



The role of nuclear in carbon-free energy production Findings from latest IEA energy policy reviews

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Global context: Covid-19 impact

- **Covid-19 is resulting in the largest economic crisis since the great depression**
 - Global GDP is estimated to decline by 5% in 2020
 - Around 400 million jobs were lost in first half of 2020
- **The energy sector plays a vital role, but is strongly impacted**
 - Energy supplies provided essential services and reduced impact of crisis
 - Energy production, use and investment highly disrupted, 6 million energy jobs lost or at risk
- **Clean energy transitions face challenges but offer a road to sustainable recovery**
 - Clean energy investment is strongly impacted by the pandemic with 2020 global energy investment down 20% (-10% in electricity), largest drop in history with declines in every sector
 - Global CO₂ emissions could fall by 7% in 2020, but a rebound can be expected unless clean energy transitions are placed at the heart of the economic recovery

The role of nuclear

Nuclear power in the global context:

- Scale and urgency of the climate challenge
- Nuclear and renewables most resilient in Covid pandemic
- Safety, waste management and security of electricity

Governments can support the role of nuclear energy in three ways:

- **Preserve** aging fleet with lifetime extensions to gain time for scaling up
- **Renew** the fleet with new builds through licensing, finance and regulation
- **Innovate** in new nuclear power technologies (small modular reactors and advanced large reactors)

IEA Review of EU Energy Policies 2020



European Union 2020
Energy Policy Review

International
Energy Agency

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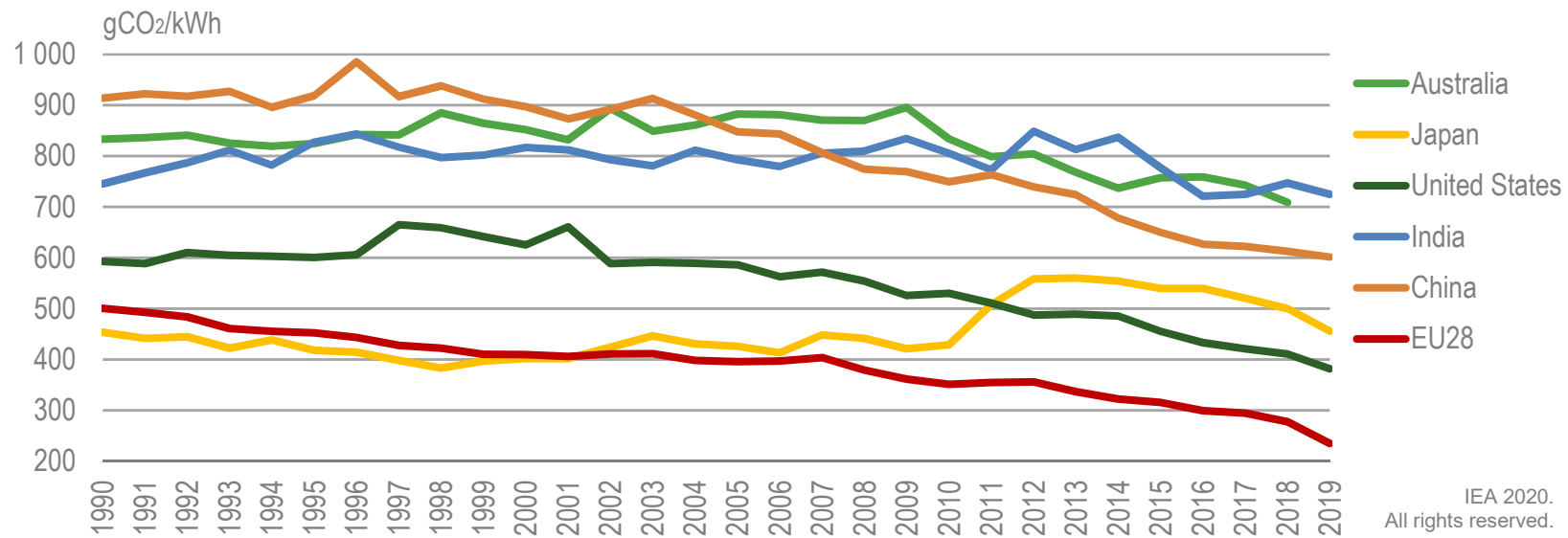
IEA recommends the following to help the EU improve energy sustainability, competitiveness & security:

- Put the **energy sector at the heart of Covid-19 recovery**, including through large-scale renovation of buildings, easing barriers on investment & promoting clean energy industries
- **Reduce regulatory & pricing barriers** to boost energy efficiency, renewables and digitalisation
- **Keep all technology options** on the table, by strengthening carbon pricing & leveling the playing field for investment and sustainable financing
- Place ongoing focus on **EU energy security, particularly in electricity & natural gas**

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EU power system is decarbonising

CO₂ emissions per kWh heat and power generation in EU and other large economies, 1990-2019

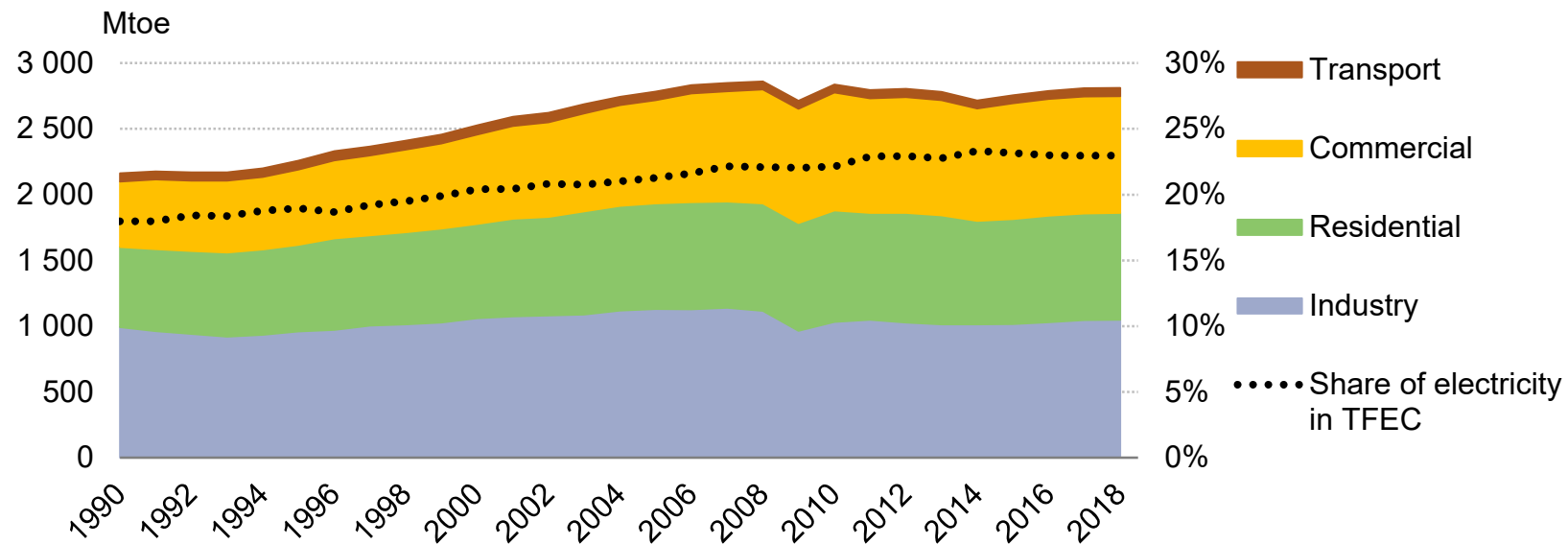


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Thanks to strong renewable growth, the carbon intensity of electricity reached 235 gCO₂/kWh in 2019, a strong basis for decarbonising Europe's economy. However, electricity only accounts for 23% in energy use.

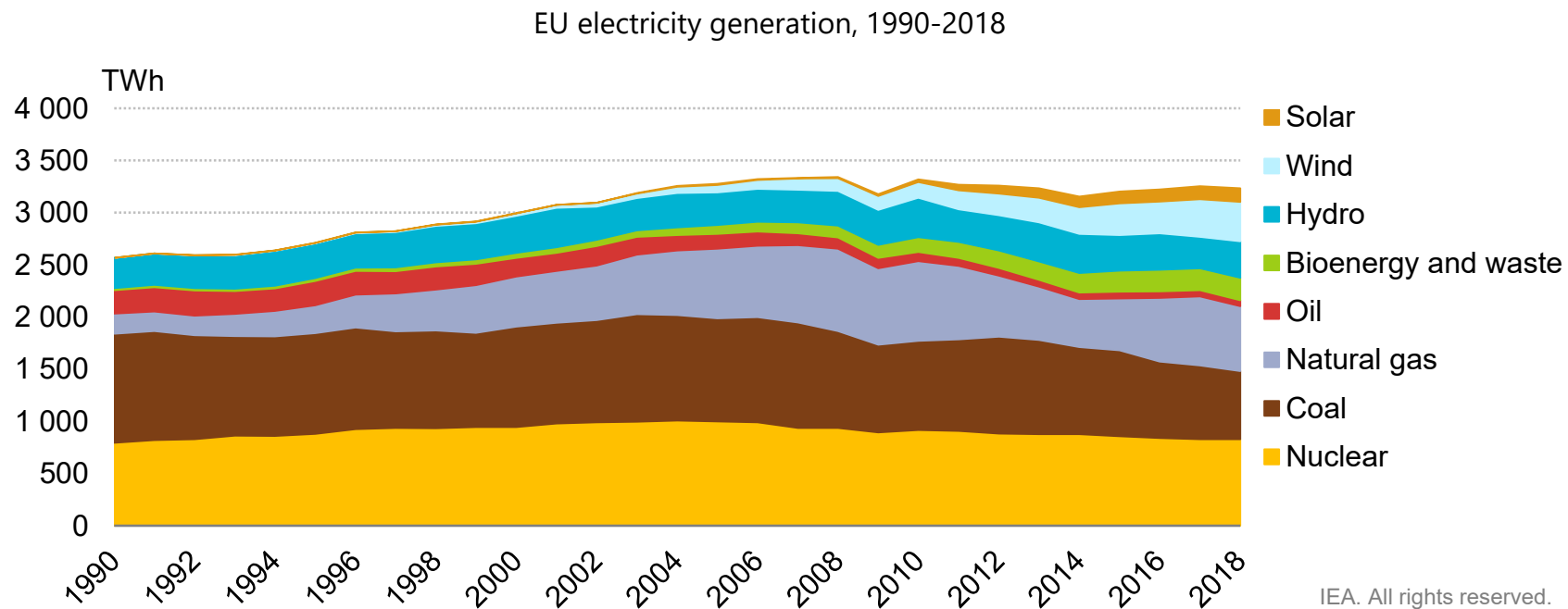
Low carbon fuels in buildings, transport, industry

Electricity in TFC by sector and total share, 1990-2018



Opportunities remain for boosting energy efficiency and low-carbon fuels, coupled with electrification of end-uses. Strengthen carbon price signals in the EU ETS/non-ETS sectors and EU energy taxation.

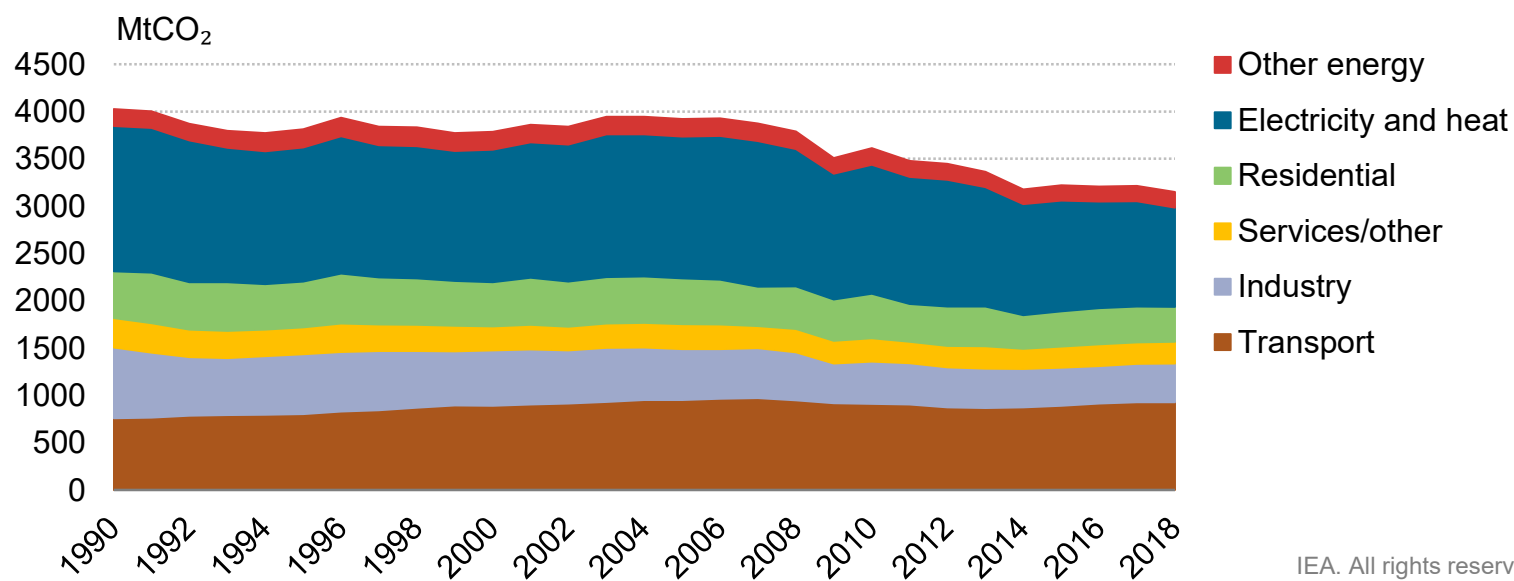
Renewables and nuclear are the pillars of the EU electricity mix today



The EU electricity generation is transforming: the share of renewables reached 32%, led by wind power (offshore wind). Nuclear (25%), natural gas (20%) and coal (22%) played a significant role.

Emissions are only declining in power and heat

Energy-related CO₂ emissions by sector, 1990-2018

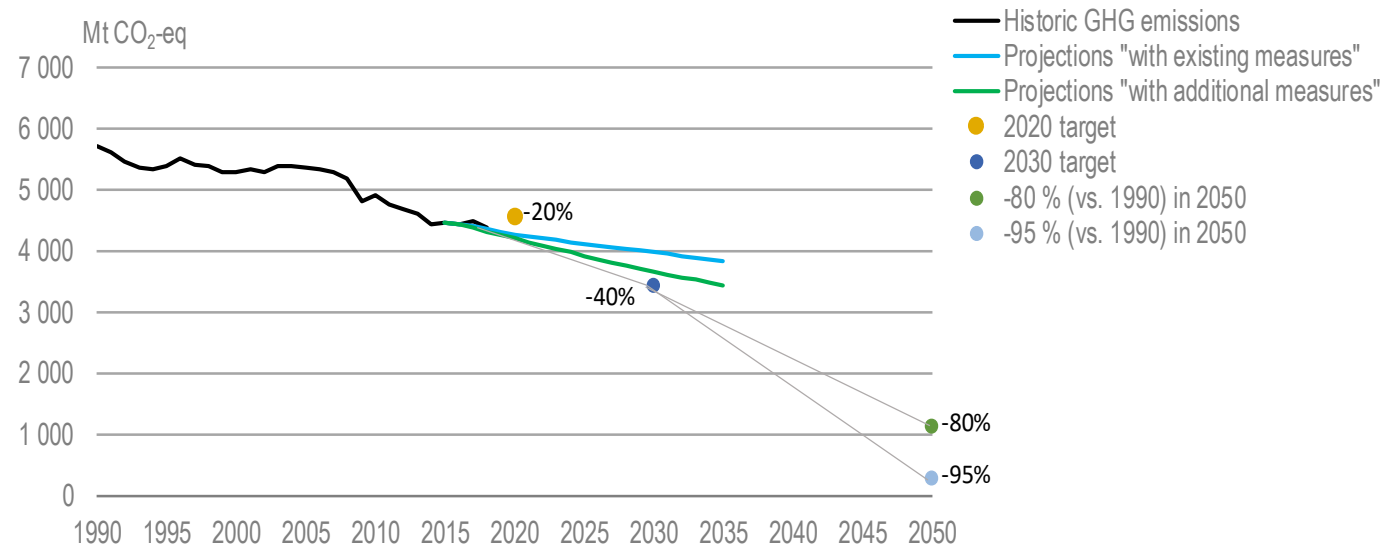


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Emissions in transport are rising, while industry and residential emissions have stabilised. Policies are inadequate to deal with rising emissions and air pollution in transport let alone decarbonise other sectors.

Hard to get to 2030 or 2050 with stated policies

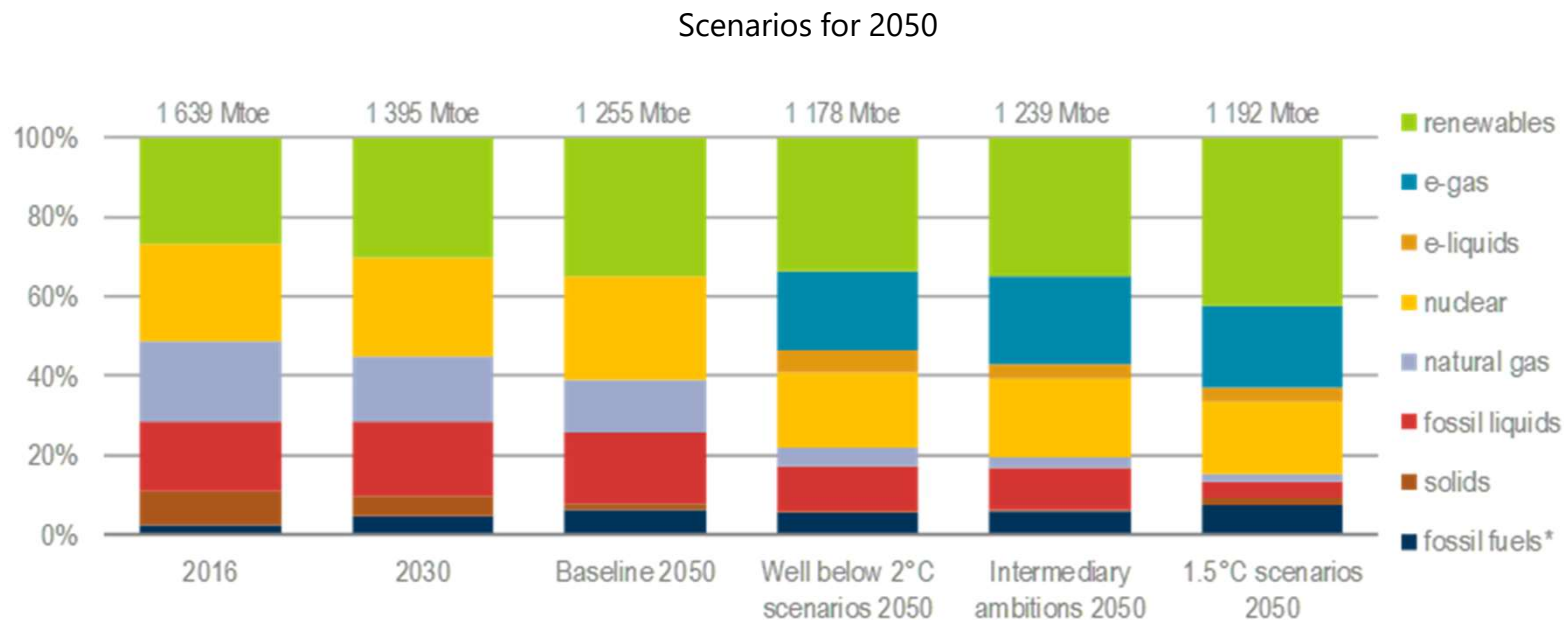
GHG emissions trends, projections and targets in the EU, 1990-2050



Source: EEA 2019

EU GHG emissions are not on a trajectory to net zero by 2050. The implementation of final NECPs should identify the gaps and opportunities for scaling up and meet the 40% target. 55% is ambitious.

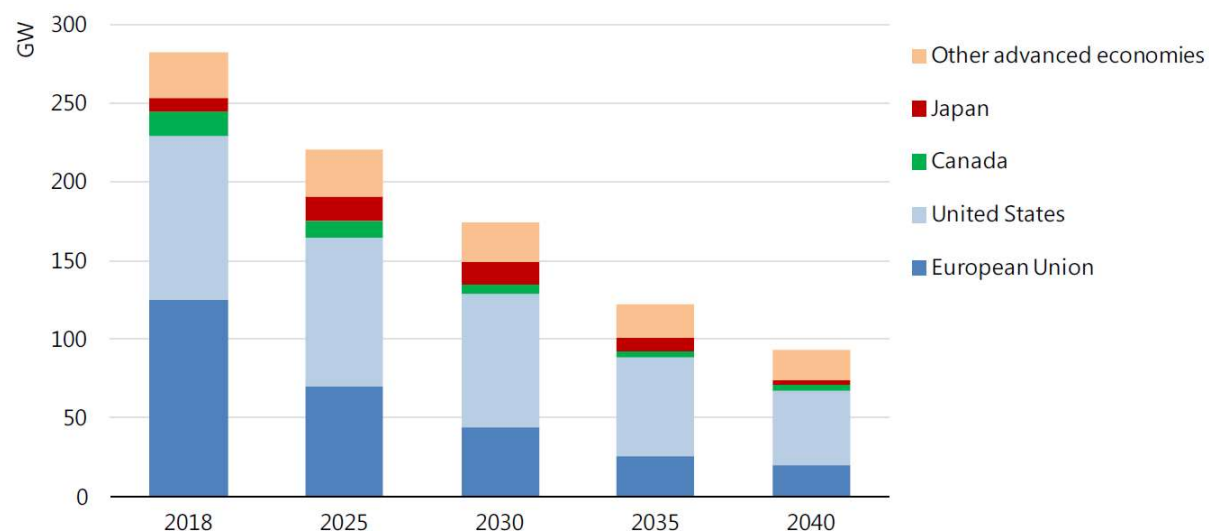
Nuclear forms part of the 2050 Long-Term Strategy



Renewables and nuclear energy are the backbones of the low-carbon energy mix in the EU's Long-Term Strategy in 2050.

Nuclear energy is exiting the mix without policy action

Operational nuclear capacity in advanced economies (Nuclear Fade Case)



Today, nuclear accounts for 25% of EU electricity mix (120 GW) but falls to 5% with retirements in 2040.

EU long term strategy assumes 15% of nuclear power in 2050, which equals today's capacity.

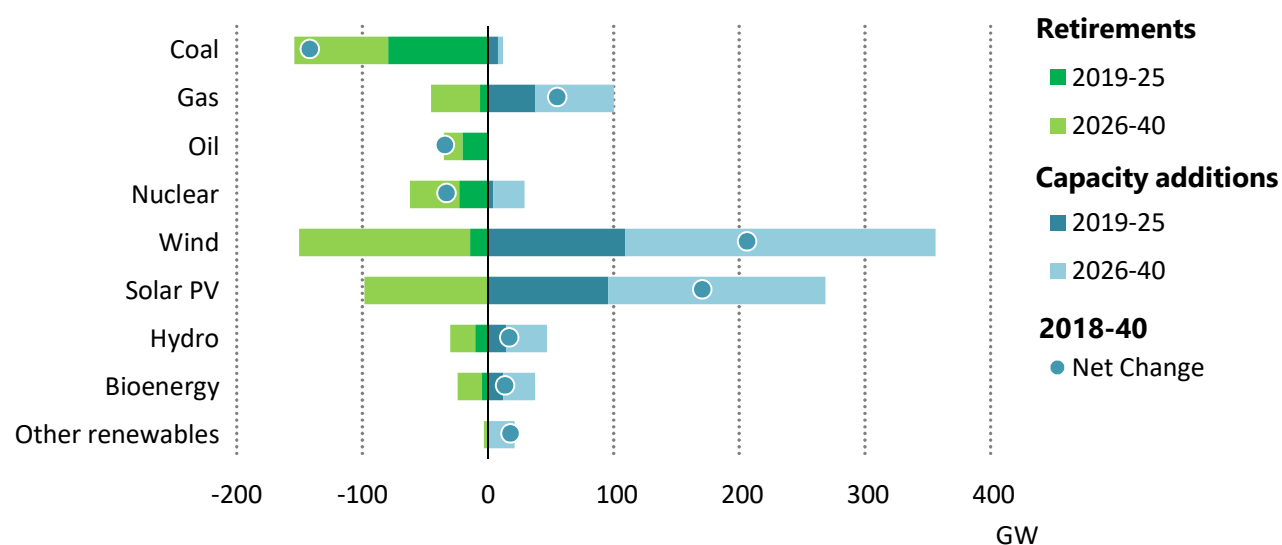
Given fast retirements, EU would need to extend the lifetime and built new plants.

Source: IEA (2019), Nuclear report, Paris.

To keep the option for nuclear open in the EU's decarbonisation pathway, EU policies & financial support should not exclude nuclear and create a level playing field among technologies.

Europe's electricity adequacy cliff - when and how deep?

Generation adequacy – Evolution of power generation capacity in the medium and longer term



Retirements
 In the EU most of the countries have decided coal phase-out and, even without such decisions, low gas and high CO2 prices are severely affecting coal power plants.

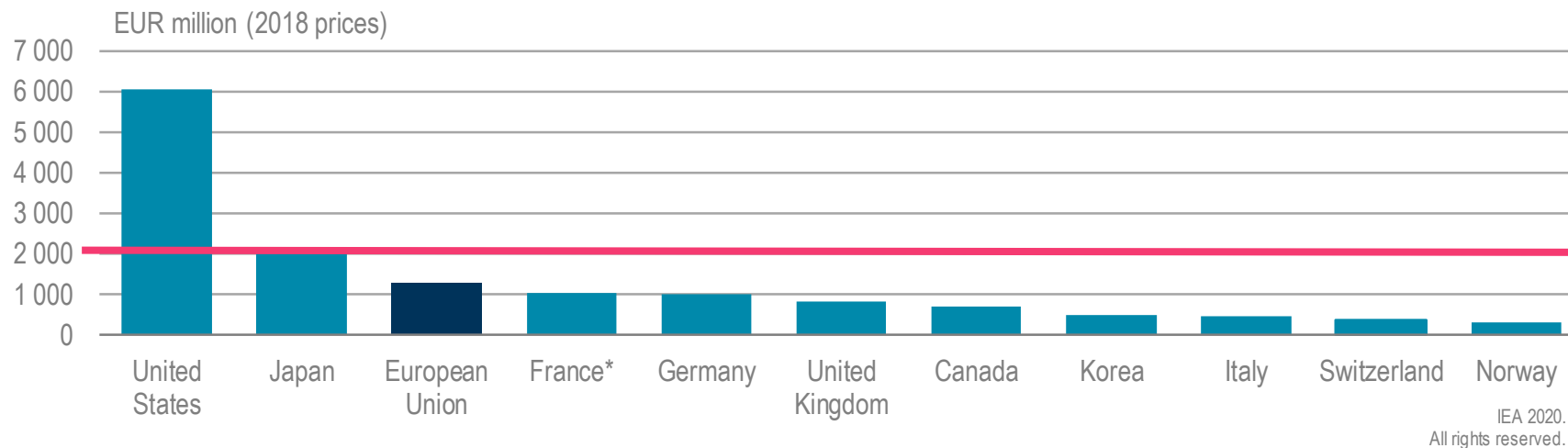
Capacity additions
 Coal phase-outs and nuclear retirements will boost the reliance on natural gas (imports) and will increasingly link gas and electricity security in the EU.

Source: IEA (2019), World Energy Outlook, Paris.

Electricity security is a top priority for the European Union. The European adequacy assessment is a success story but only the start of the journey, and nuclear requires a particular attention.

Expand clean energy technology innovation

Energy-related RD&D spending by the EU and IEA country, 2018



*No data on France in 2018.

The energy RD&D budget of the EU under the Horizon 2020 is now larger than that of all but two IEA member countries: the United States and Japan. In comparison, private sector spent EUR 18 billion in 2018.

IEA key findings and recommendations – Nuclear

- **Support the role that nuclear energy can play in the transition towards decarbonisation and sustainability:** Concerned member states should keep the nuclear option open by supporting the lifetime extension of existing and new plants.
- **Support a broader spectrum of RD&D on advanced concepts and small modular reactors. Promote better synergies between the research programmes under Euratom and the TFEU.** Ensure that financing mechanisms for innovation are open for nuclear.
- Work with EU member states on the **proactive development of plans for the final repository of high-level nuclear waste**, notably at regional level.
- Foster **international co-operation with non-EU countries and entities**, notably the use or construction of scarce large nuclear research infrastructure, including fusion research.

IEA Review Energy Policy of Netherlands 2020



- Monitor **security of supply** issues resulting from the closure of Groningen.
- Ensure policy supports **strong deployment of digitalisation**.
- Align GHG emission reduction measures with **achieving EU targets for RES and energy efficiency**.
- **Support emerging technologies** with potential for cost-effective emission reductions.
- Ensure electricity markets support innovation and **integration of variable renewable generation**.
- Facilitate investments in **low-carbon hydrogen** development.

Recommendations on nuclear

The government of the Netherlands should:

- Consider facilitating a **lifetime extension of the Borssele nuclear power plant beyond 2033** to maintain the plant's contribution of low-carbon electricity and Dutch knowledge of nuclear power.
- Examine how the **energy security and emissions reduction benefits of nuclear power can be better valued in the electricity market** and establish a level playing field with other low-carbon energy sources.
- Ensure **timely authorisations in the development of the PALLAS research reactor project** in order to carry on with the radioisotope production programme.

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