

Japan's 2035 Energy Outlook

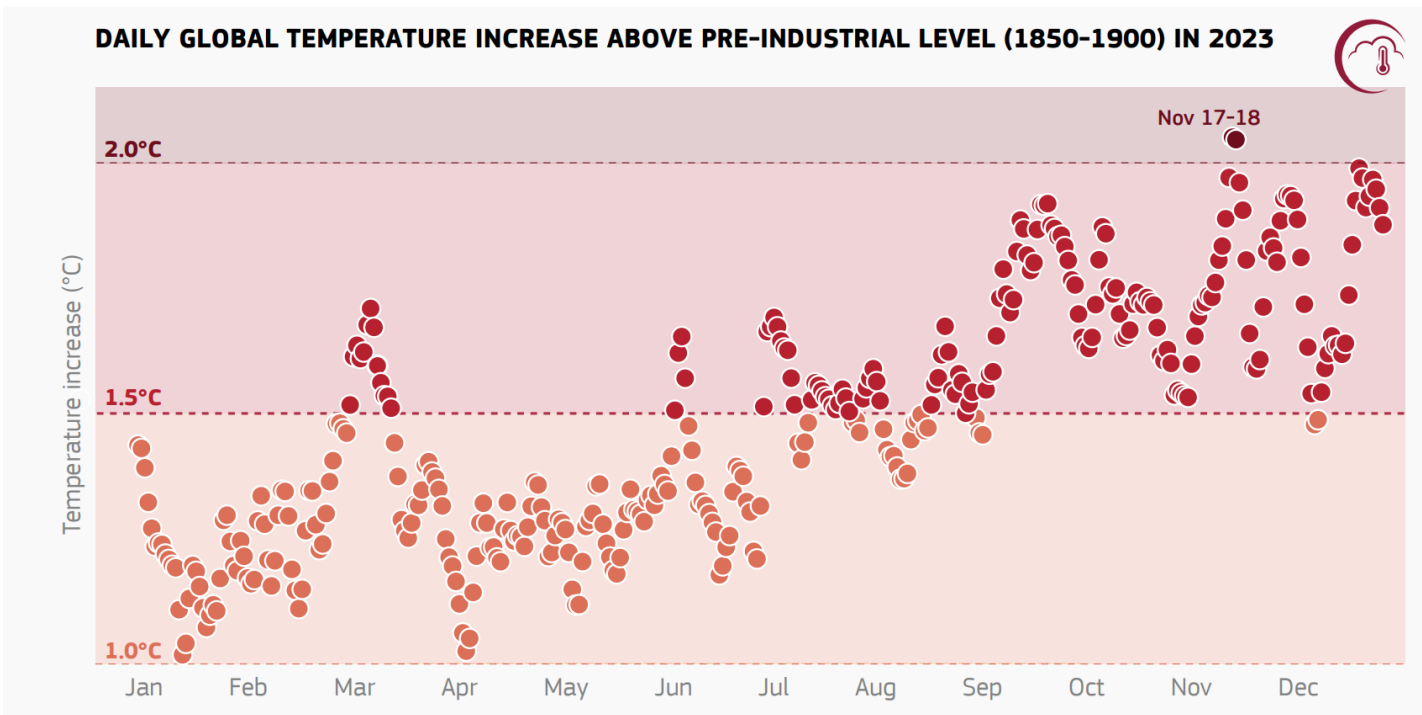
REvision 2024

Dr. Ali Izadi, Head of Asia-Pacific

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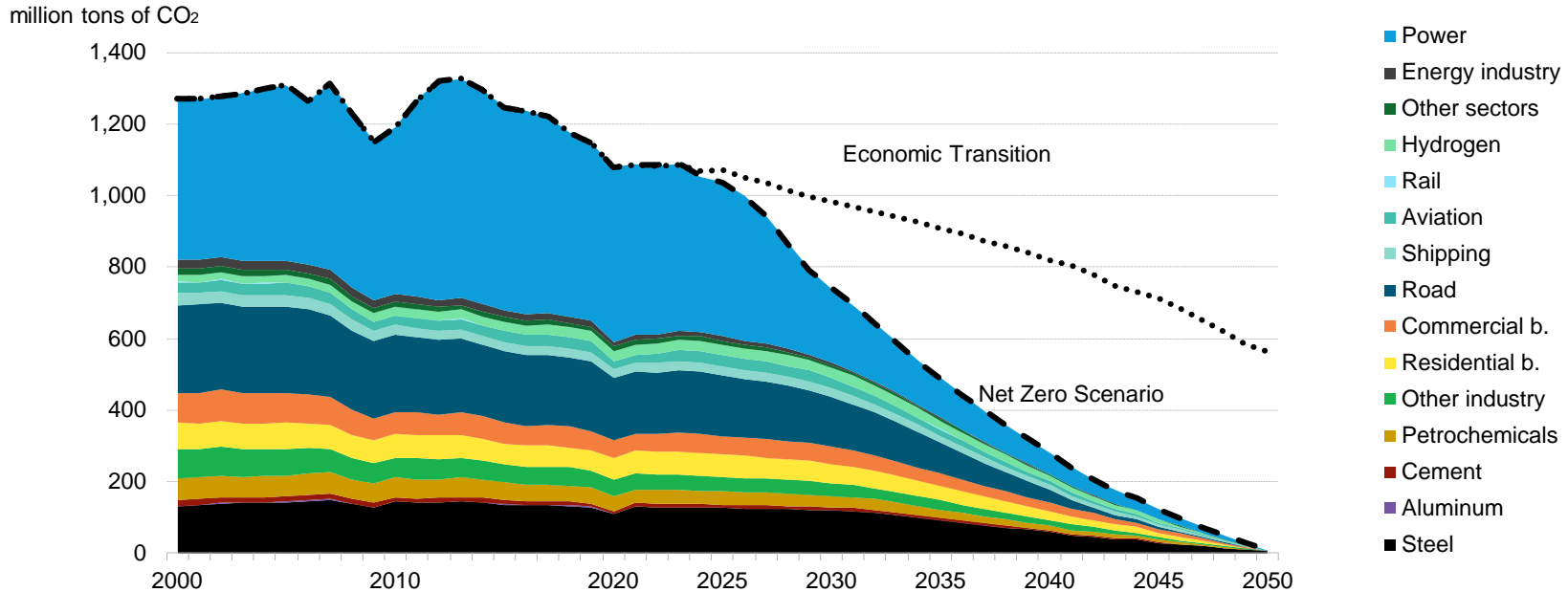
2023 was the hottest year on record: average global surface temperature was **1.48°C** warmer than the 1850-1900 pre-industrial level



Data source: [ERA5](#). Credit: [C3S/ECMWF](#)

There are still plausible pathways to meet the Paris Agreement goal

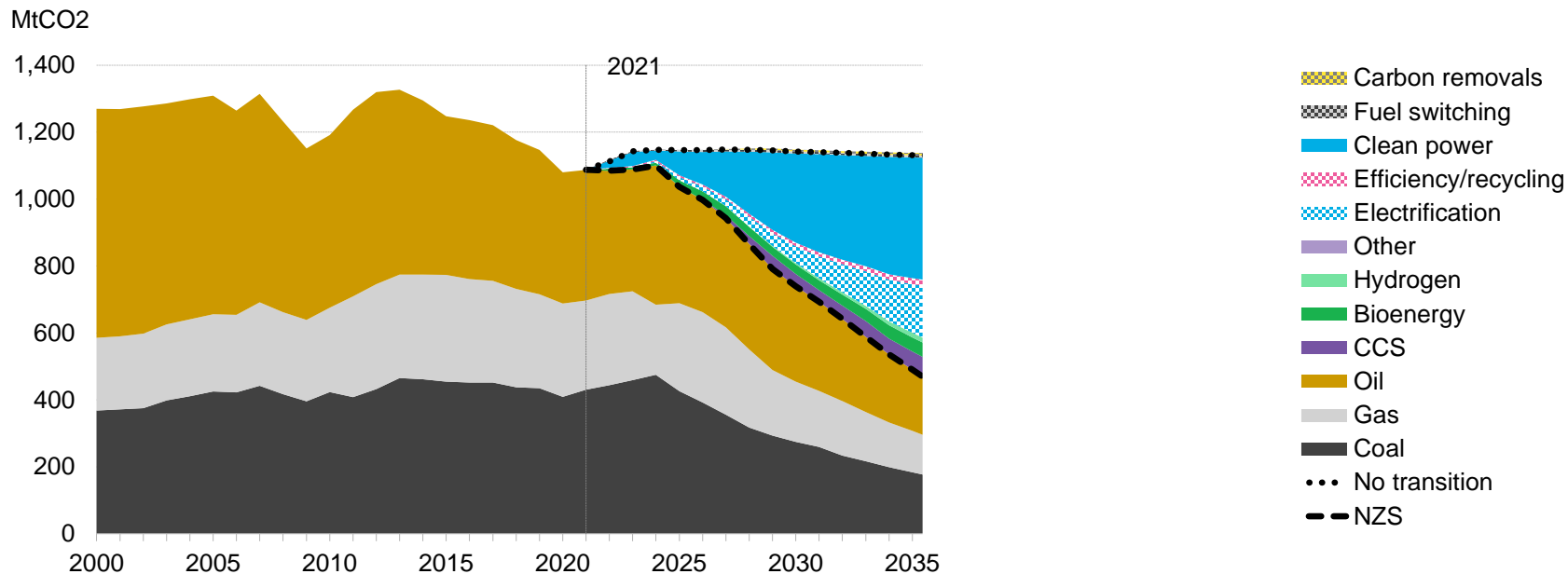
Japan energy emissions and carbon budget



Source: BloombergNEF. Note: NZS – Net Zero Scenario. ETS – Economic Transition Scenario.

2/3rd of Japan's emission abatement between now and 2035 will have to come from clean power

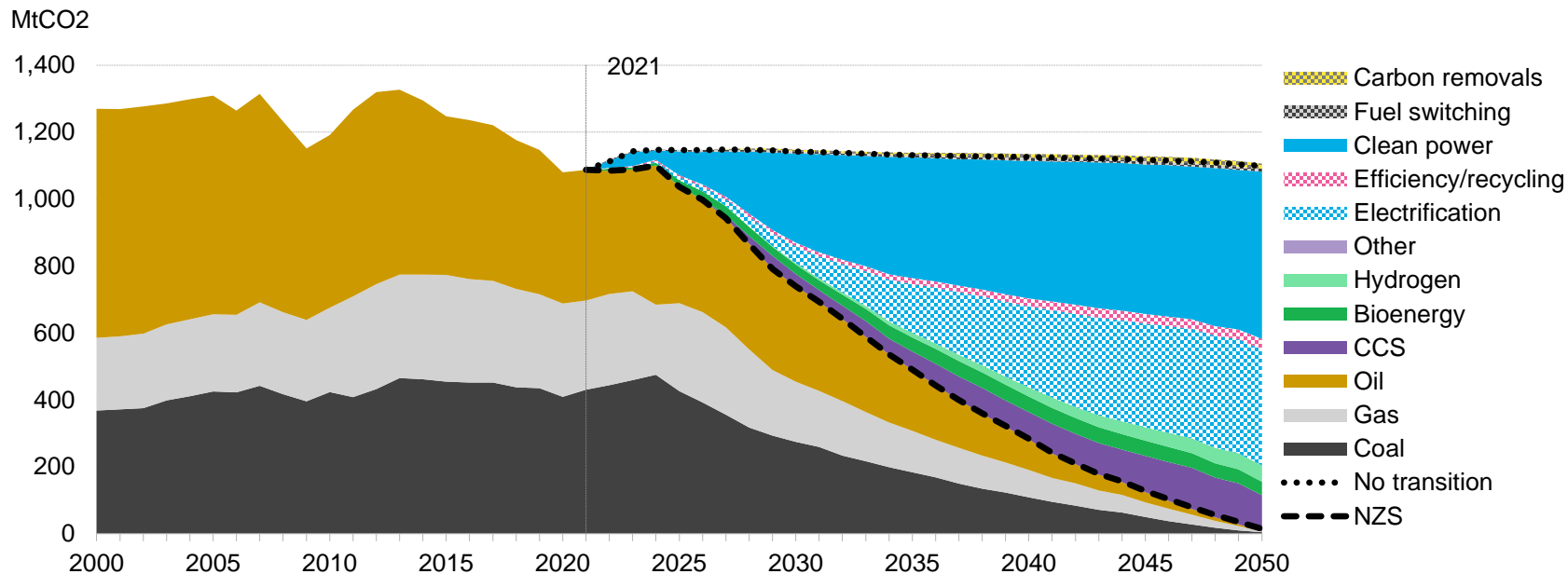
Japan CO2 emissions abatement by technology



Source: BloombergNEF

By 2050, 75% of emission abatement comes from clean power and electrification

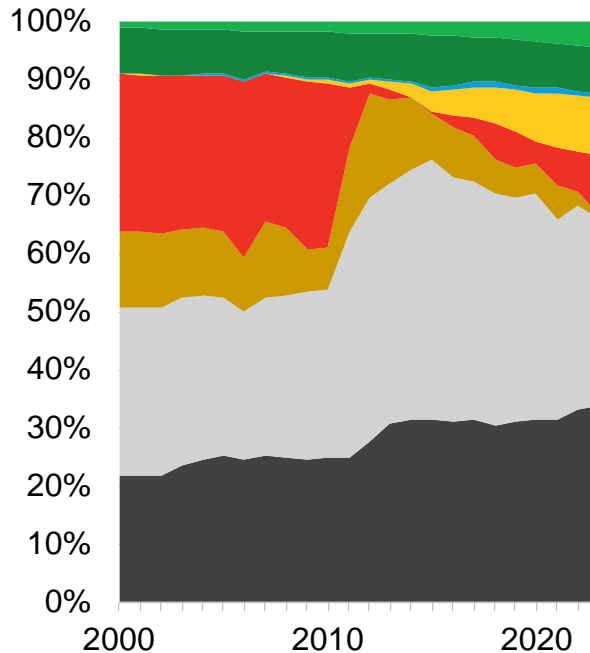
Japan CO2 emissions abatement by technology



Source: BloombergNEF

Japan's generation mix will need to transform from one dominated by fossil fuels...

Japan generation mix



Source: BloombergNEF

2023

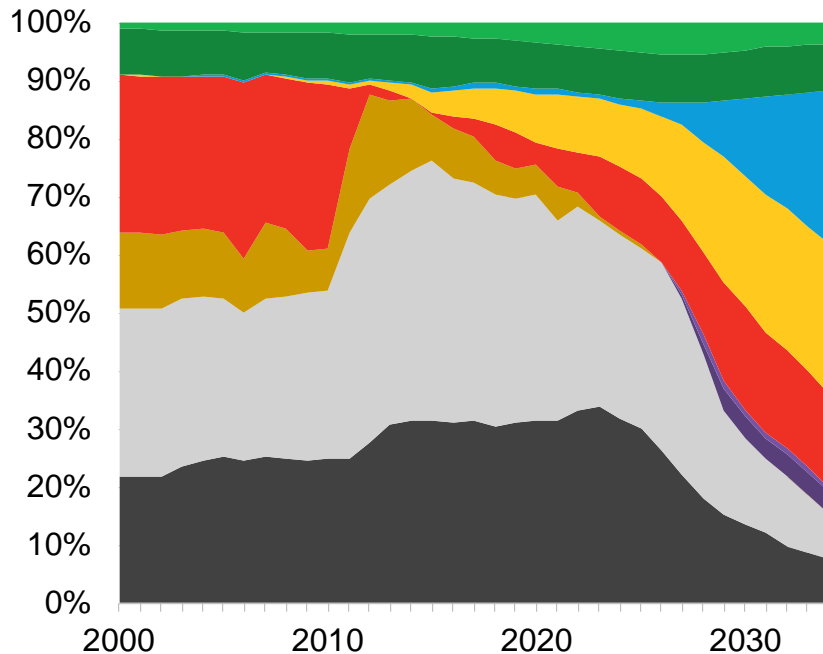
Total: 1,035TWh

Zero carbon: 33%
Fossil fuel: 67%

- Bioenergy
- Other renewables
- Solar
- Wind
- Nuclear
- Hydrogen
- Gas with CCS
- Coal with CCS
- Oil
- Gas
- Coal

... to one where solar and wind supply more than half of electricity generated in 2035

Japan generation mix, Net-Zero Scenario



Source: BloombergNEF

2035 – NZS

Total: 1,237TWh
(19% growth from 2023)

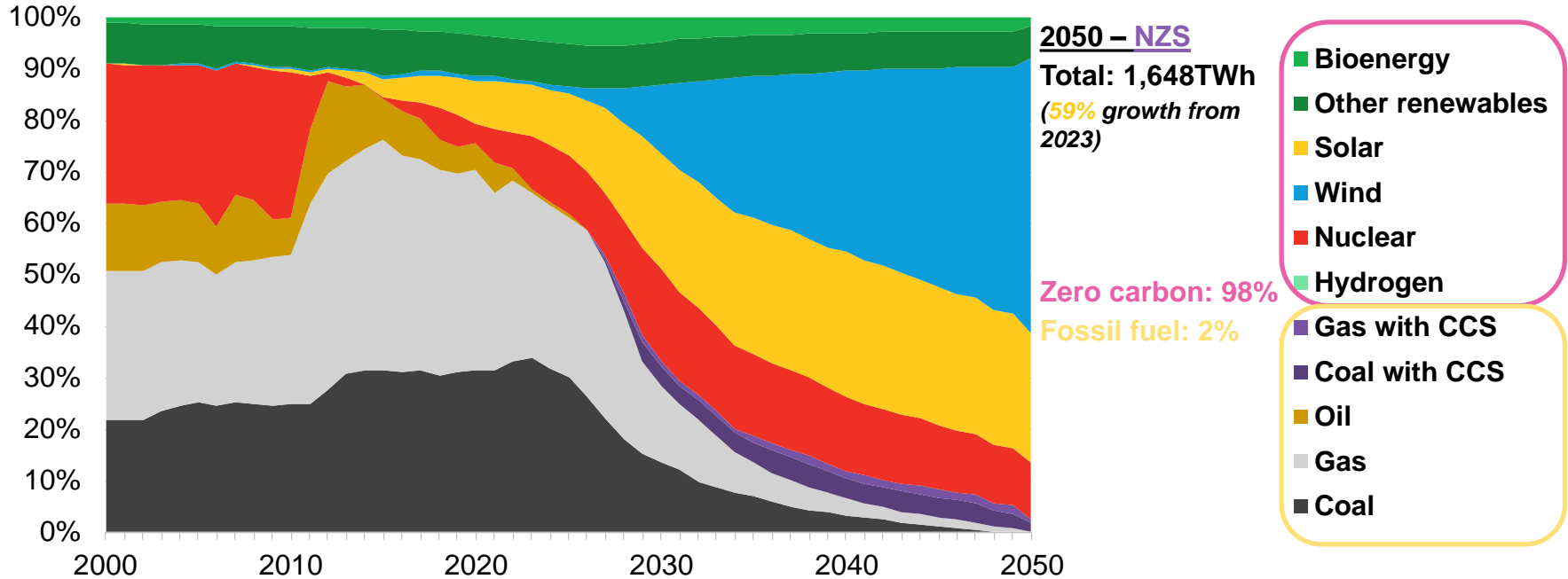
Zero carbon: 81%

Fossil fuel: 19%

- Bioenergy
- Other renewables
- Solar
- Wind
- Nuclear
- Hydrogen
- Gas with CCS
- Coal with CCS
- Oil
- Gas
- Coal

By 2050, 79% of Japan's electricity supply will need to come from solar and wind

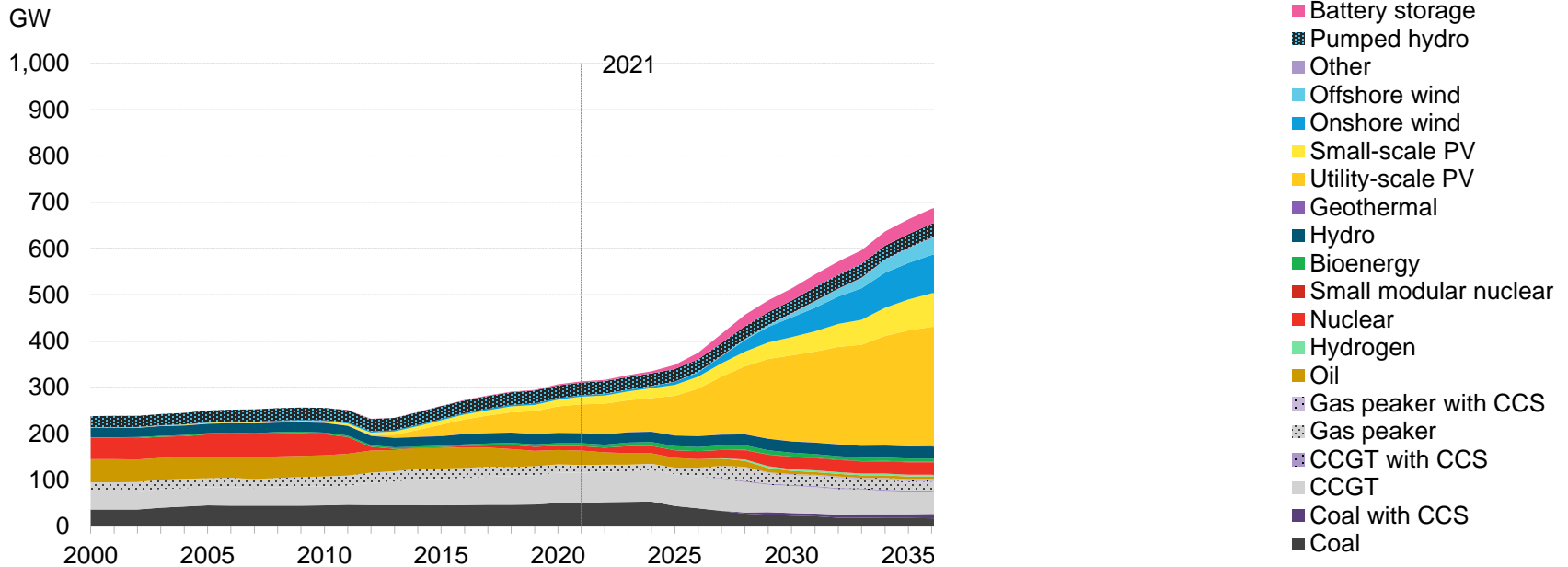
Generation mix, Net-Zero Scenario



Source: BloombergNEF

By 2035, Japan will need 317GW of solar and 110GW of wind capacity

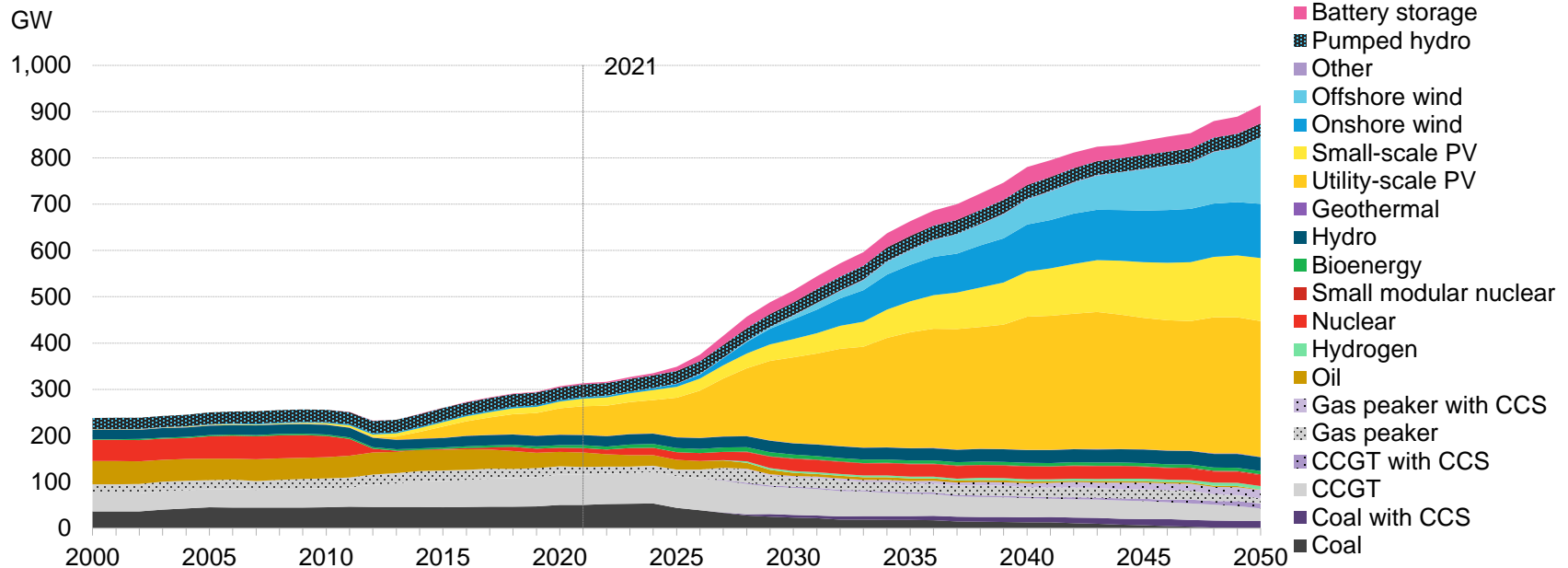
Japan power capacity, Net Zero Scenario



Source: BloombergNEF. Note: CCS – carbon capture and storage, CCGT – combined cycle gas turbine.

By 2050, Japan will need 429GW of solar and 260GW of wind capacity while remaining thermal power plants will become critical backup

Japan power capacity, Net Zero Scenario

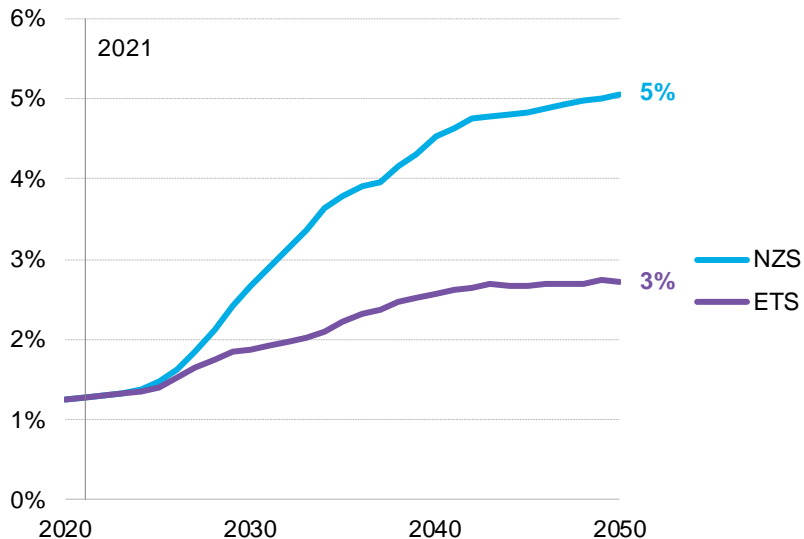


Source: BloombergNEF. Note: CCS – carbon capture and storage, CCGT – combined cycle gas turbine.

Renewables footprint under BNEF scenarios are well within the realm of possibility

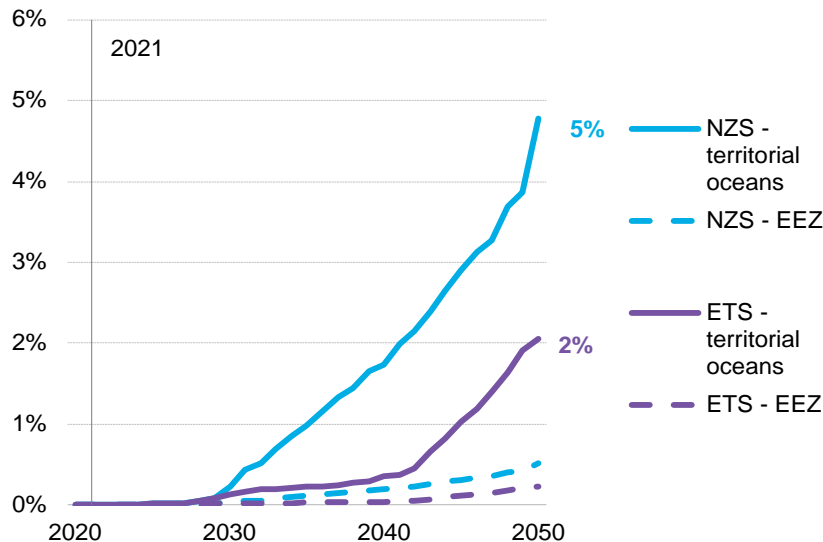
Share of land area covered by solar and onshore wind, Japan

Land areas covered by solar and onshore wind



Share of ocean area covered by offshore wind projects, Japan

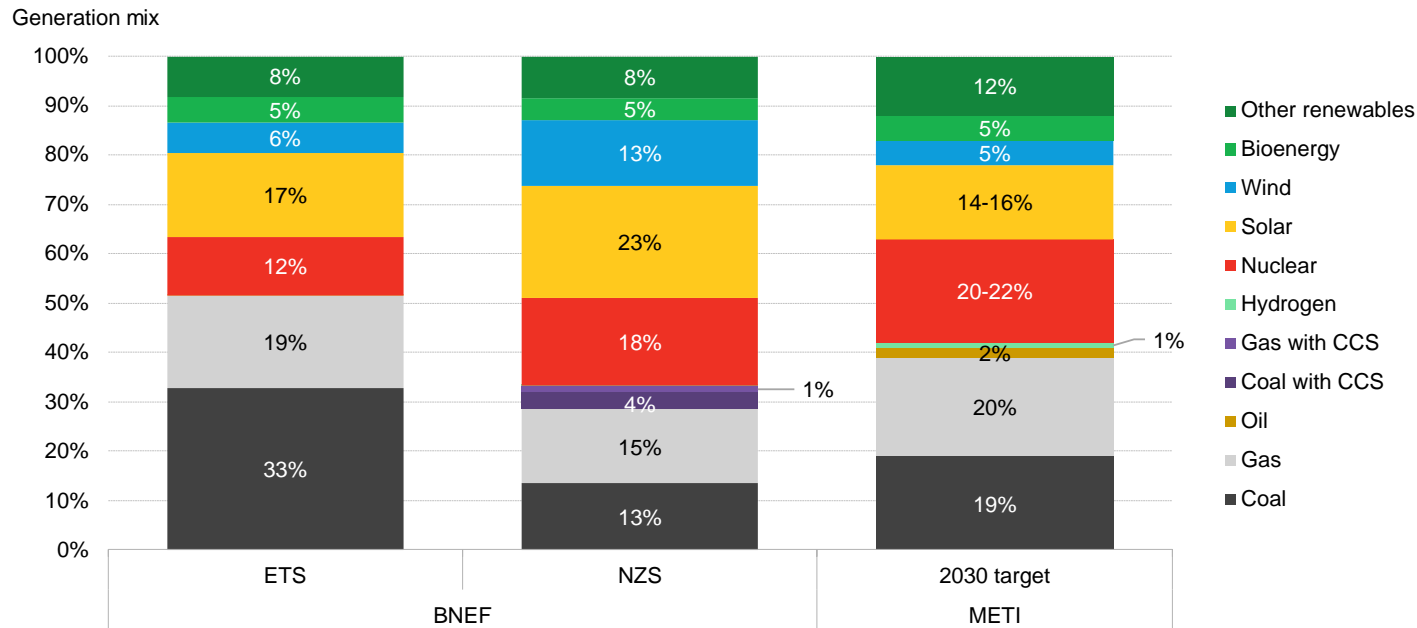
Ocean area covered by offshore wind



Source: BloombergNEF. Note: Solar includes small-scale solar. Estimated total land area excludes water surface, roads, and residential and industrial areas. EEZ = economic exclusive zones.

Under BNEF scenarios solar and wind exceed government 2030 target, while nuclear falls short

Comparison of Japan electricity generation mix in 2030

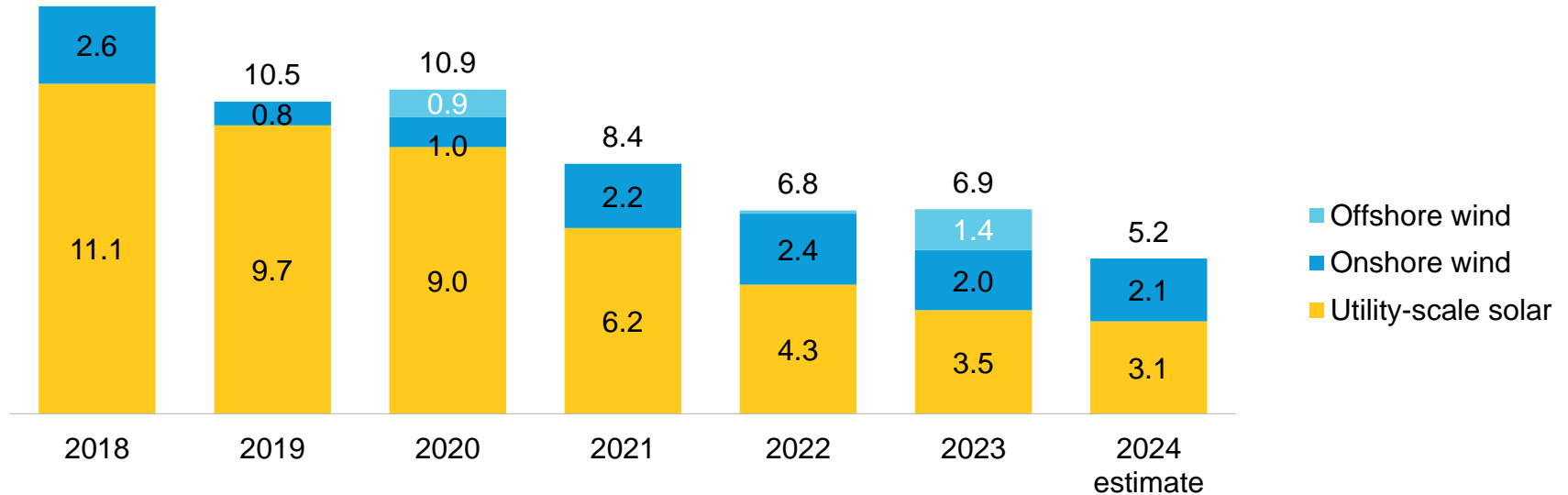


Source: BloombergNEF, Ministry of Economy, Trade, and Industry of Japan (METI). Note: CCS - carbon capture and storage.

Unlike the rest of the world, investments in renewables have been declining in Japan

Annual investments in solar and wind in Japan

Billion \$
13.7

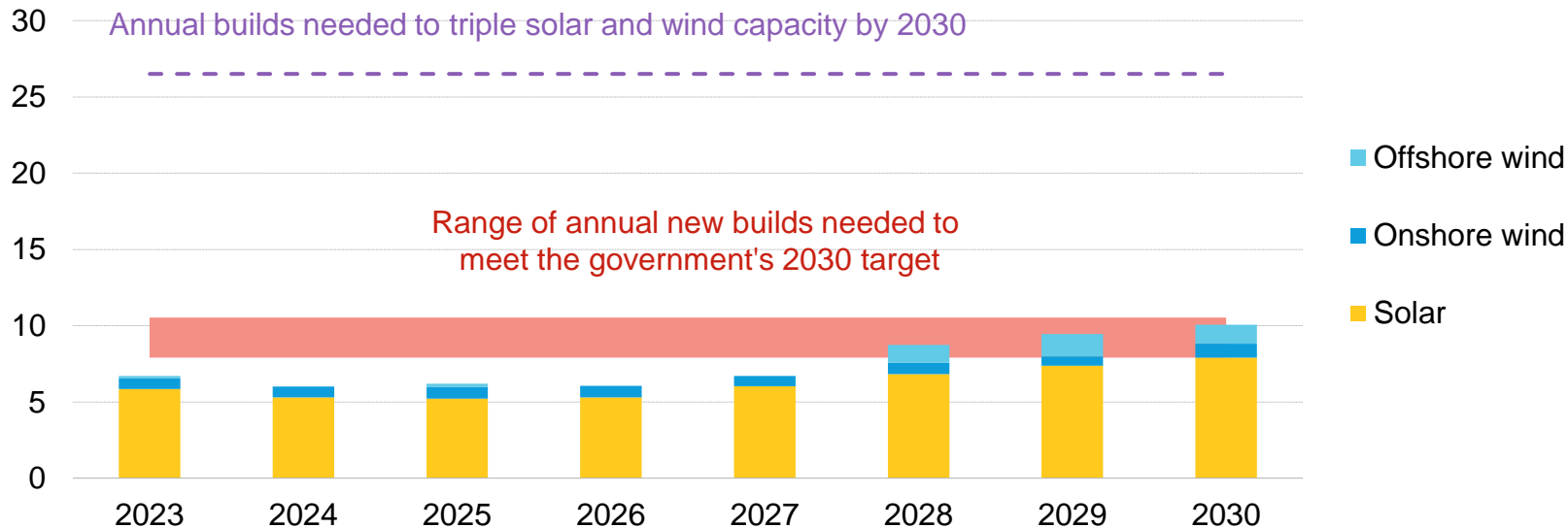


Source: BloombergNEF

Japan is not on track to meeting even its own modest 2030 renewable target

BNEF's solar and wind forecast for Japan versus the government's targets

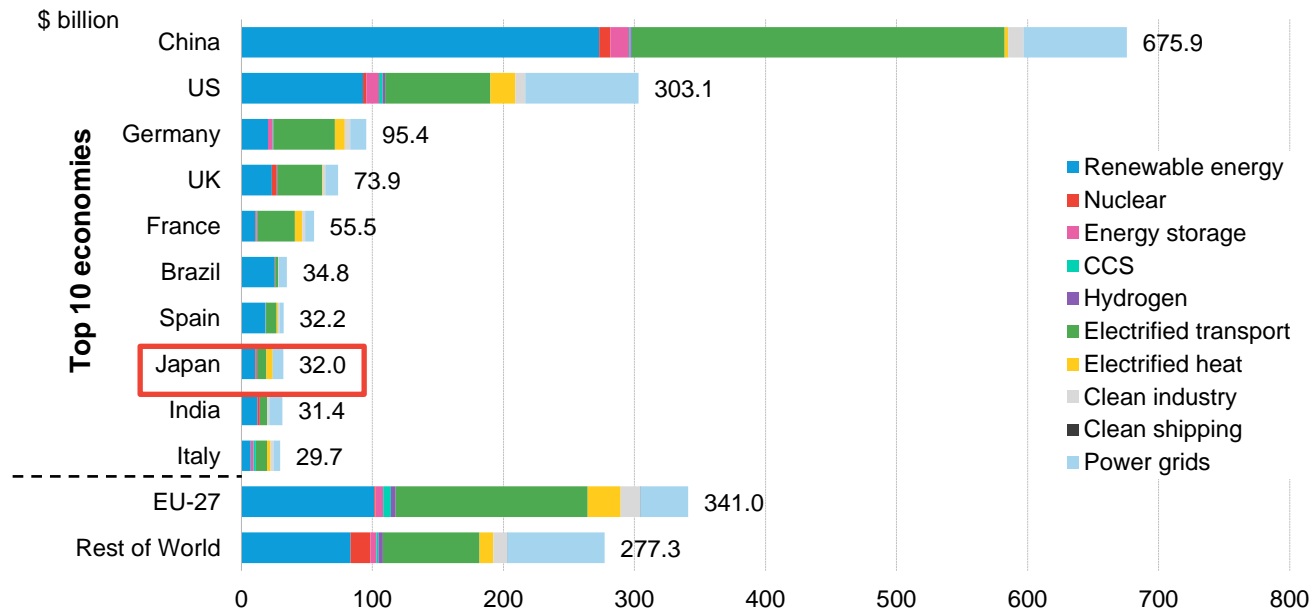
Gigawatts (annual builds)



Source: Note: Japan's 2030 solar capacity target converted from alternating current (103.5-117.6GW) to direct current (134.6-152.9GW). Solar capacity in DC.

Japan lags its peers on energy transition investment

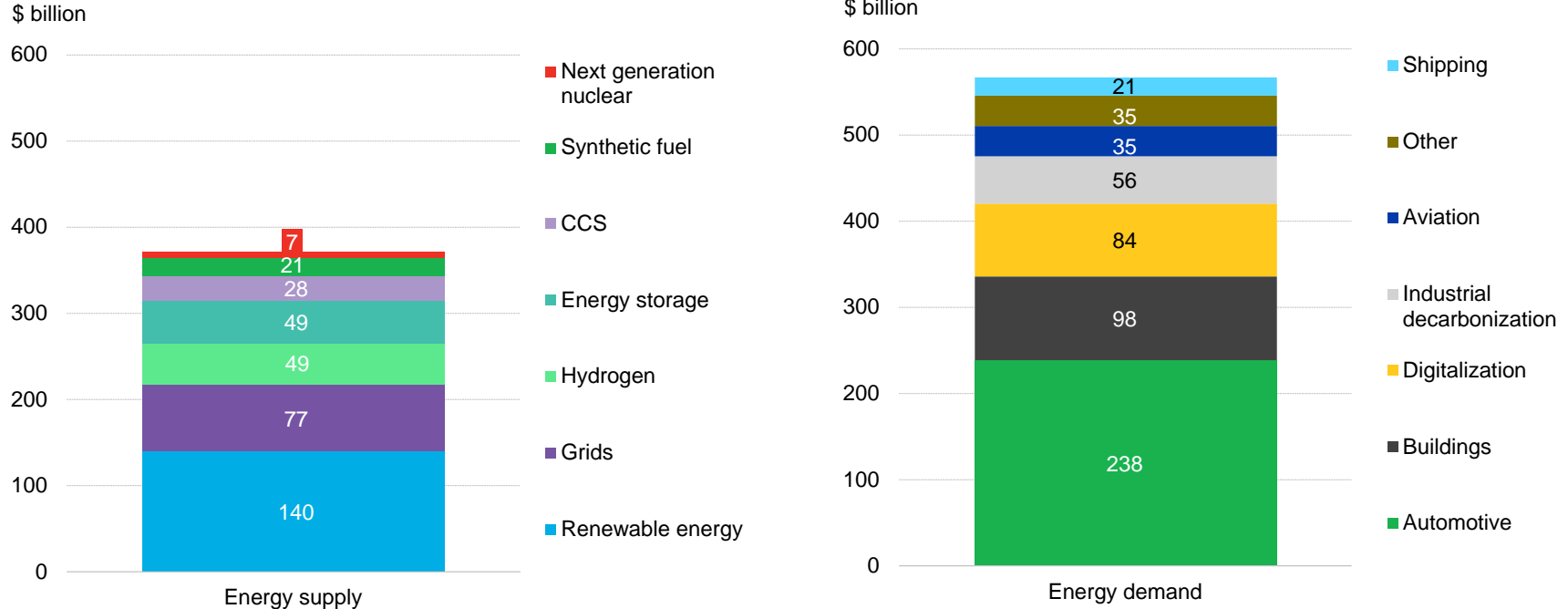
Top 10 economies for 2023 energy transition investment, plus the EU-27 and rest of the world



Source: BloombergNEF. Note: EU-27 bar also includes the EU member states shown. Rest of World is global investment excluding the EU and individual economies in the chart. A small amount of estimated spend for EU countries may be included in Rest of World. CCS refers to carbon capture and storage.

The government's proposed net-zero investment plan is a good start, but immediate policy action is need to increase investment

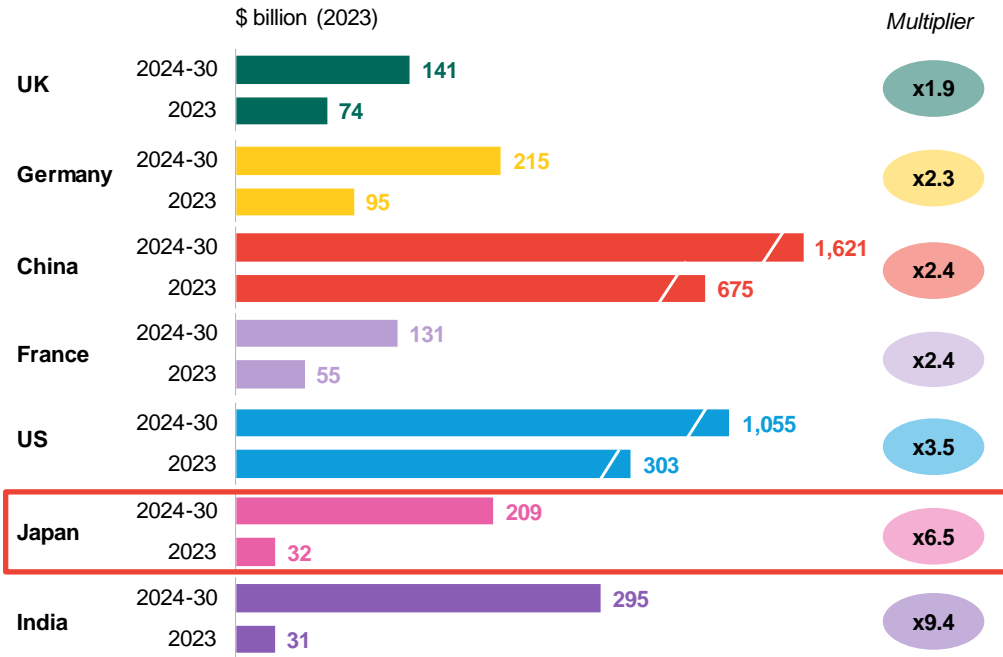
Japanese government's proposed net-zero investment plan, 2023-2033



Source: Japan Cabinet Secretariat. Note: 'Other' includes bio-based products and recycling

Japan will need to increase annual energy transition investment by more than 6x within this decade

Comparison: 2023 energy transition investment versus required annualized levels in NEO 2022 Net Zero Scenario, by economy



Source: BloombergNEF. Note: Excludes investment in fossil-fuel supply, clean shipping, commercial and fuel-cell vehicles. The multiplier shows the multiplication factor required for the 2023 investment levels to match the average annual investment needs across 2024 to 2030 to align for net zero. Mainland China and US figures are not to scale.

Policy recommendations to increase clean power supply and electrification in Japan

- Improve transparency of grid connection processes such as timelines and costs
- Shorten and simplify permitting processes for renewable power projects
- Organize local government-led reverse auctions for solar with guaranteed access to land and grid connection
- Host more frequent and larger government-led offshore wind tenders
- Increase policy support for geothermal by introducing a municipality-led centralized auction system and supporting domestic drilling companies
- Increase investment in the power grid to accommodate more renewables
- Implement a more stringent carbon pricing mechanism
- Set phaseout targets for unabated fossil fuel power plants
- Set phaseout target for fossil fueled vehicles to boost electrification of mobility
- Shift Japan's generous hydrogen subsidies to focus on critical clean hydrogen applications

Source: BloombergNEF

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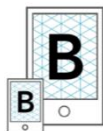
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