



The Role of Nuclear Power in Achieving Net Zero

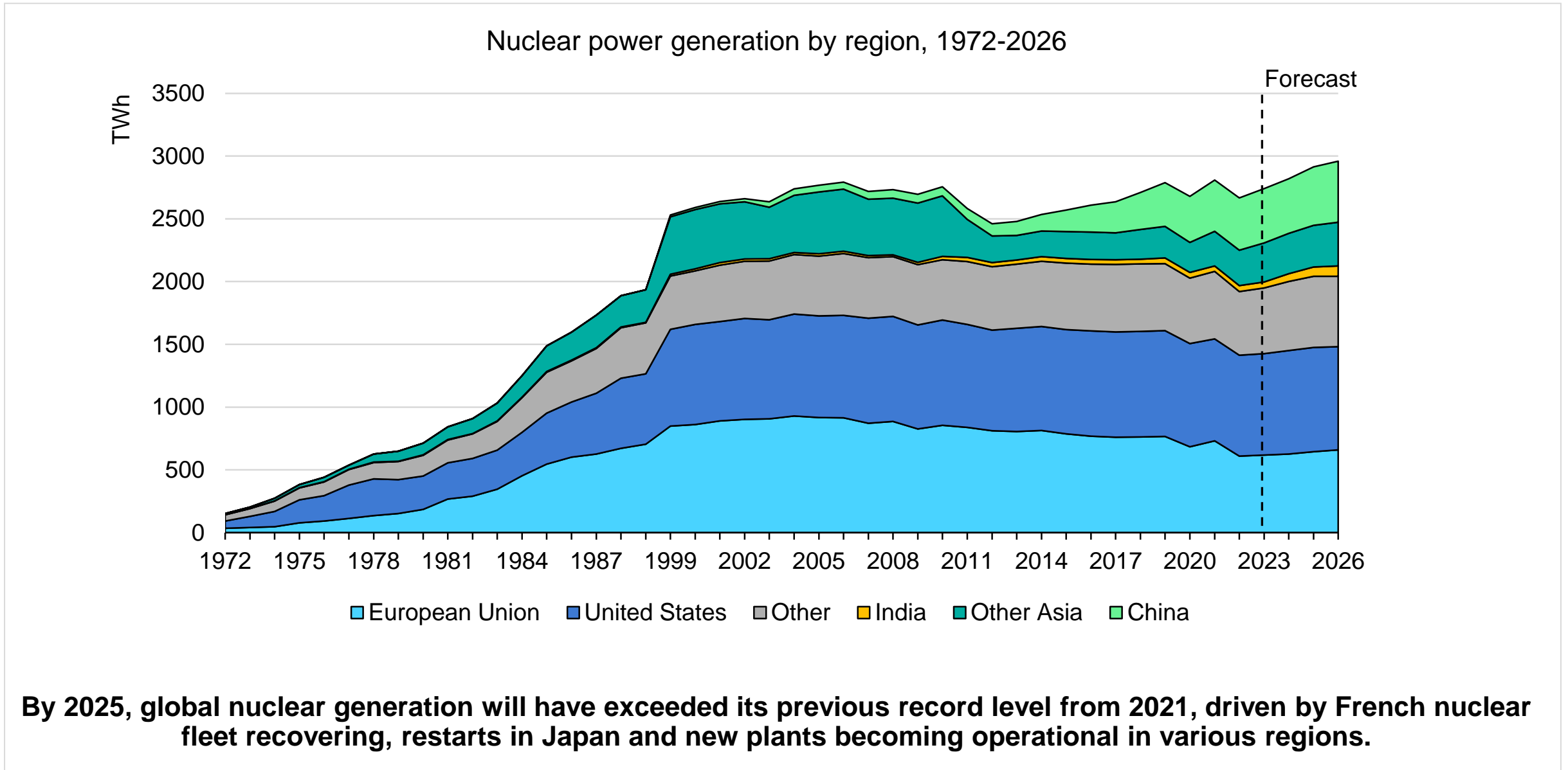
Keisuke Sadamori, Director, Energy Markets and Security

ERRA Nuclear Energy Regulatory Forum

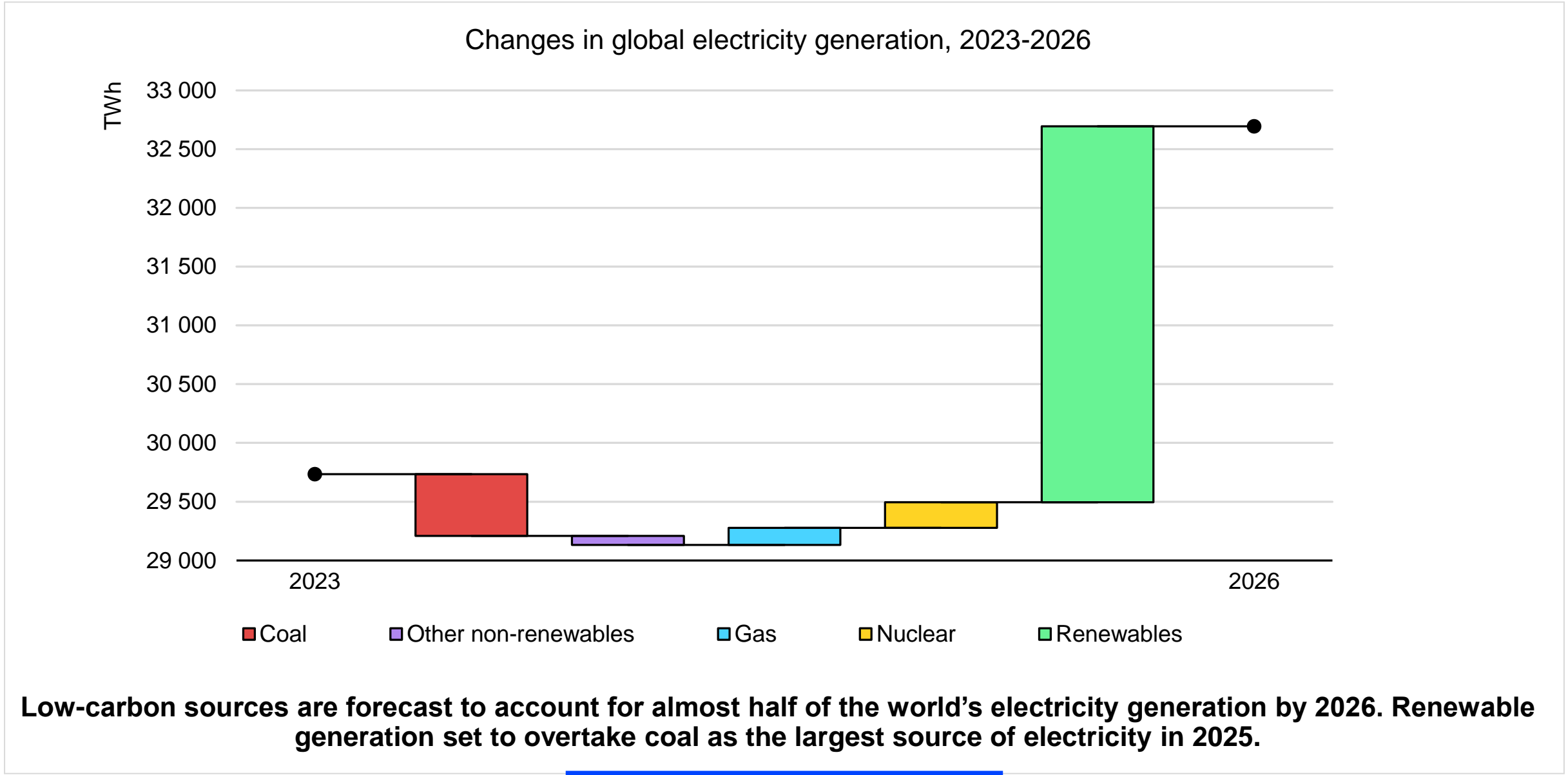
12 June 2024

Warsaw, Poland

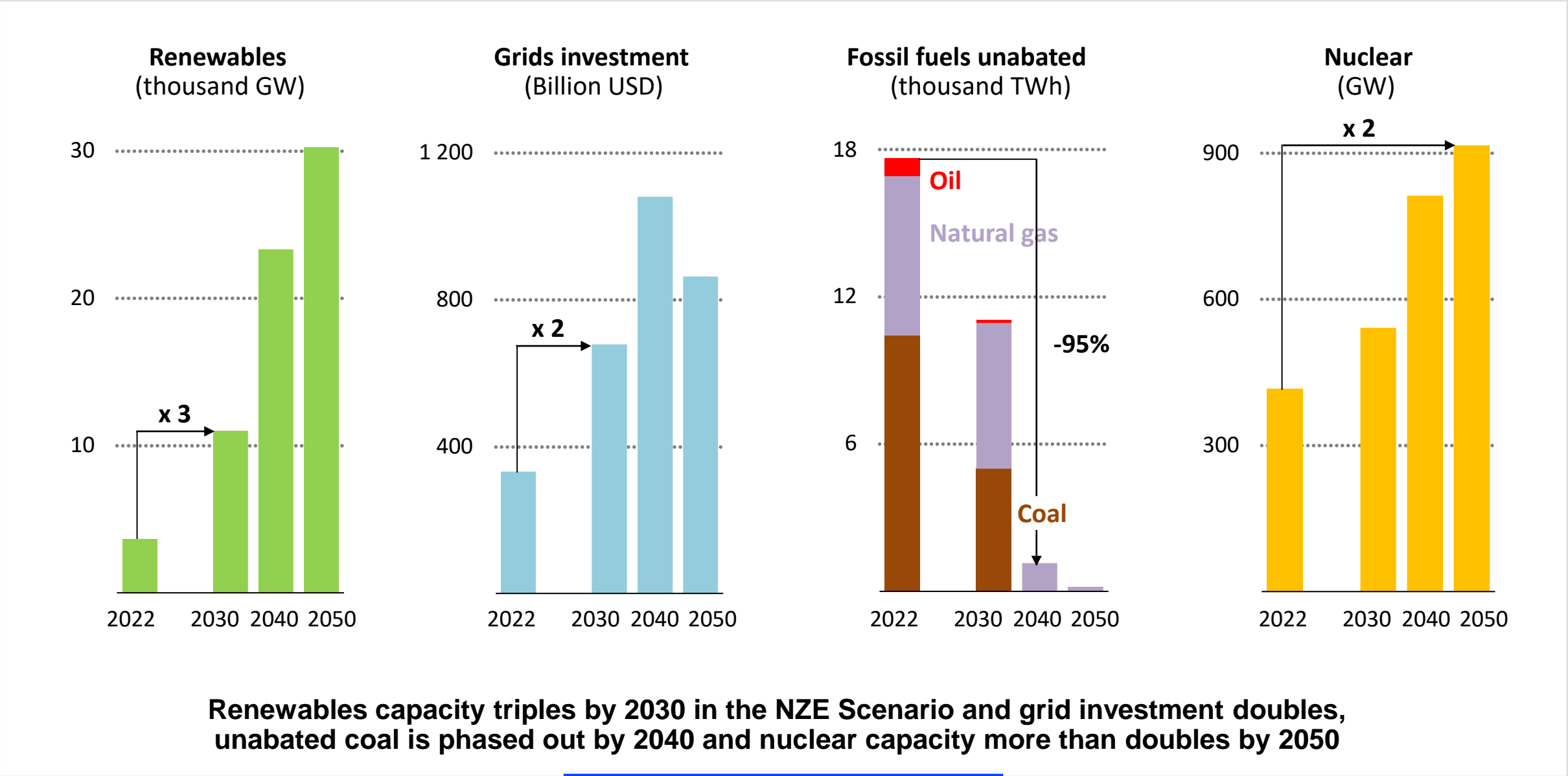
Global nuclear generation will reach a new record high in 2025



Clean electricity supply set to meet nearly all growth to 2026



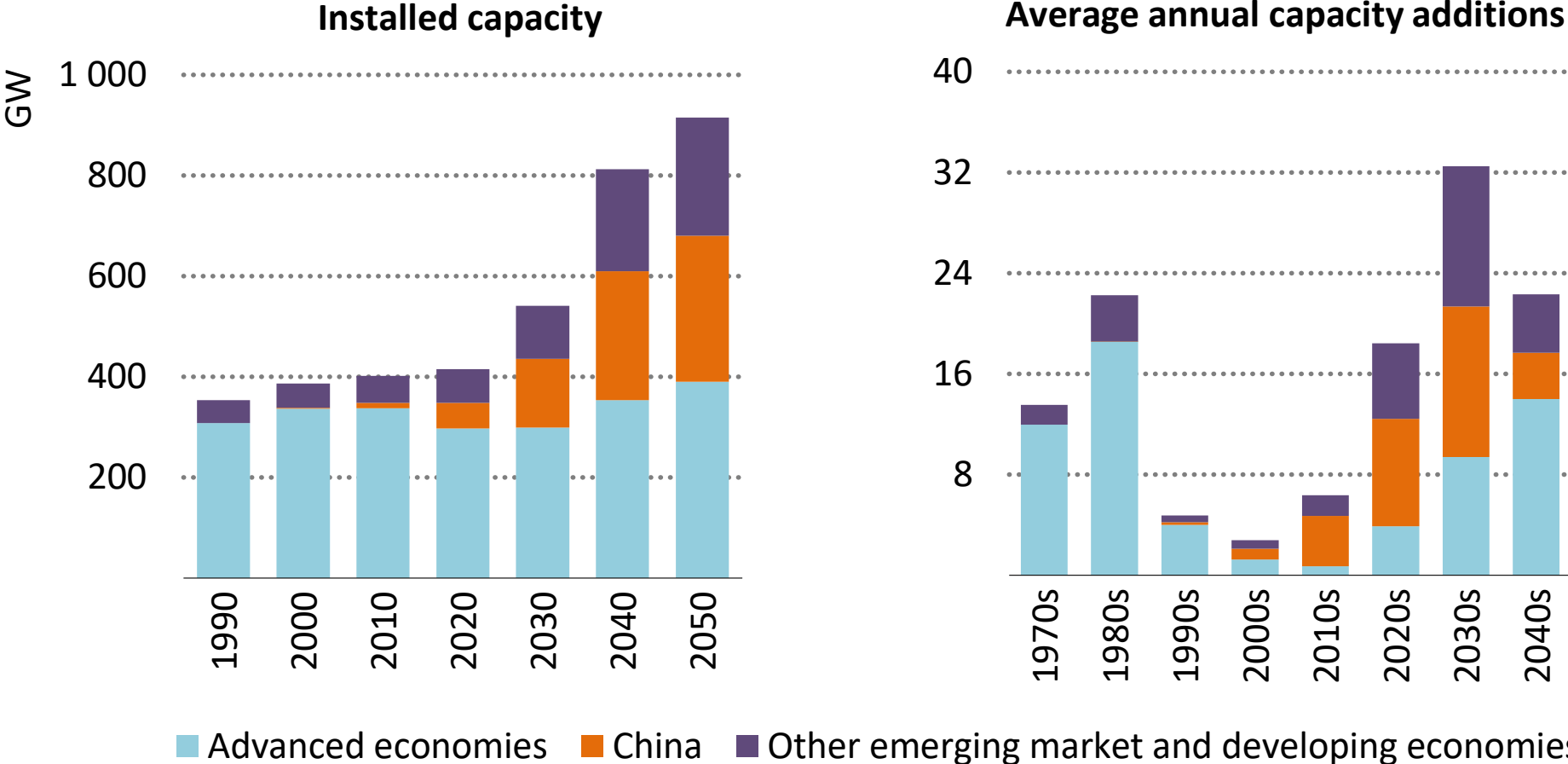
Electricity systems are re-imagined for net zero electricity



Nuclear capacity more than doubles to 2050 on the path to Net Zero

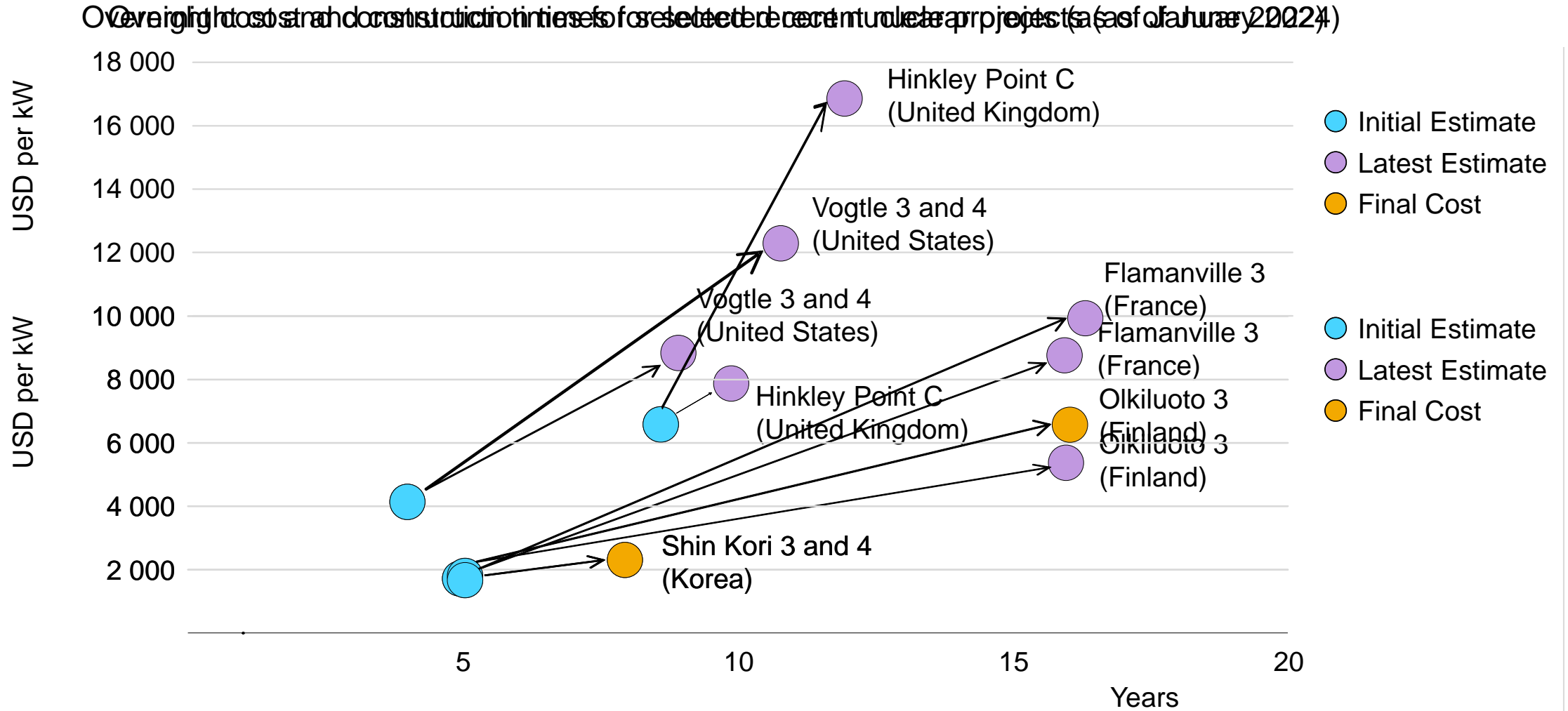


World nuclear power capacity in the NZE



Doubling global nuclear capacity by 2050 means setting new deployment records and tripling investment to over USD 100 billion per year, while tripling nuclear capacity would require much higher levels in the 2030s and 2040s

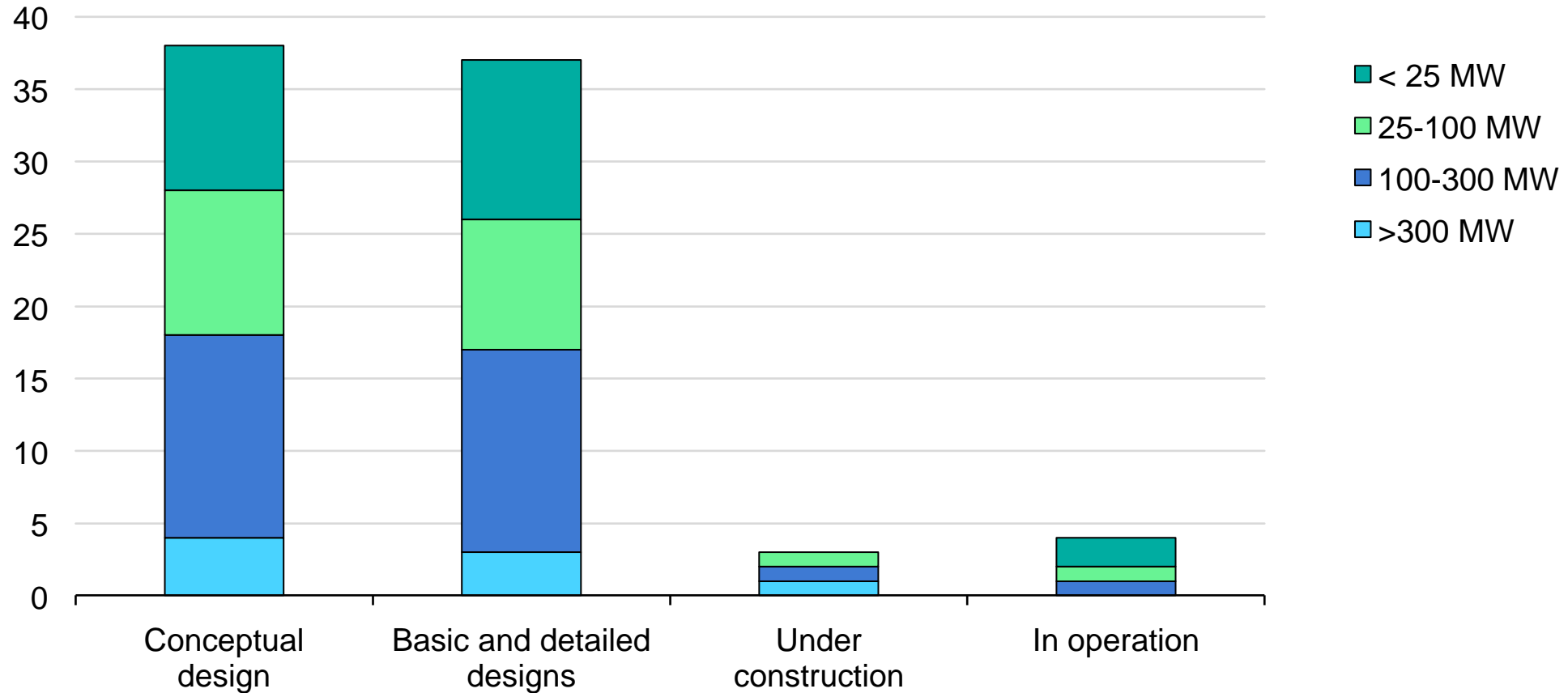
Delays and cost overruns have troubled the nuclear industry



Although advanced economies have nearly 70% of global nuclear capacity, investment stalled decades ago and the latest projects are running far over budget and behind schedule.

The net zero challenge has stimulated a burst of activity on SMRs

Number of small modular reactor projects in the world by status of development



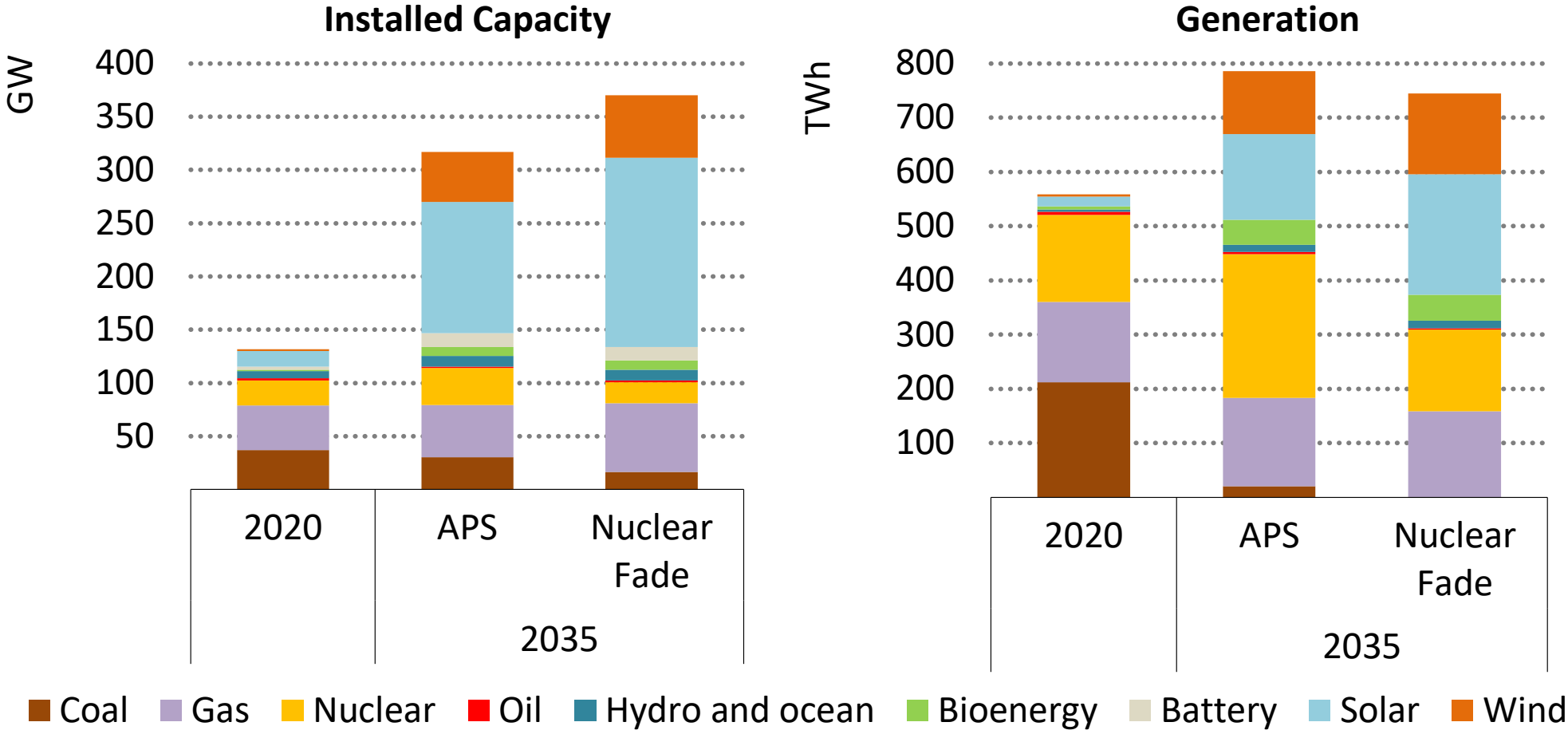
Source: IAEA

With the recent momentum, small modular reactors could complement large reactors and play a significant part in energy transitions, provided investments and development decisions are made now

Managing seasonal variability becoming increasingly important



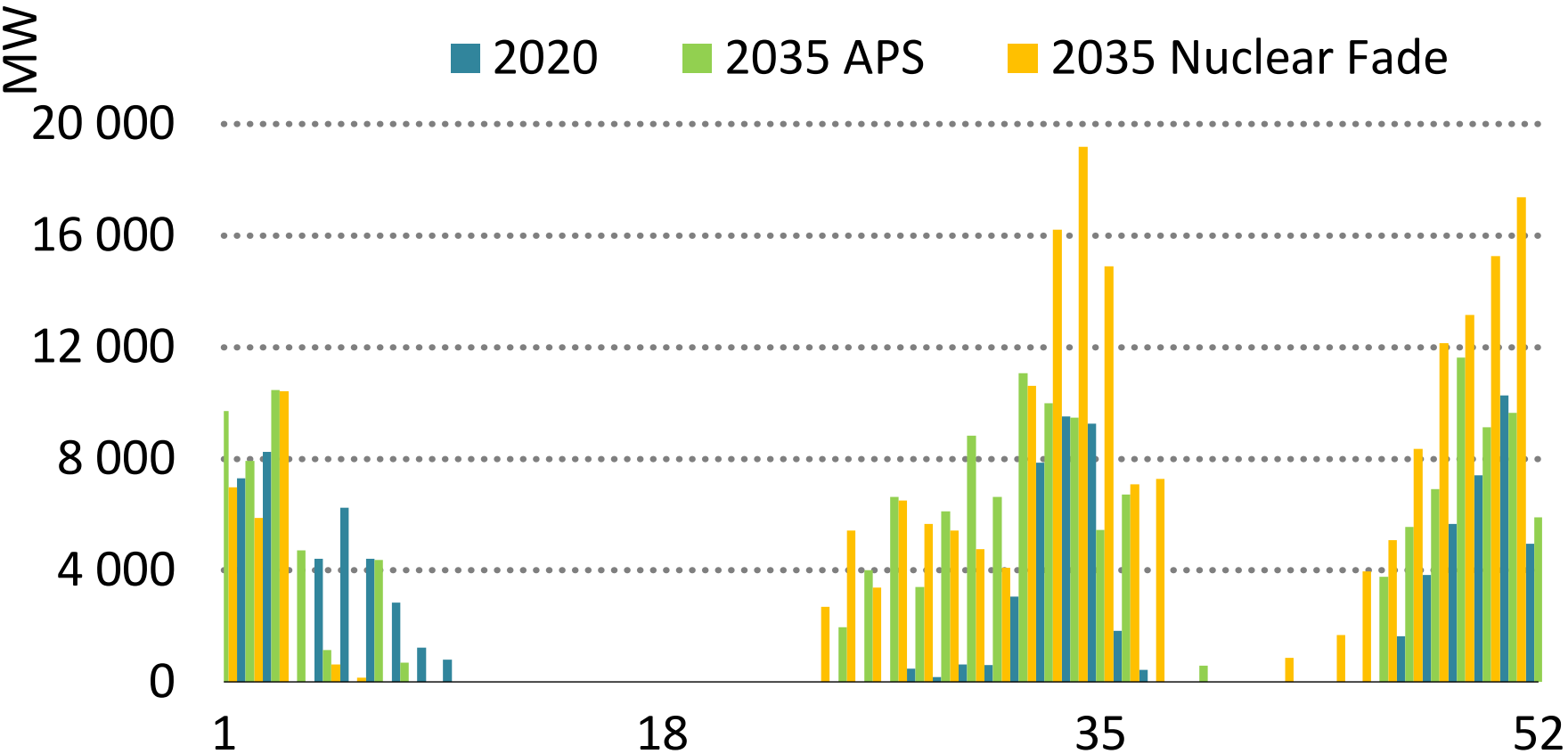
Installed capacity (left) and generation (right) by technology in Korea, in the Announced Pledges Scenario and Nuclear Fade case, 2020-2035



Reducing the share of nuclear leads to a larger overall system for the same drop in emissions

Nuclear reduces seasonal flexibility need

Seasonal flexibility needs in Korea by week in the Announced Pledges Scenario and Nuclear Fade case, 2020-2035



About 10 GW of additional gas-fired generation is needed in the Nuclear Fade case to address seasonal variability

- Prospects for nuclear power are improving. Global nuclear power generation is forecast to record all-time high in 2025.
- All additional electricity demand in the coming few years will be met by low carbon sources, renewables and nuclear. CO2 intensity of power systems is going down.
- Nuclear energy can and should play an important role in ensuring rapid and secure energy transitions. Energy transitions with less nuclear would be more difficult and costly.
- Investments in nuclear must step up fast. Existing nuclear plants must be extended. The nuclear industry has to deliver new projects on time and on budget.
- Governments should promote efficient and effective safety regulation, implement solutions for nuclear waste disposal and create financing frameworks for new reactors including SMRs.
- In very high-VRE future systems, legacy thermal assets, ideally with CCUS or low-carbon fuels, would provide major portion of seasonal flexibility services although they provide minor share in electricity.
- A diversified low-carbon power mix including nuclear would help lower seasonal variability and strengthen electricity security.
- Electricity market designs must recognise the value of dispatchable low emissions capacity.

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