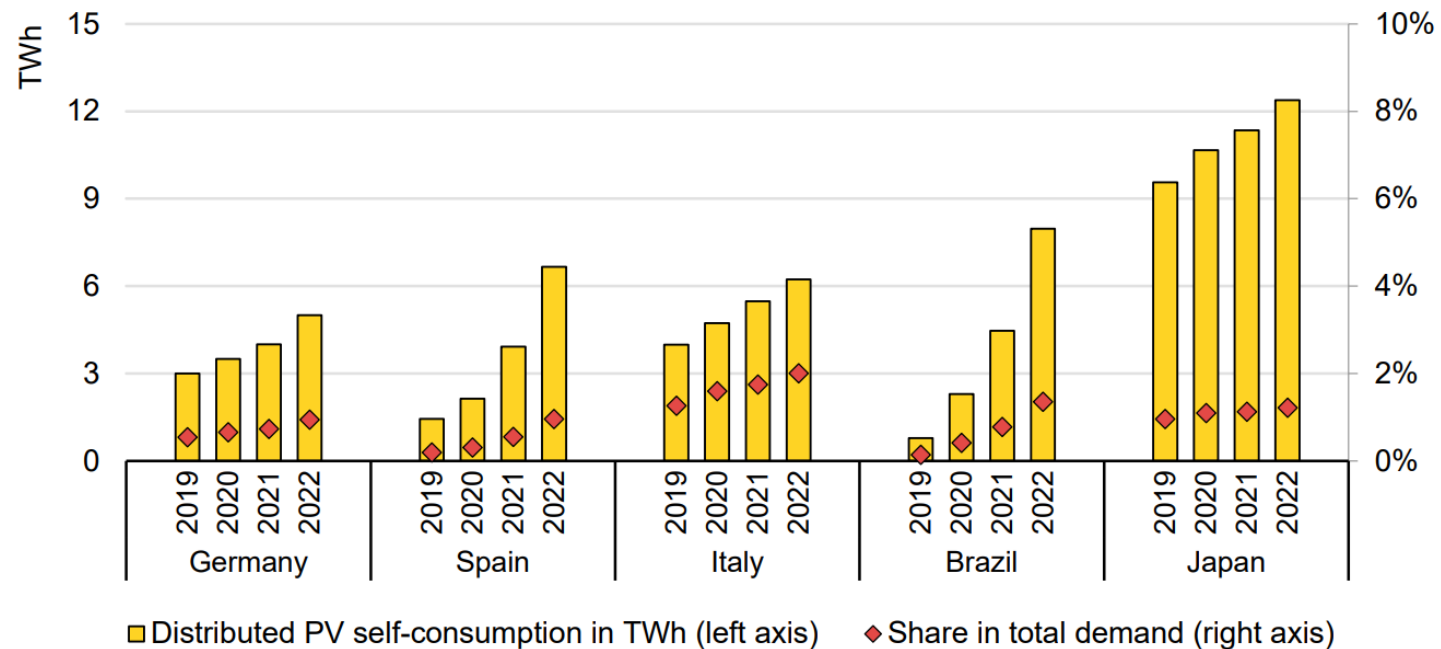


**Electricity demand growth in China is forecast to slow down, but production of solar PV modules and batteries, and processing of related materials will remain significant drivers of demand.**



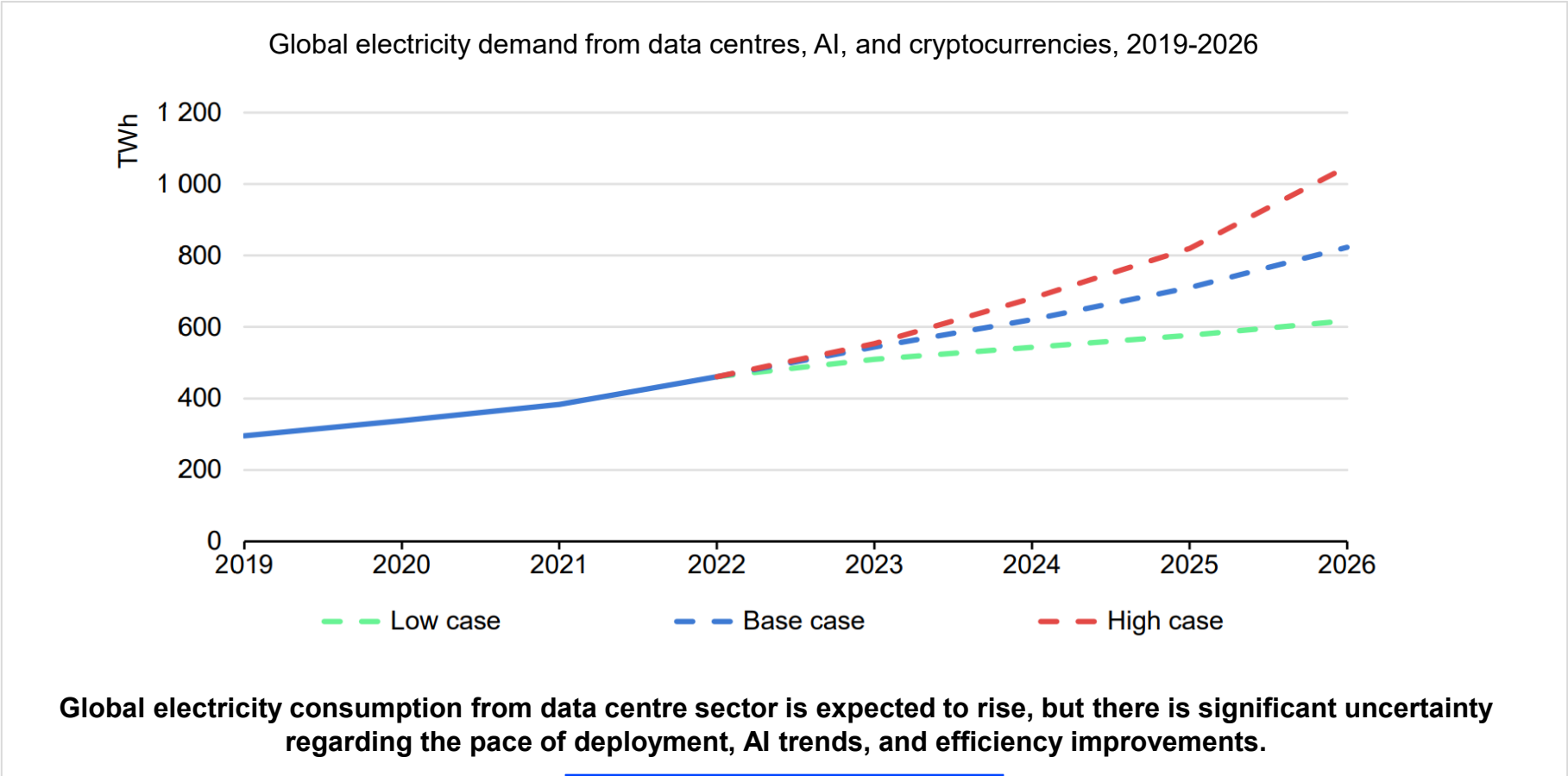
# Rising self-consumption in distributed systems and data collection challenges

Estimated electricity self-consumption in distributed systems and its share in total electricity demand in selected countries



**Self-consumption is set to increase as more distributed resources are deployed. Improved availability of distributed generation and self-consumption data will be increasingly important for accurate demand forecasts.**

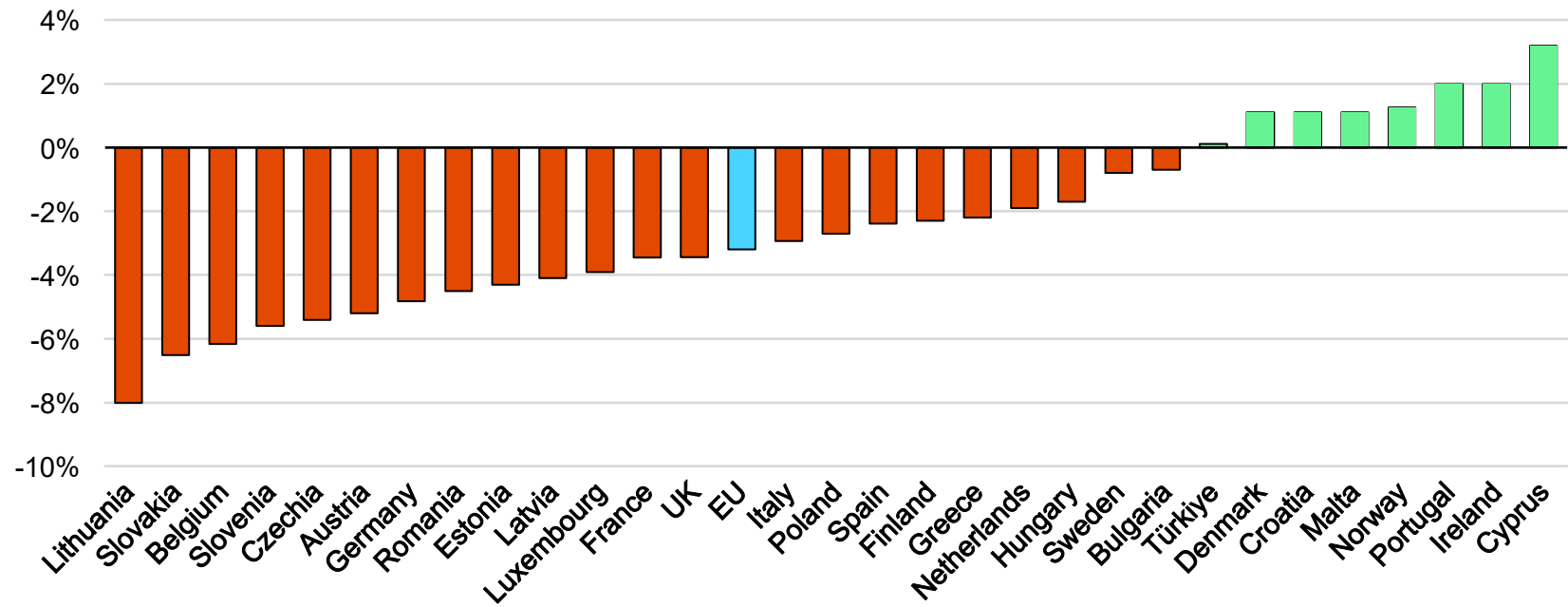
# Data centres are now main drivers of electricity demand in various regions



## **2. Spotlight: Navigating the uncertainties in the recovery of EU electricity demand**

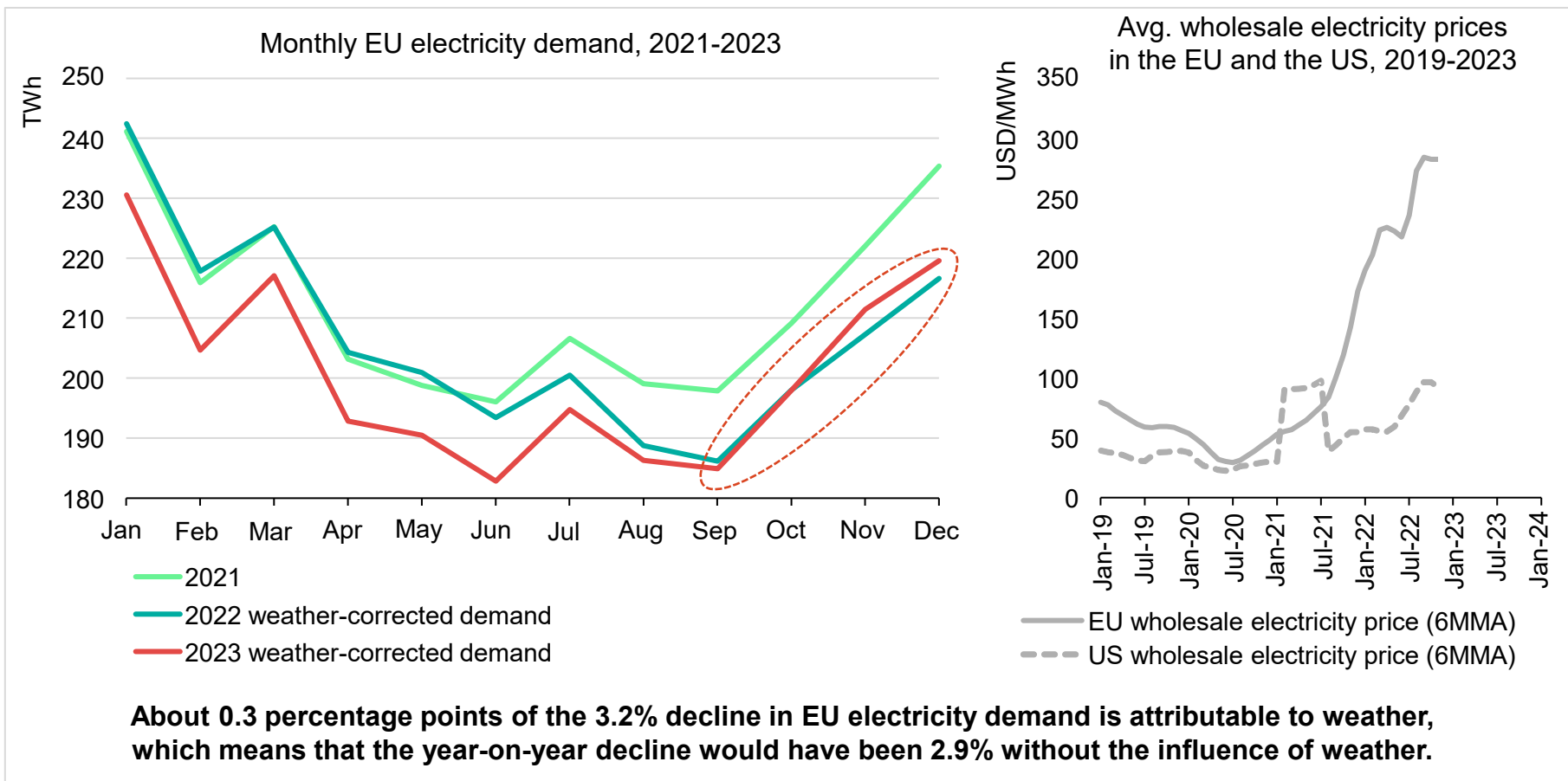
# EU electricity demand fell 3% and is back at levels last seen 20 years ago

Year-on-year percent change in electricity demand in Europe, 2023 vs 2022

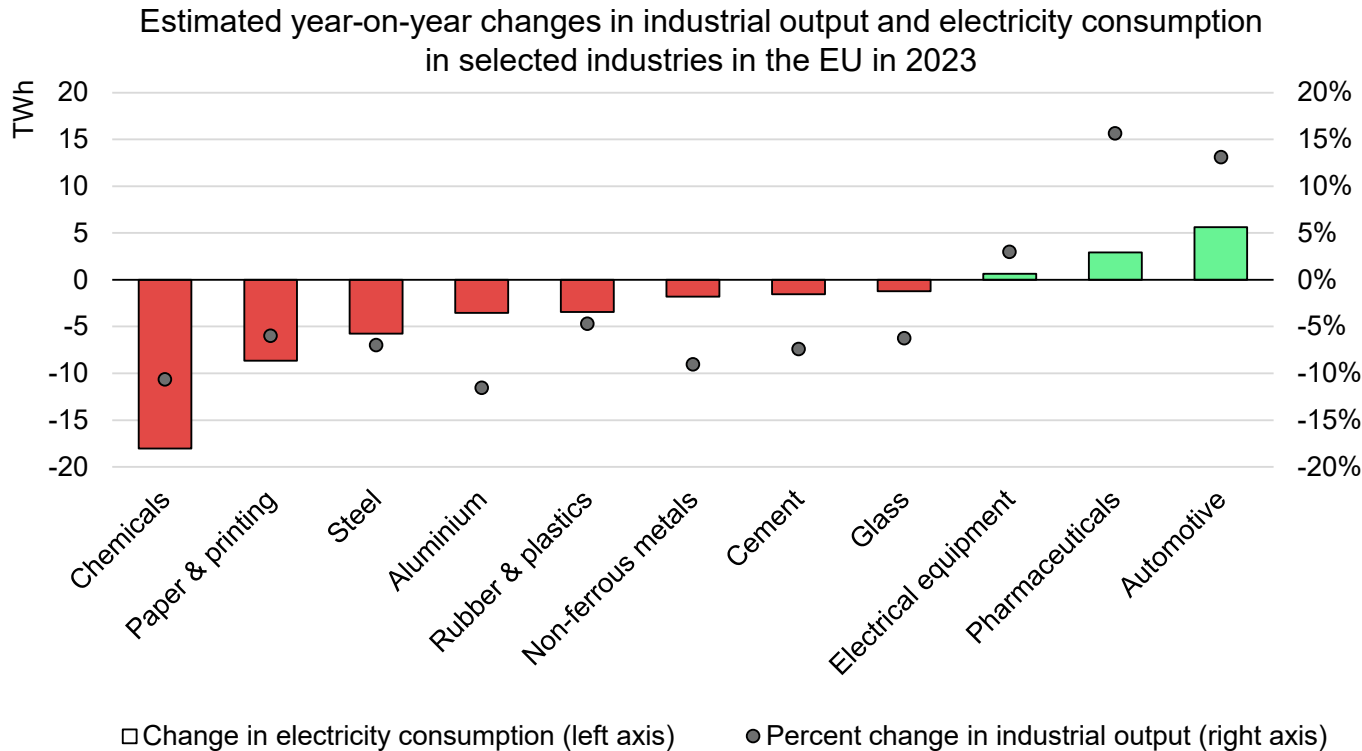


**In the majority of EU countries, electricity demand decreased amid the sluggish macroeconomic environment and weak manufacturing & industrial activity. However, different demand trends were observed across the region.**

# The fall in EU electricity demand seems to have stopped in Q4 2023

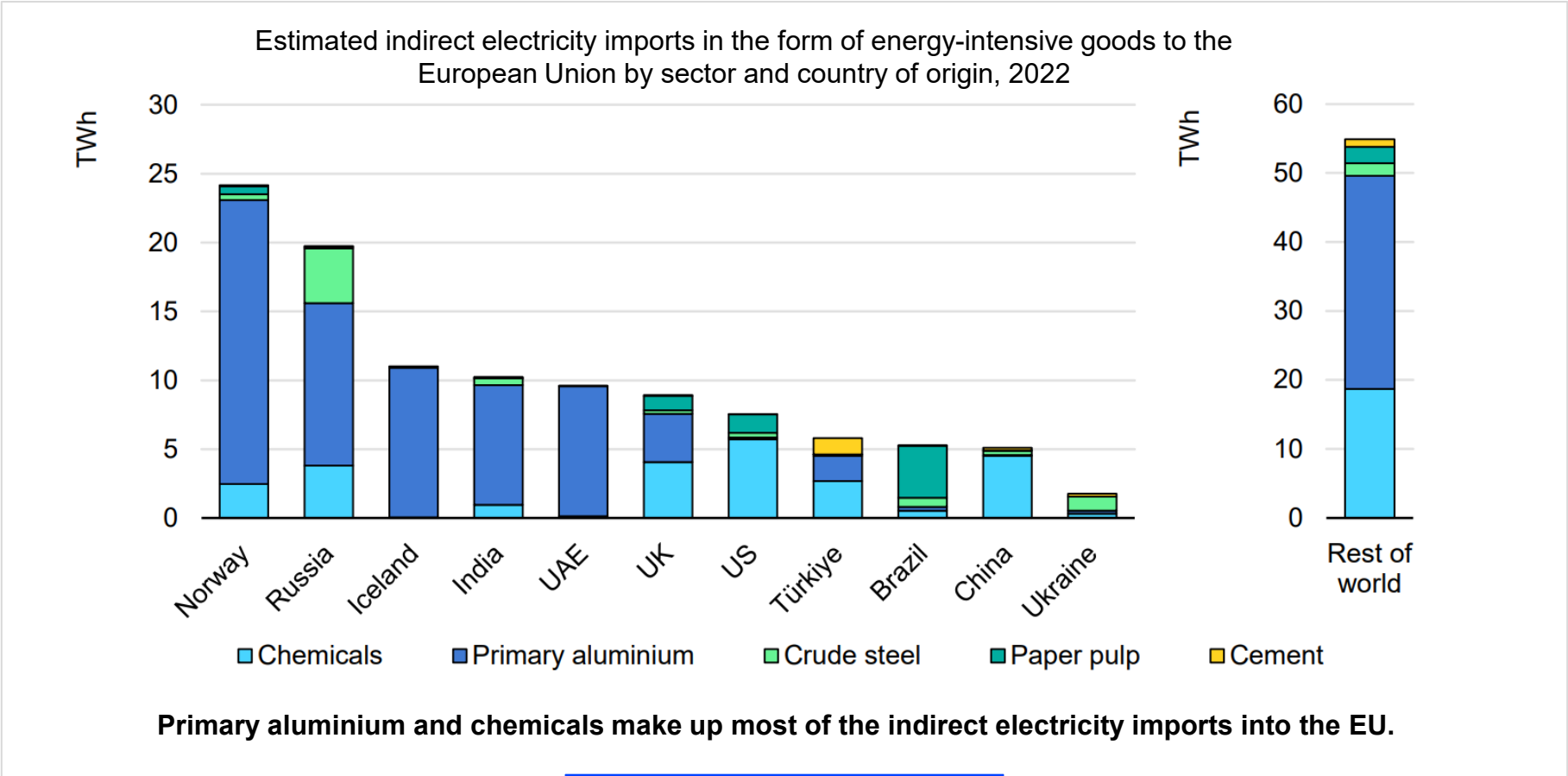


# Chemical and primary metal industries were particularly affected



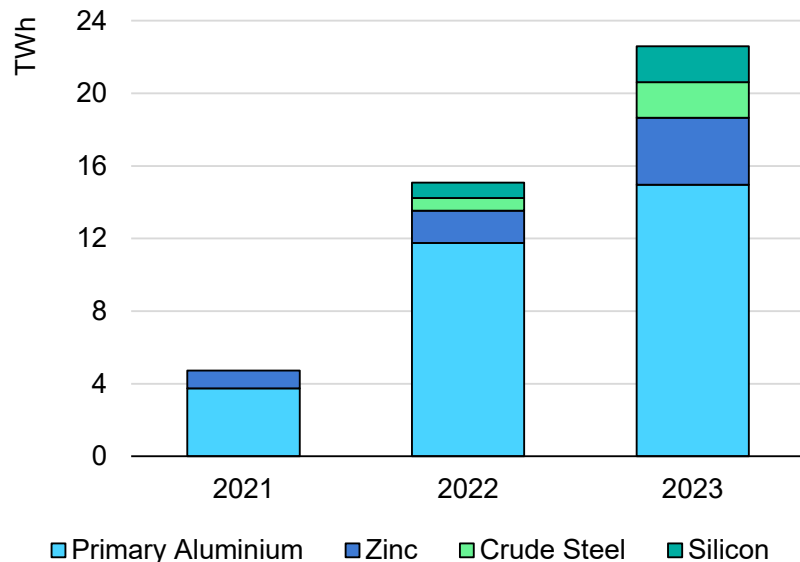
**Following a 5.8% decline in 2022, we estimate electricity consumption in the EU industrial sector fell about 6% in 2023. European metal and chemical industries are likely to remain vulnerable to energy price shocks.**

# How much electricity does the EU import indirectly?

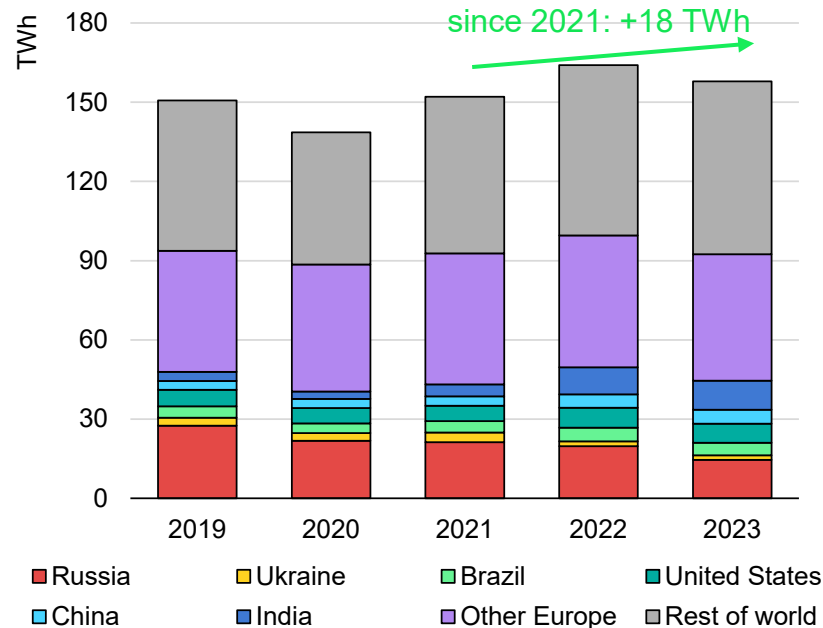


# There are signs of some permanent electricity demand destruction

Estimated cumulative loss in annual electricity demand in selected primary metal industries in the EU compared to 2020



Indirect electricity imports to the EU in the form of energy-intensive goods (chemicals, primary aluminium, crude steel, paper pulp, and cement)

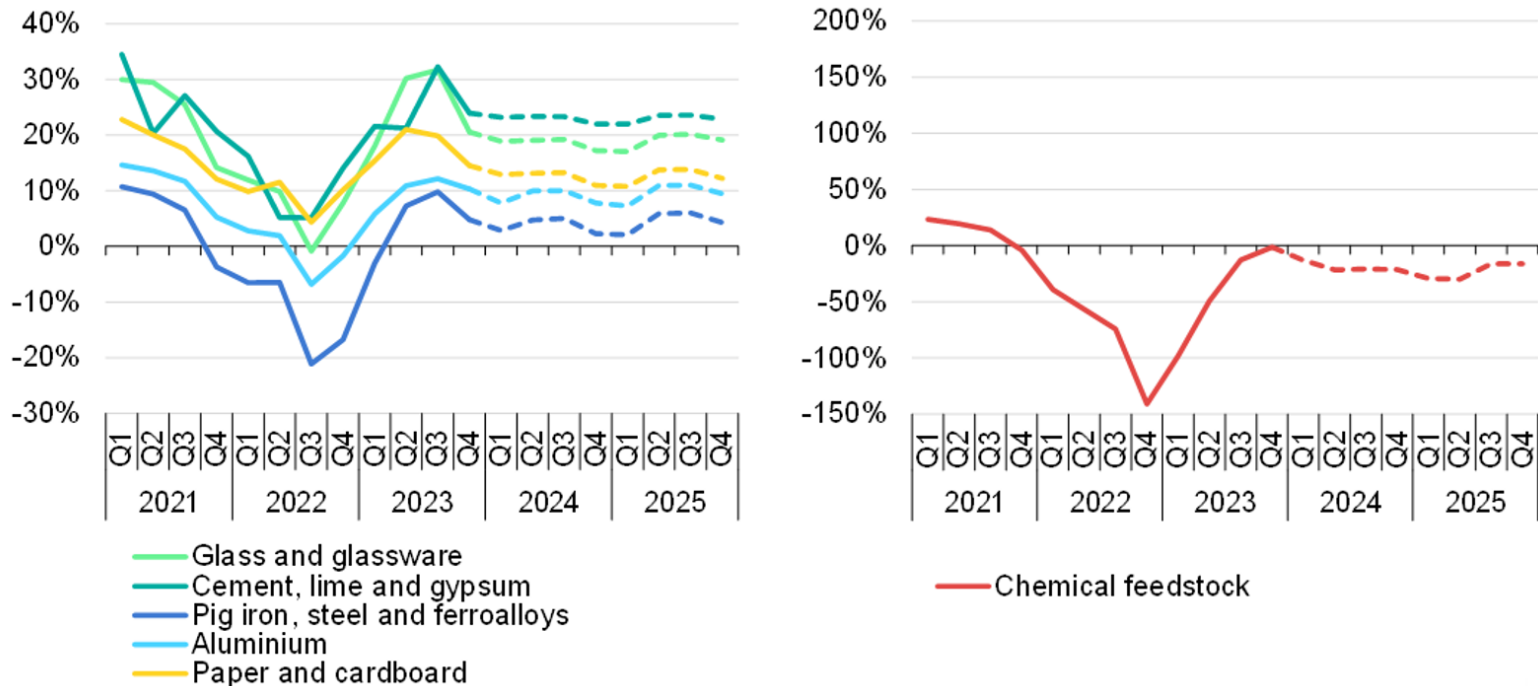


**Around 30% of EU primary aluminium production capacity has been suspended since 2021 due to curtailments and closures. This corresponds to an estimated loss of about 15 TWh of annual electricity demand.**



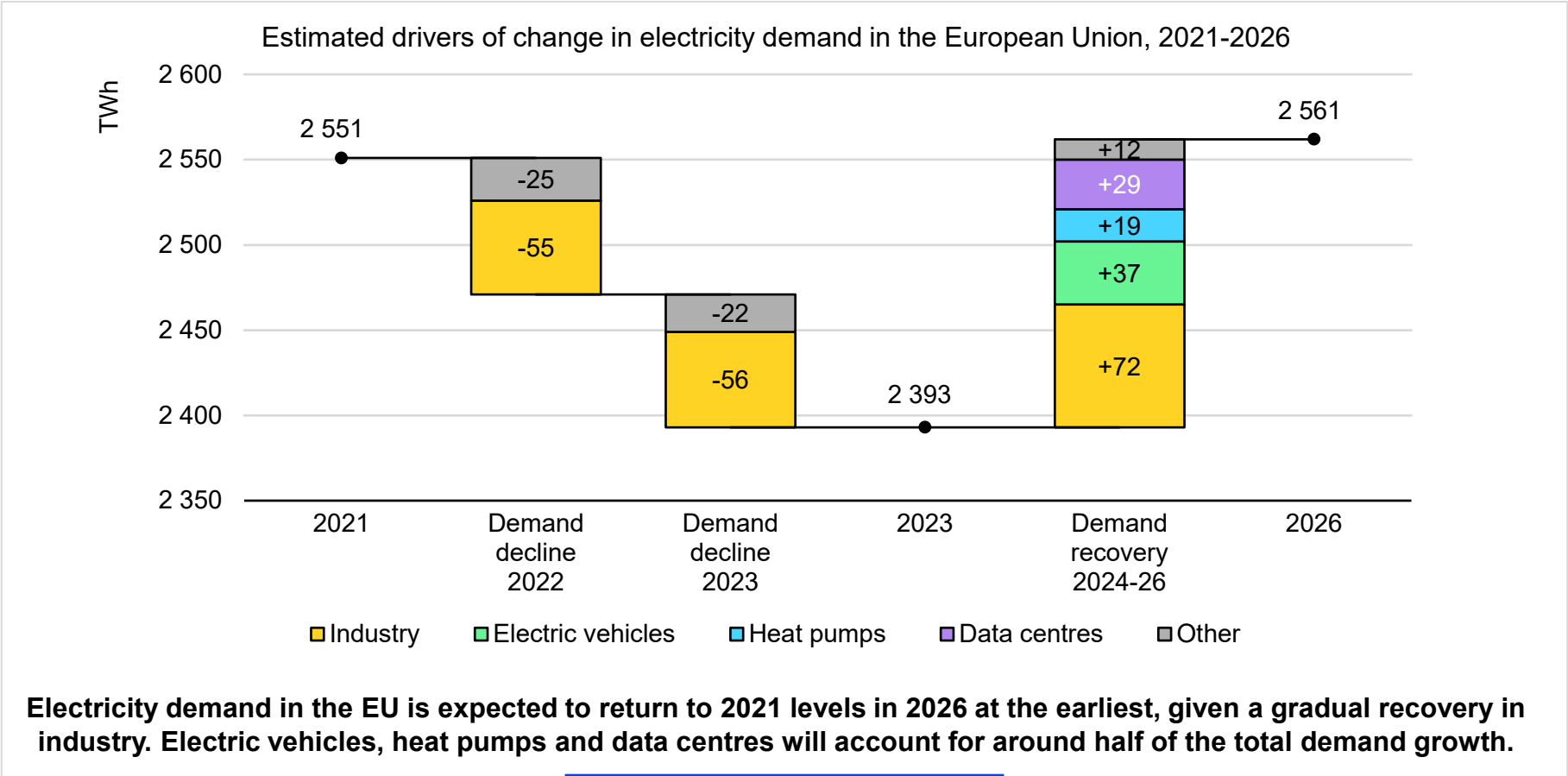
# Chemicals and primary metals are more exposed to increasing energy cost

Estimated quarterly net value added of selected industries in Germany, 2021-2025



**European metal and chemical industries are likely to remain vulnerable to energy price shocks**

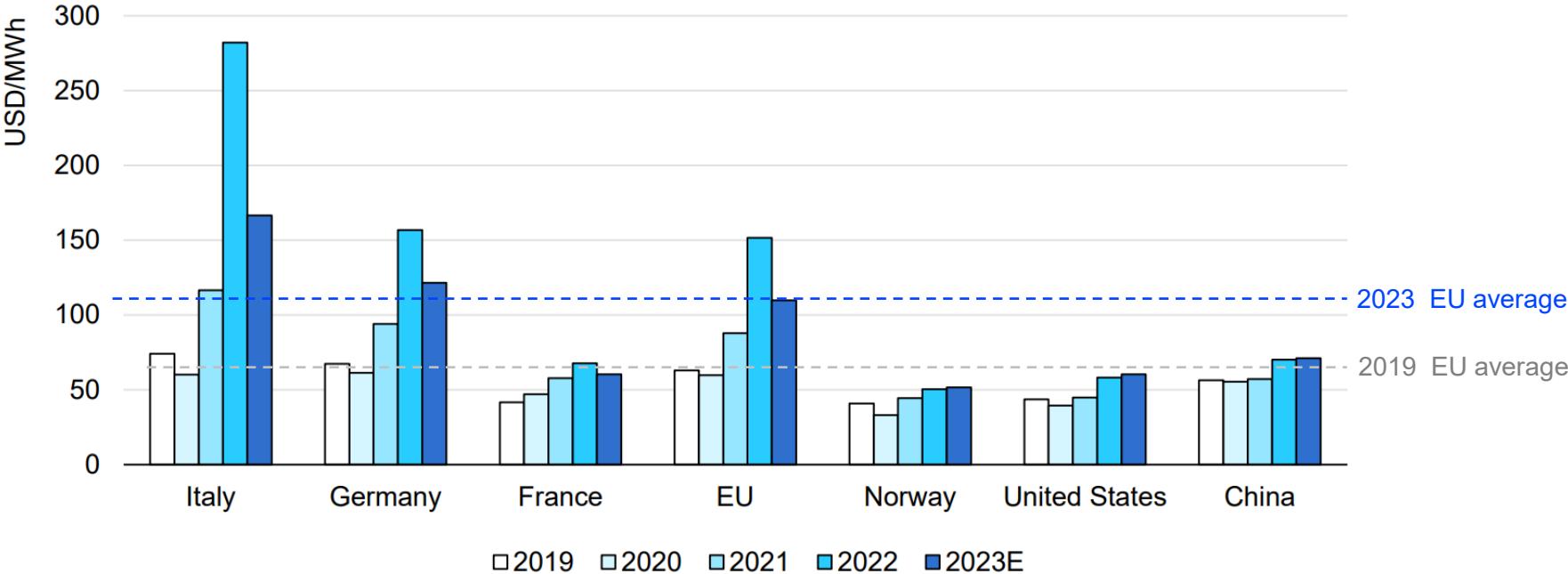
# Slim chances for a quick recovery in the EU energy-intensive industries



# Electricity prices for energy-intensive industries differ among regions



Estimated final electricity price for large industrial customers in energy-intensive industries, 2019-2023

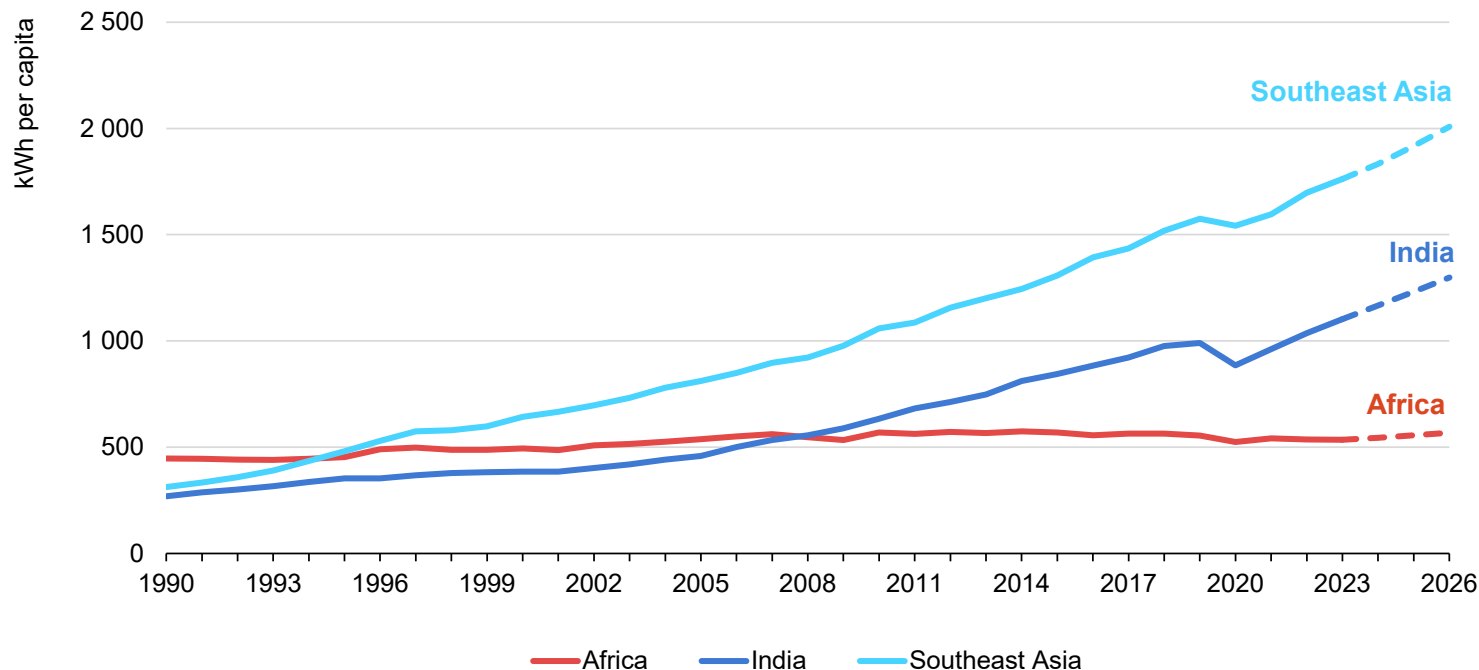


**Despite decreasing from their 2022 highs, electricity costs for energy-intensive industries in the EU continued to be higher in 2023 than in other countries such as Norway, United States, and China.**

### 3. Regional Overview

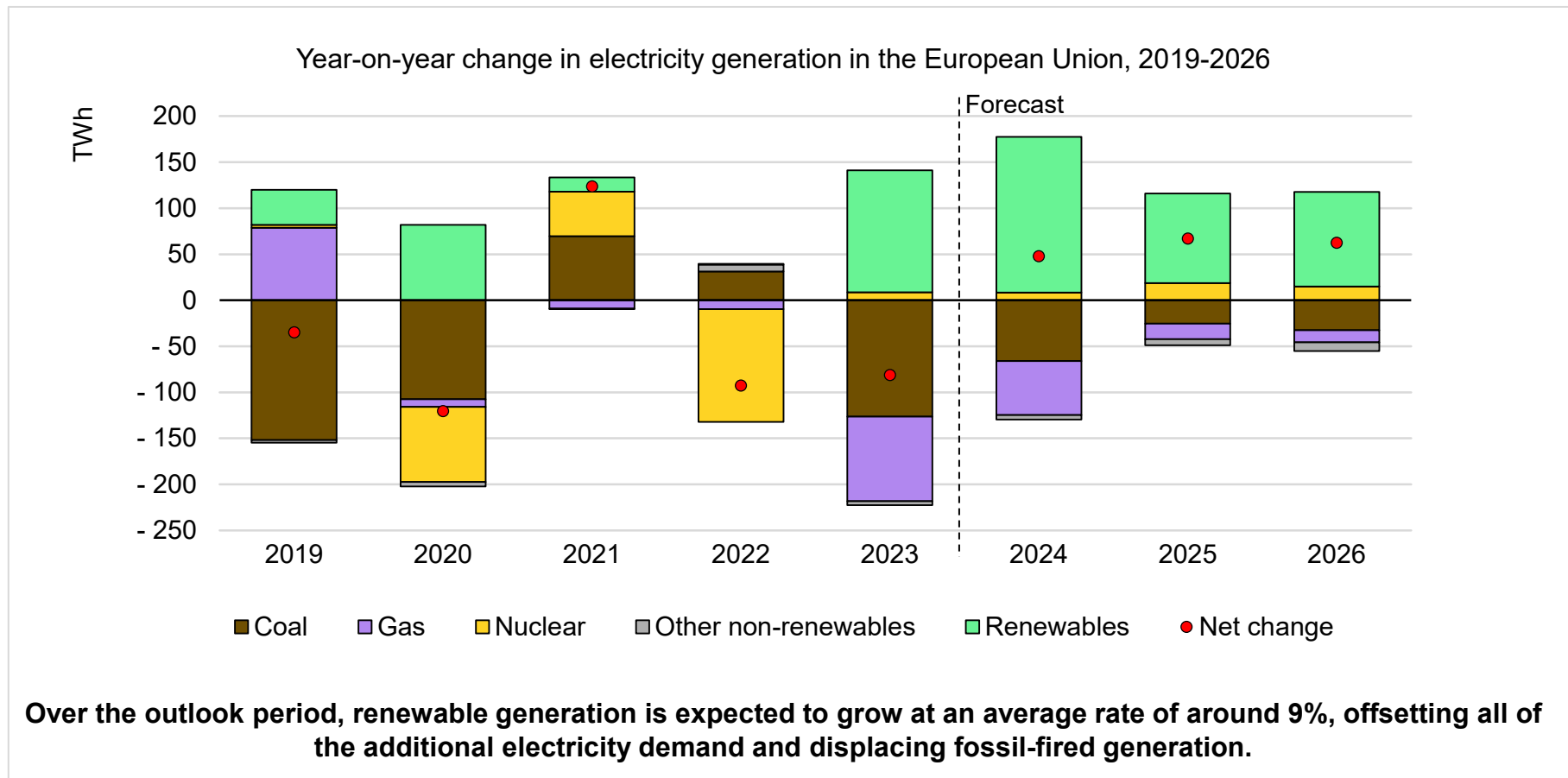
# Africa lags far behind in electricity consumption per person

Electricity consumption per capita in Africa, Southeast Asia, and India

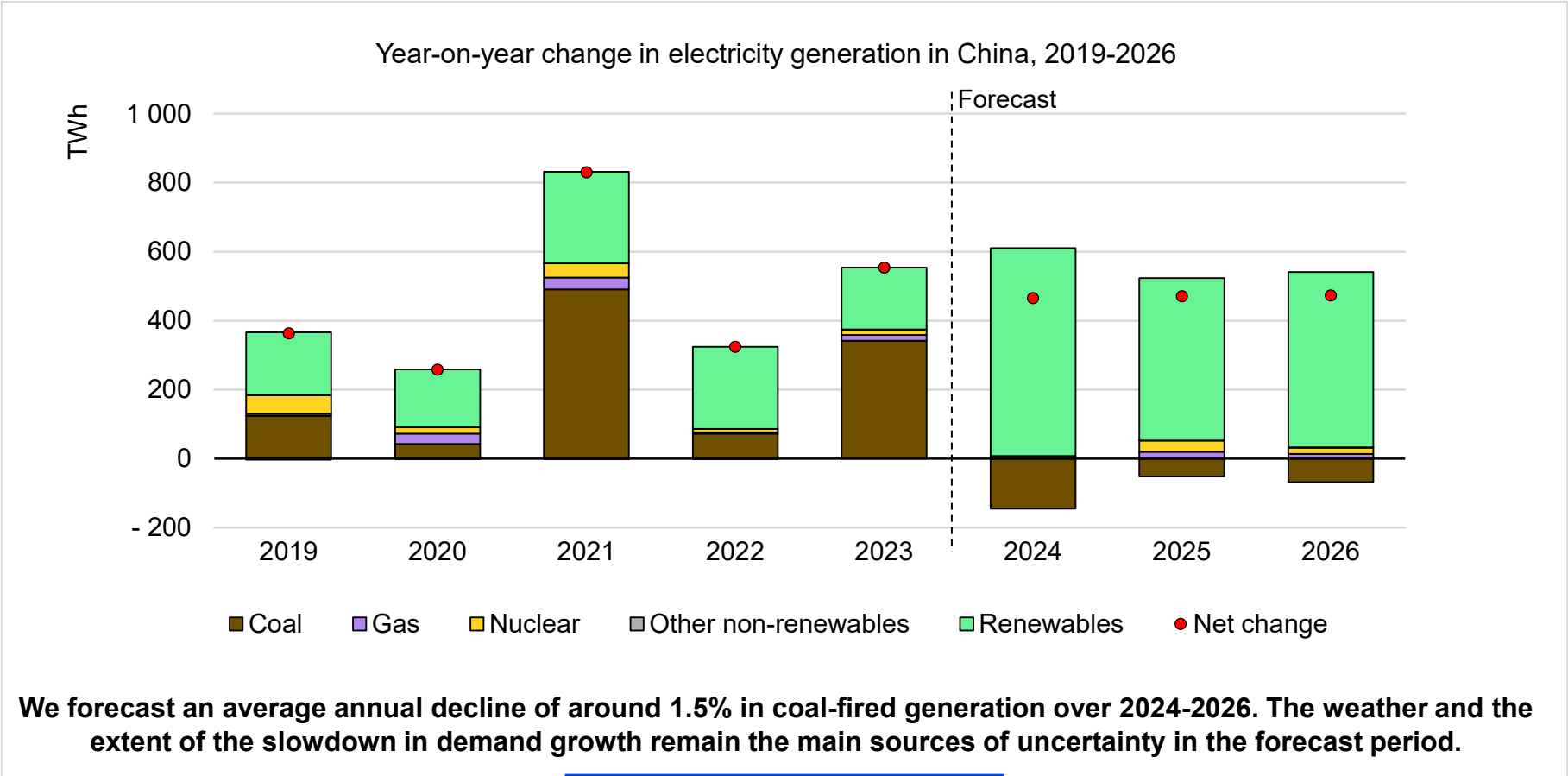


**While electricity use per person in India and Southeast Asia is rapidly rising, it is stagnating in Africa. Per capita electricity use in Africa is expected to recover to its 2010-2015 levels end-2026 at the earliest.**

# In the EU, clean electricity share in generation is set to surpass 75% in 2026

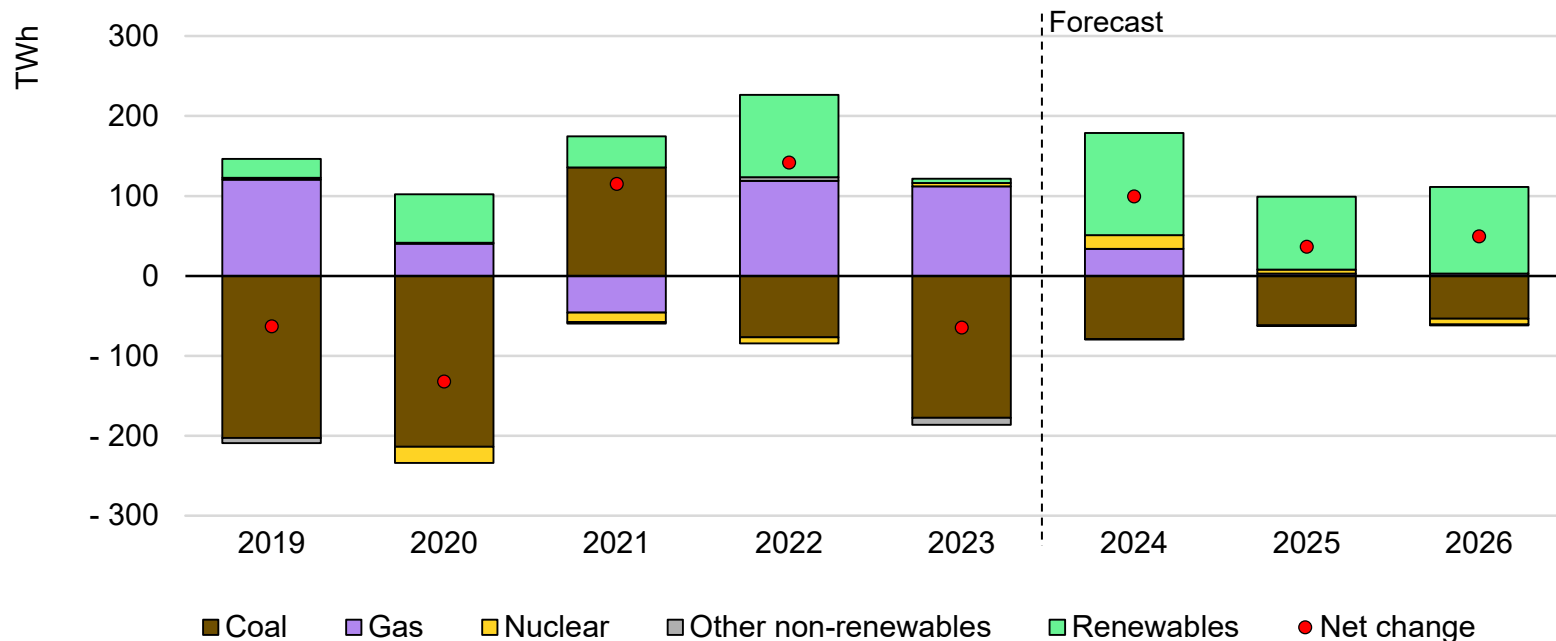


# Renewables and nuclear are set to meet all of the demand growth in China



# US electricity demand fell in 2023 due to milder weather, but is set to grow

Year-on-year change in electricity generation in the United States, 2019-2026

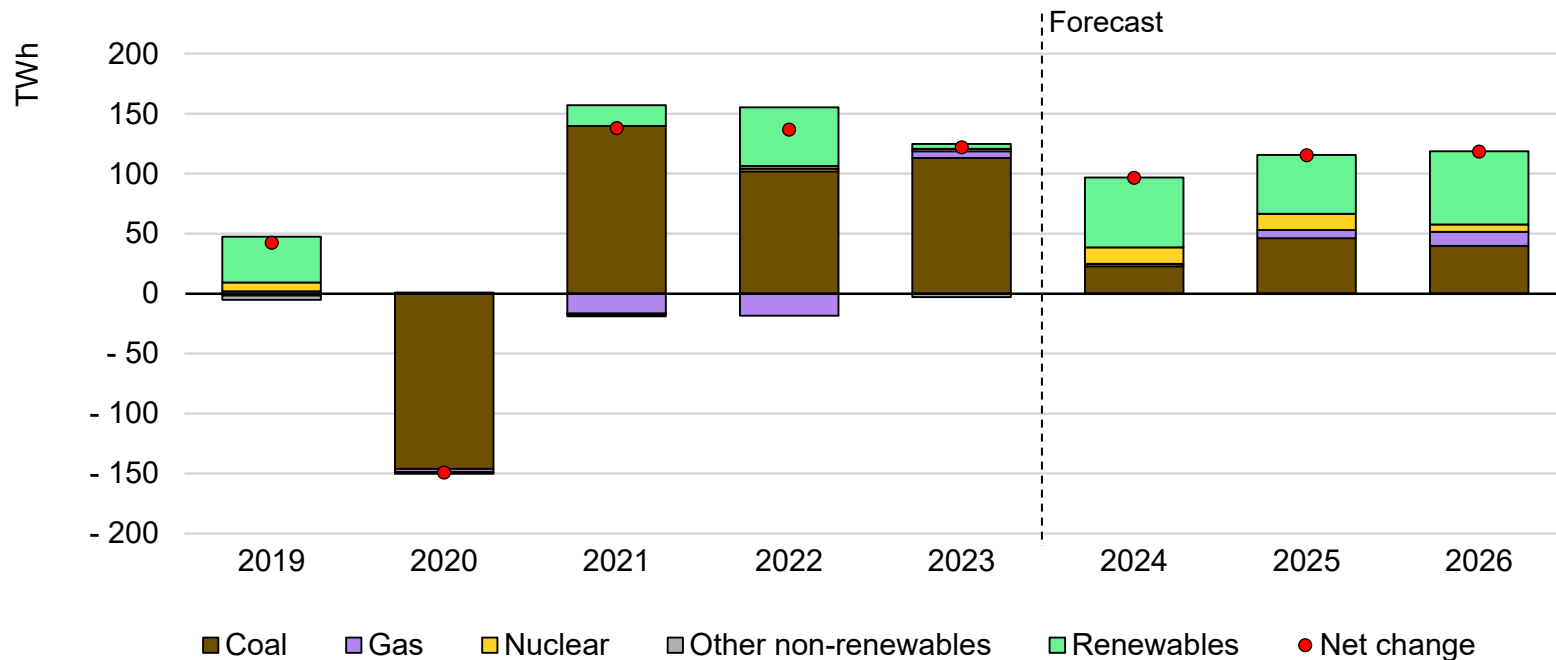


**From 2024 to 2026, we expect a return to growth in electricity demand of 1.5% on average, fuelled by increased manufacturing activity, data centre sector and electrification in the transportation and building sectors.**



# Coal remains the mainstay in India, but RES share in supply rises strongly

Year-on-year change in electricity generation in India, 2019-2026

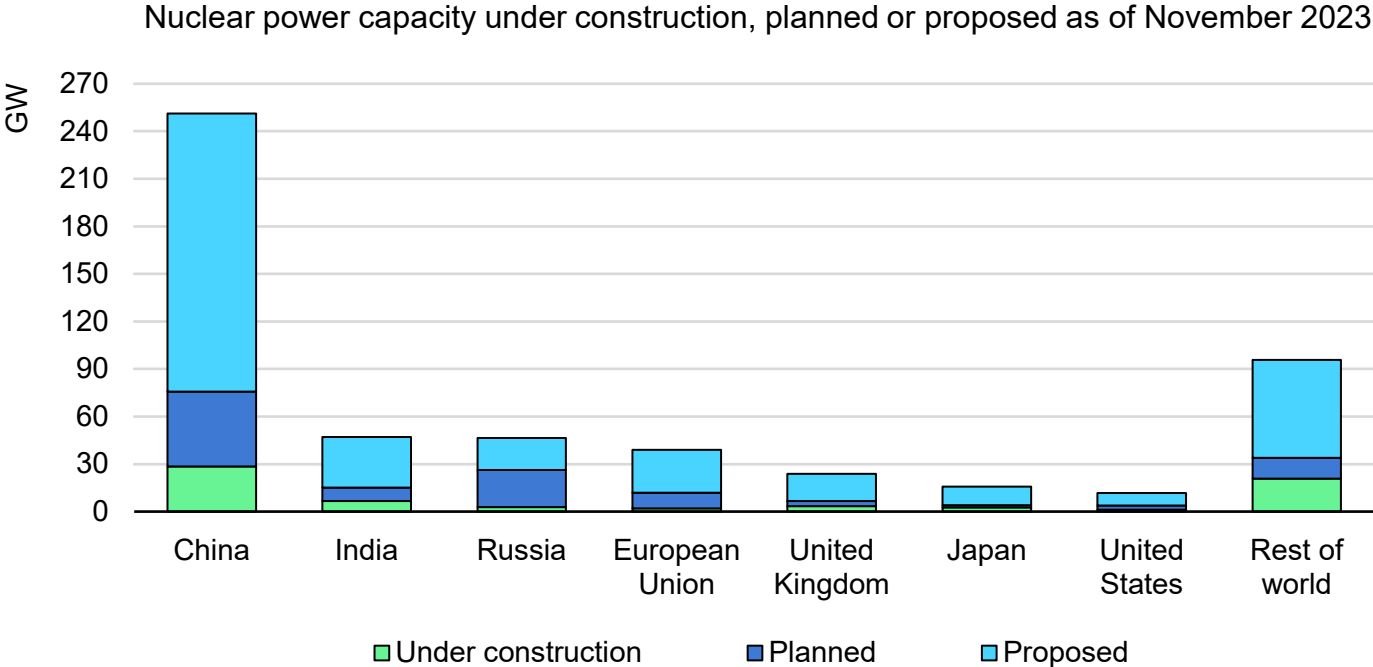


**Renewable energy generation is forecast to grow from around 21% of the generation mix to reach a 25% share in 2026.**



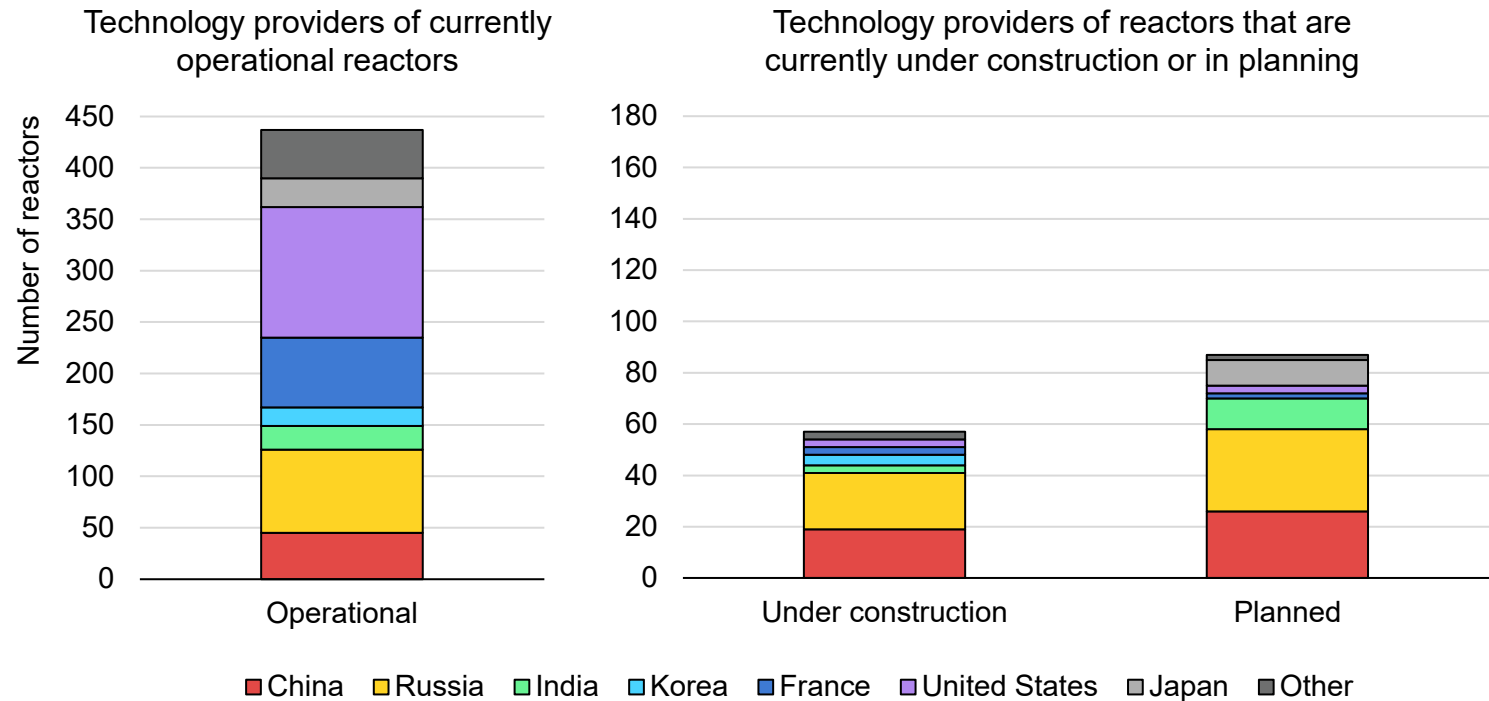
## **4. Spotlight: Trends in global nuclear power**

# Asia remains the epicentre of growth in nuclear power



**There is currently 68 GW of nuclear power capacity under construction globally. Until 2026, we expect 30 GW of this to start commercial operation, more than half of which will be in China and India.**

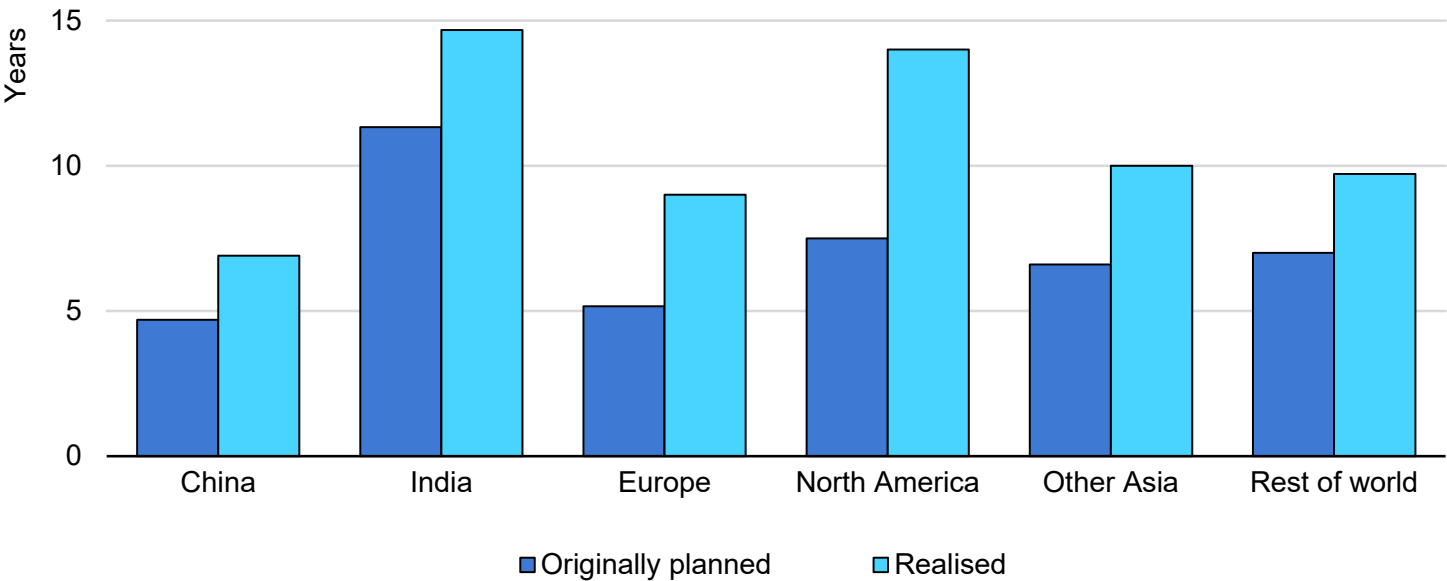
# Technology providers in nuclear power generation is shifting



**The technology providers for 70% of the reactors currently under construction were China and Russia.**

# Construction risk of nuclear projects remains the largest hurdle for financing

Share of non-VRE sources in total electricity generation in selected synchronous area, 2017-2026

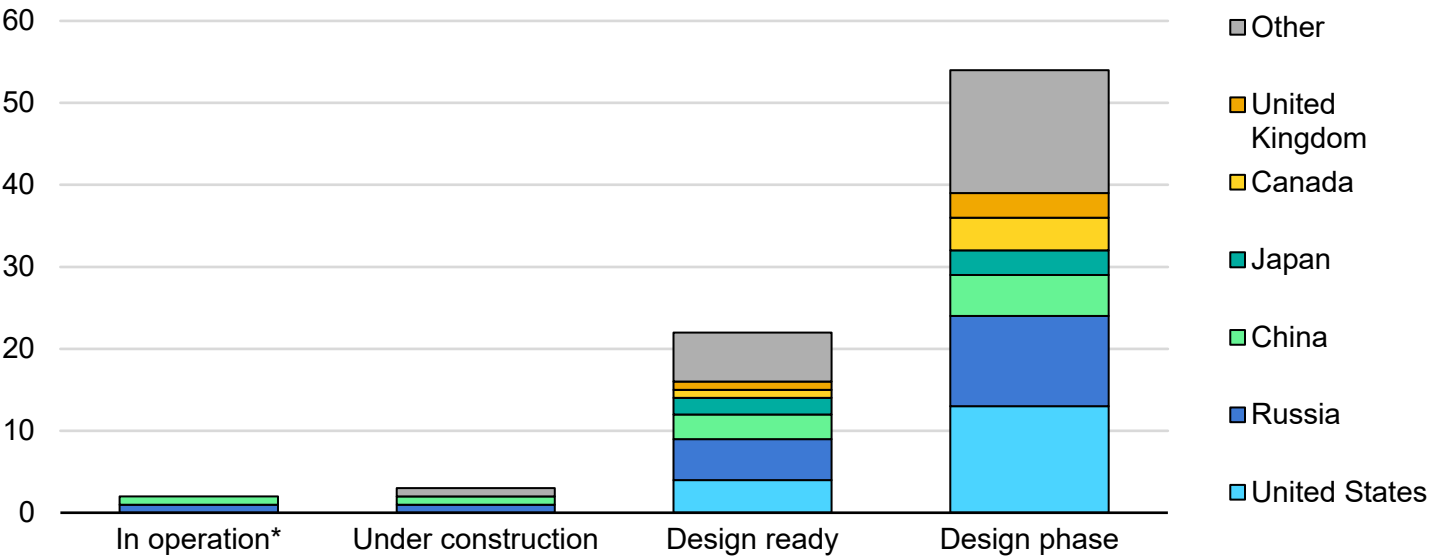


**For projects that started between 2010 and 2020, China had an average delay of just over 2 years. The global average, excluding Chinese projects, is 3.5 years, with some projects up to 8 years behind schedule.**

# SMR deployment is still limited and has challenges, but R&D is picking up



Number of ongoing SMR projects by country and status



**The largest players in developing new technologies are the United States, China and Russia, together accounting for more than half of projects in the design phase.**