



Securing investments in low carbon power generation sources

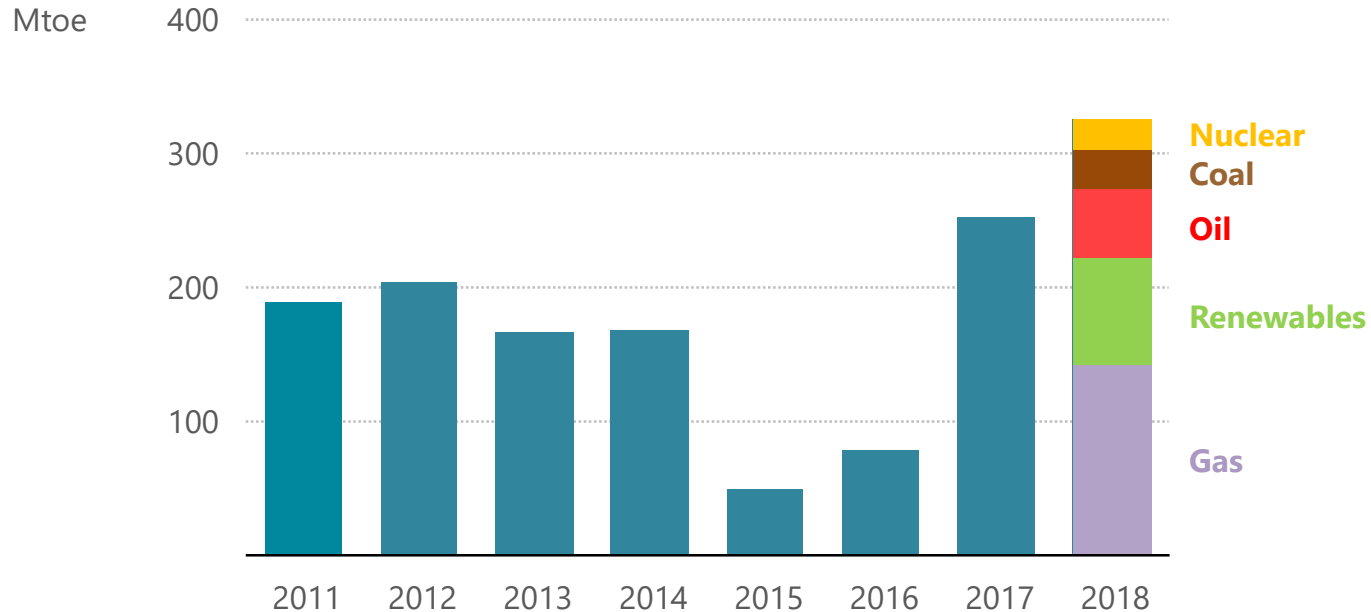
Keisuke Sadamori

13th June 2019 Canon Institute for Global Studies



2018 – Robust energy demand led by fossil fuels...

Annual change in global primary energy demand, 2011-18

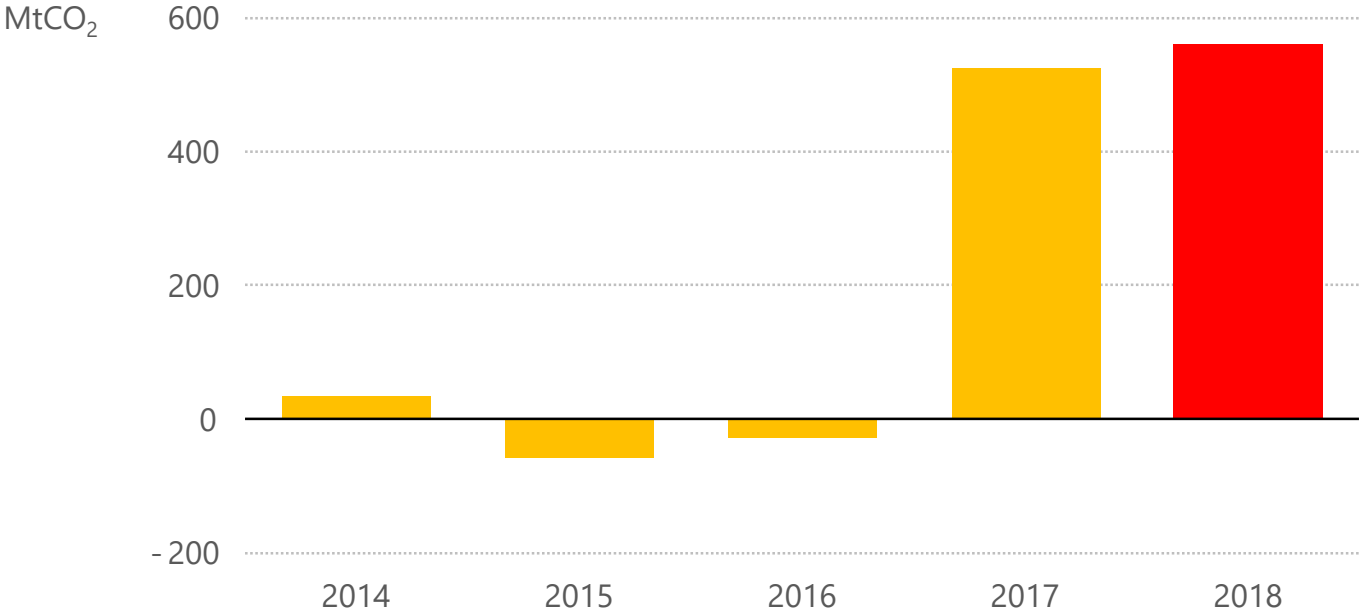


Global energy demand grew by 2.3% in 2018, the fastest pace this decade, driven by a robust global economy, unseasonal weather, and moderate energy prices

... as energy-related CO₂ emissions hit a record high...



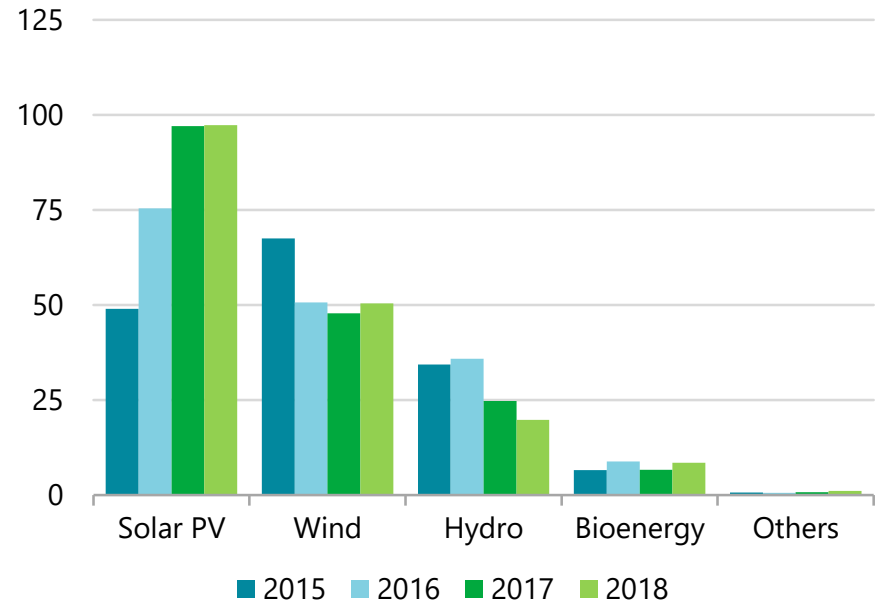
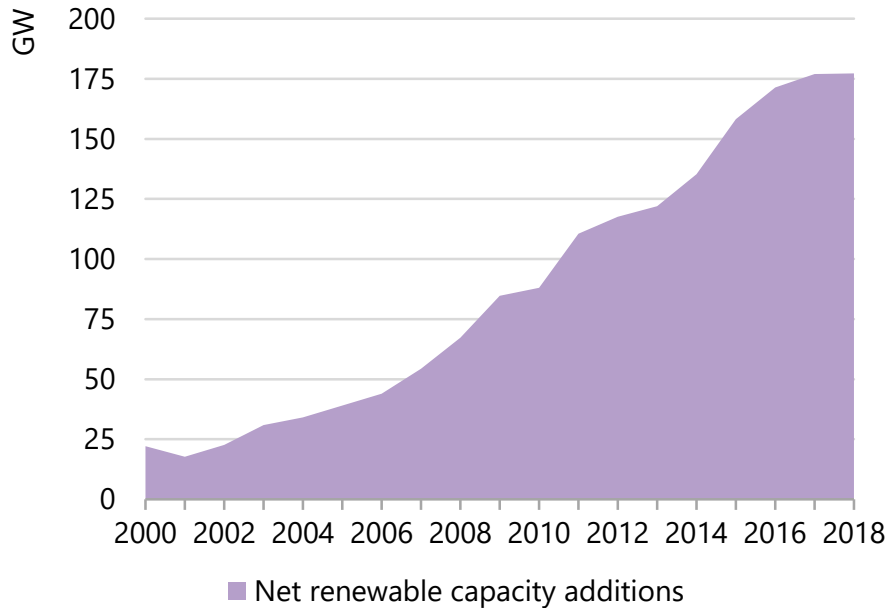
Annual change in global energy-related CO₂ emissions



Higher demand for fossil fuels drove up global CO₂ emissions for a second year in a row in 2018

... and renewable capacity growth stalled

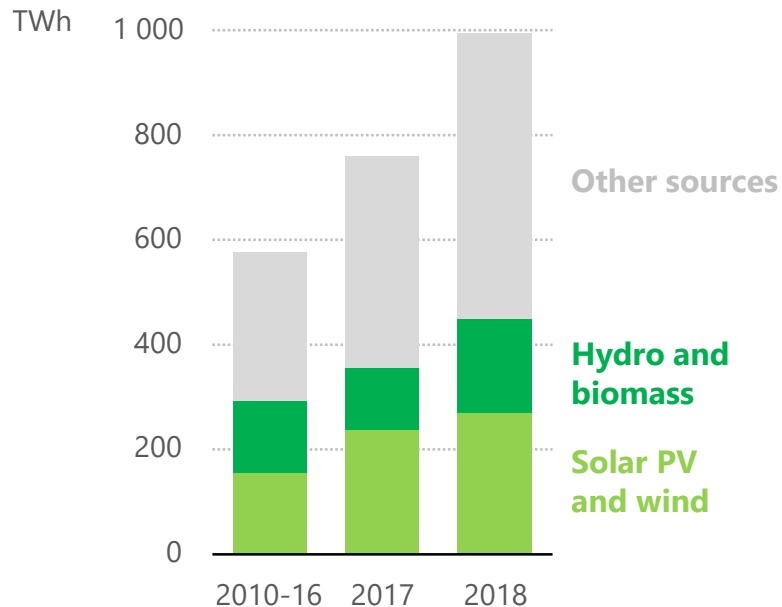
Global net renewable capacity additions



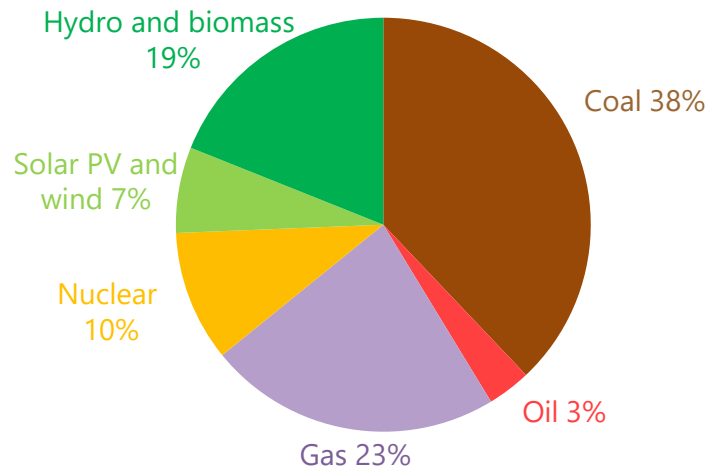
After two decades of strong expansion, renewable capacity growth stalled in 2018, raising concerns about meeting long-term climate goals

Electricity growth outpaces renewables acceleration...

Average annual change in electricity generation, 2010-18



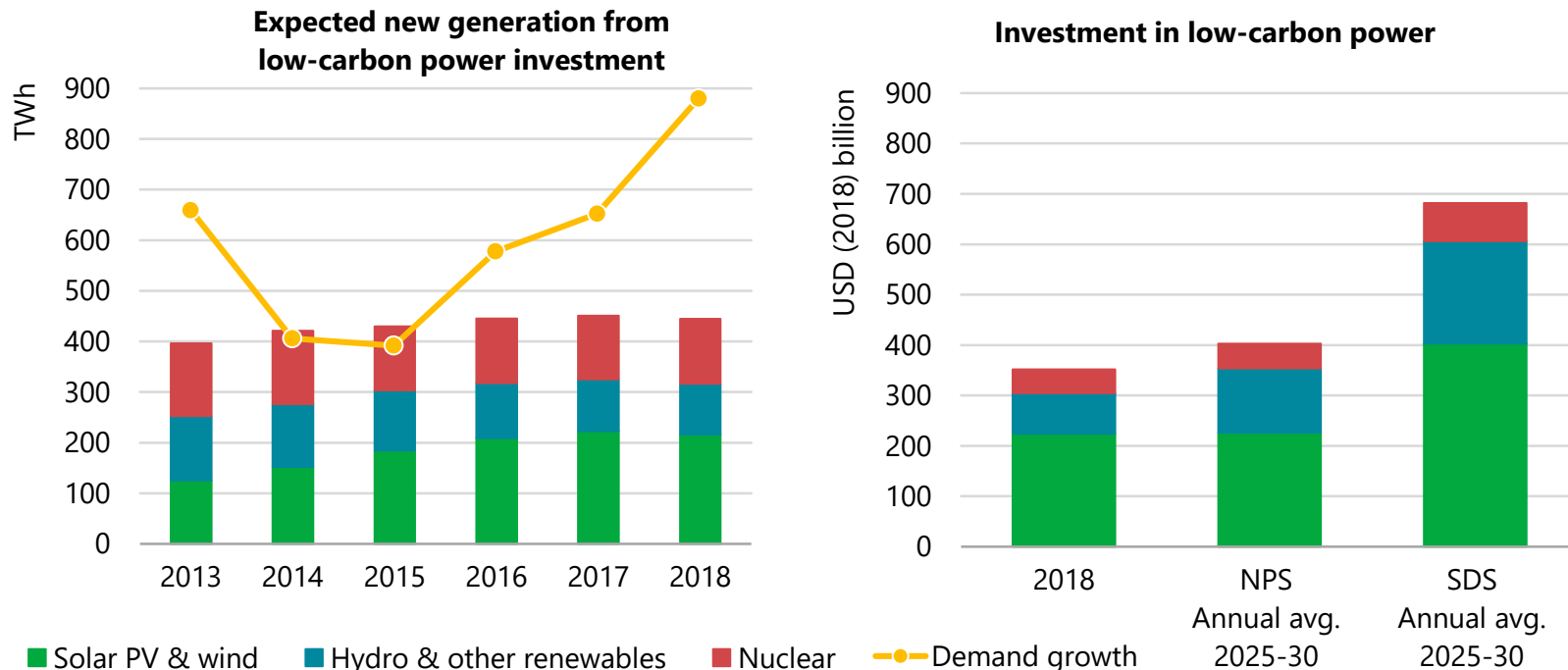
Electricity generation mix in 2018



Renewables accounted for the largest growth in electricity demand, led by growth in solar, wind and hydro. However, this growth was not fast enough to bend power sector emissions.

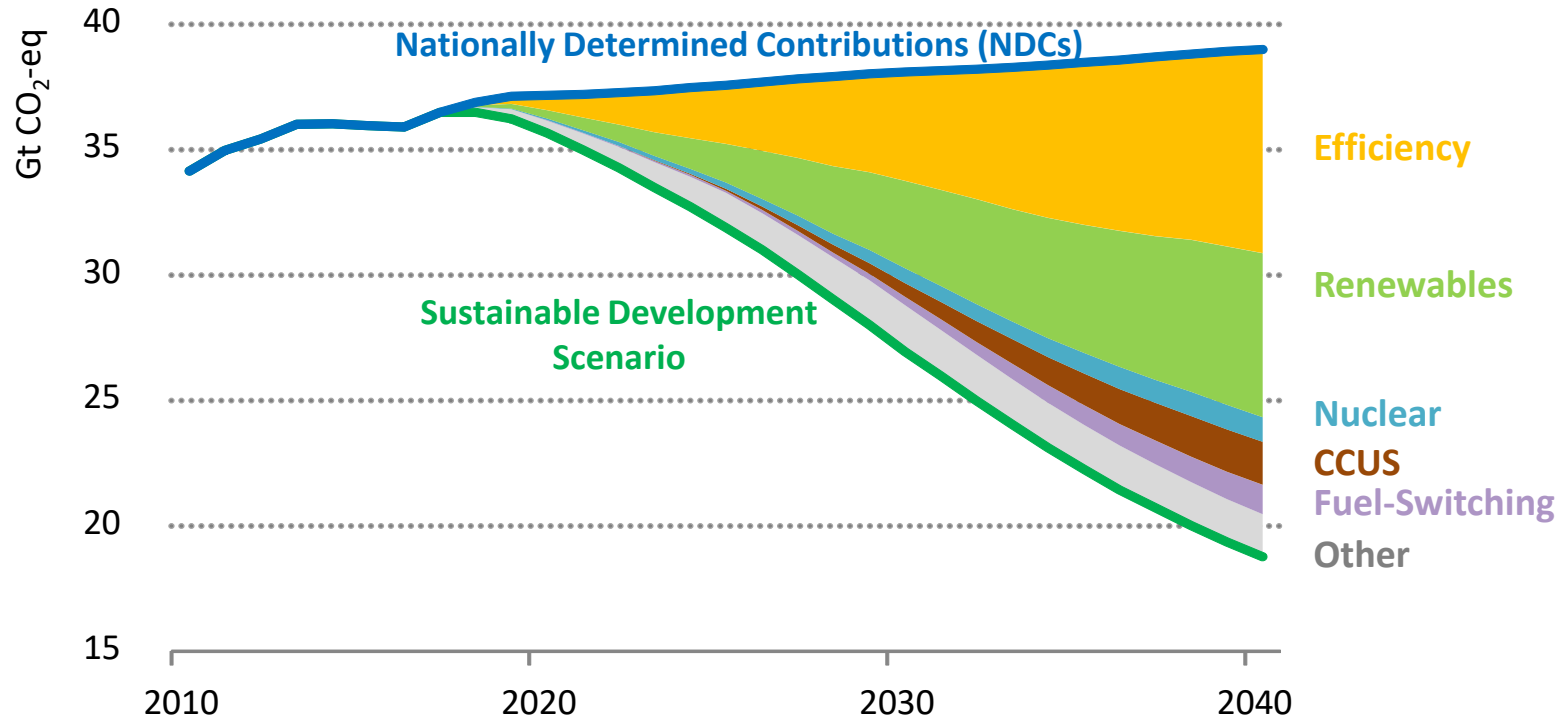
... and low-carbon investment is not keeping pace with power demand...

Expected generation from low-carbon power investments and annual investment needs by scenario



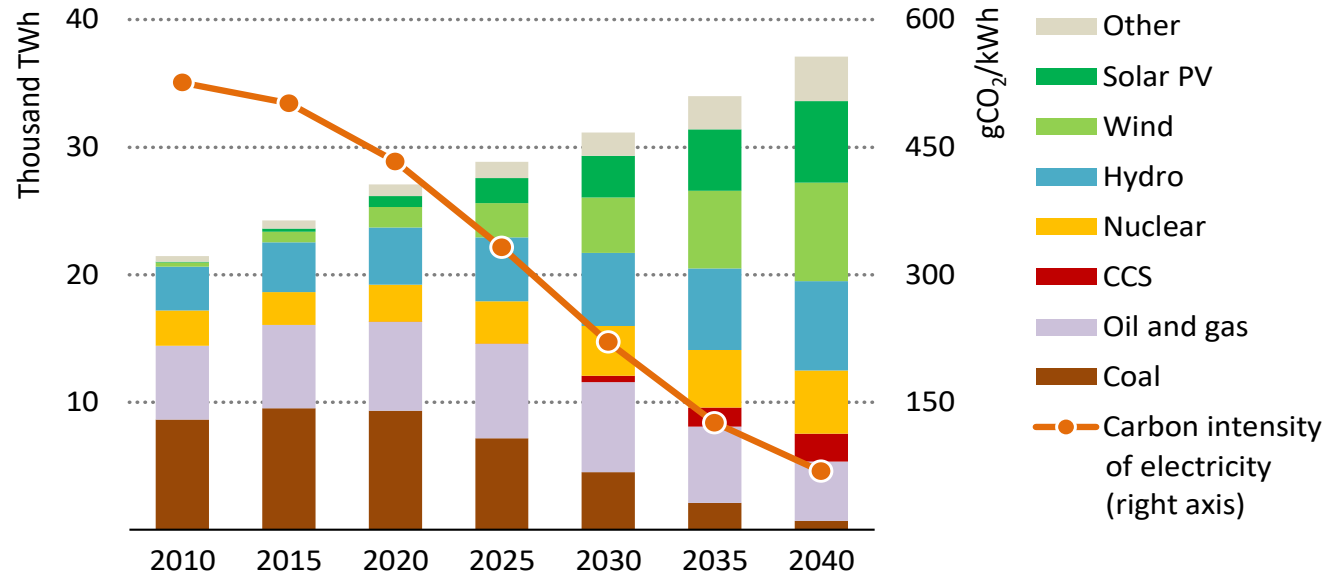
The output expected from investment in renewable & nuclear power levelled off in 2018 while demand growth soared. To meet sustainability goals, spending on renewable power would need to double.

Transitioning towards a cleaner & more secure energy system



There is no single solution to our energy challenges: while efficiency & renewables account for the bulk of abatement, many of other technologies including nuclear, CCUS, hydrogen & storage are also required

Power sector is a key battlefield for global economy's decarbonisation



Source: World Energy Outlook 2018

All low carbon technologies including renewable, nuclear and hydrogen need to be fully mobilized

Power

- Renewable power
 - Solar PV
 - Onshore wind
 - Offshore wind
 - Hydropower
 - Bioenergy
 - Geothermal
 - Concentrating solar power
 - Ocean
- Nuclear power
- Natural gas-fired power
- Coal-fired power
- CCUS in power

Industry

- Chemicals
- Iron and steel
- Cement
- Pulp and paper
- Aluminium
- CCUS in industry & transformation

Transport

- Electric vehicles
- Fuel economy
- Trucks & buses
- Transport biofuels
- Aviation
- International shipping
- Rail

Buildings

- Building envelopes
- Heating
- Heat pumps
- Cooling
- Lighting
- Appliances & equipment
- Data centres and networks

Other supply

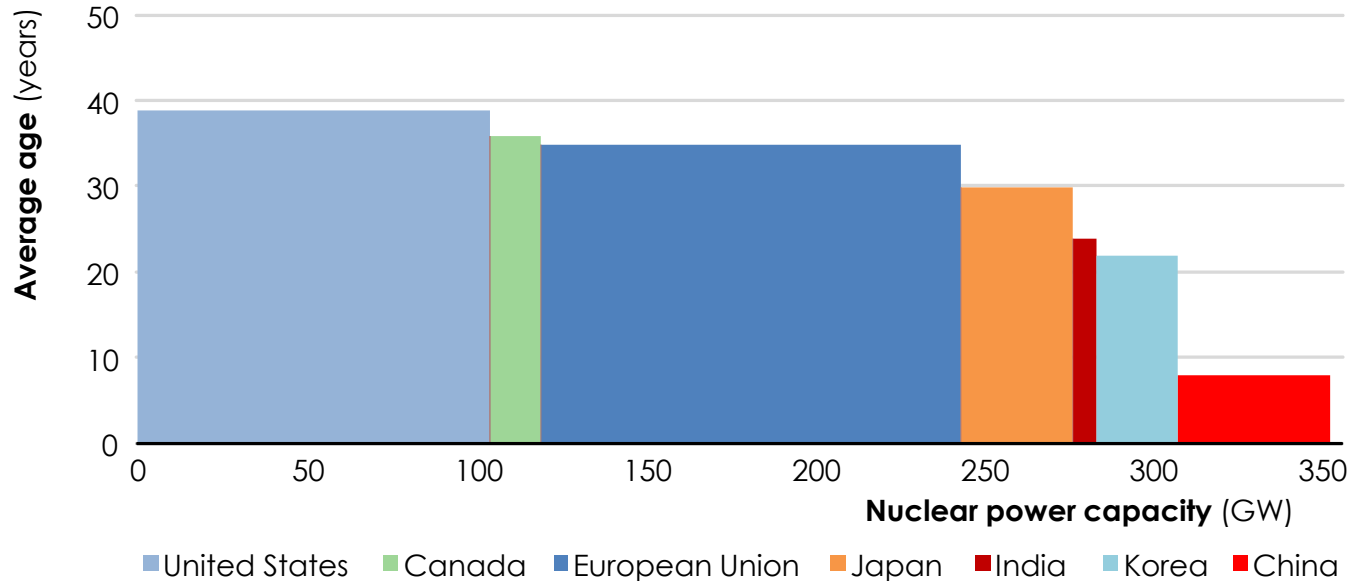
- Methane emissions from oil and gas
- Flaring emissions

Energy integration

- Energy storage
- Hydrogen
- Smart grids
- Demand response

The nuclear fleet is ageing

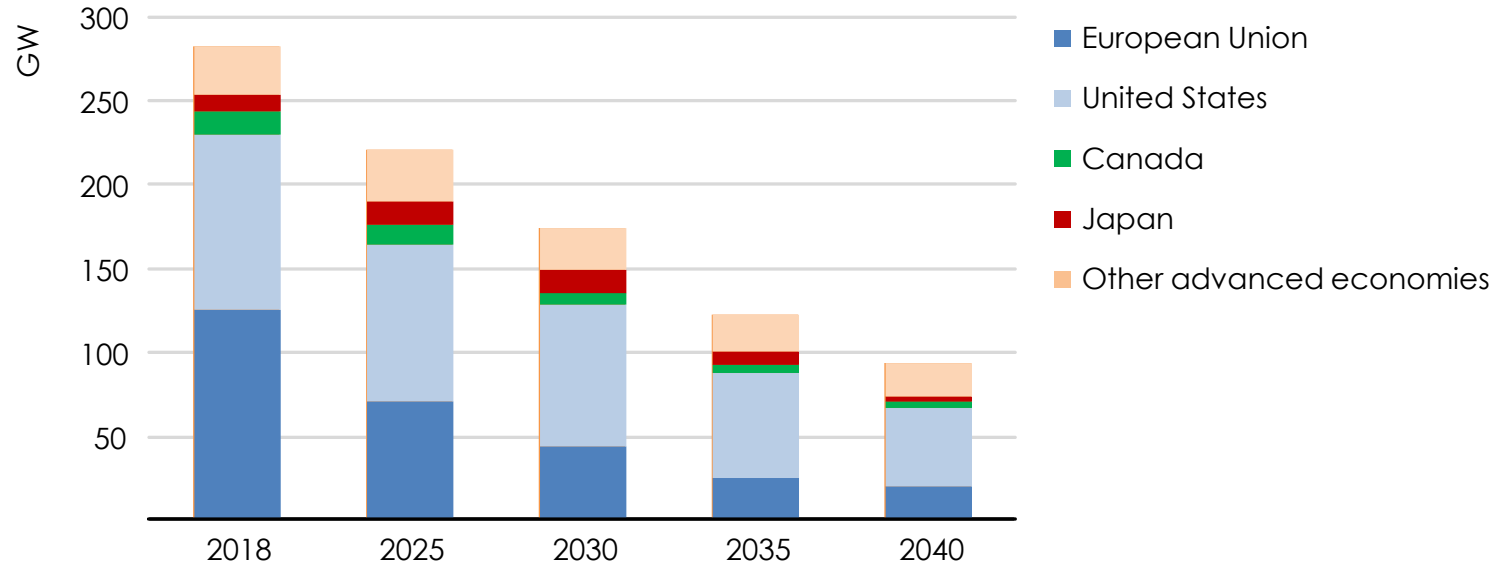
Age profile of nuclear power capacity in selected regions



Many nuclear power plants in advanced economies are facing retirement as they approach the end of their original 40-year design lifetime

Nuclear could face a steep decline in advanced economies

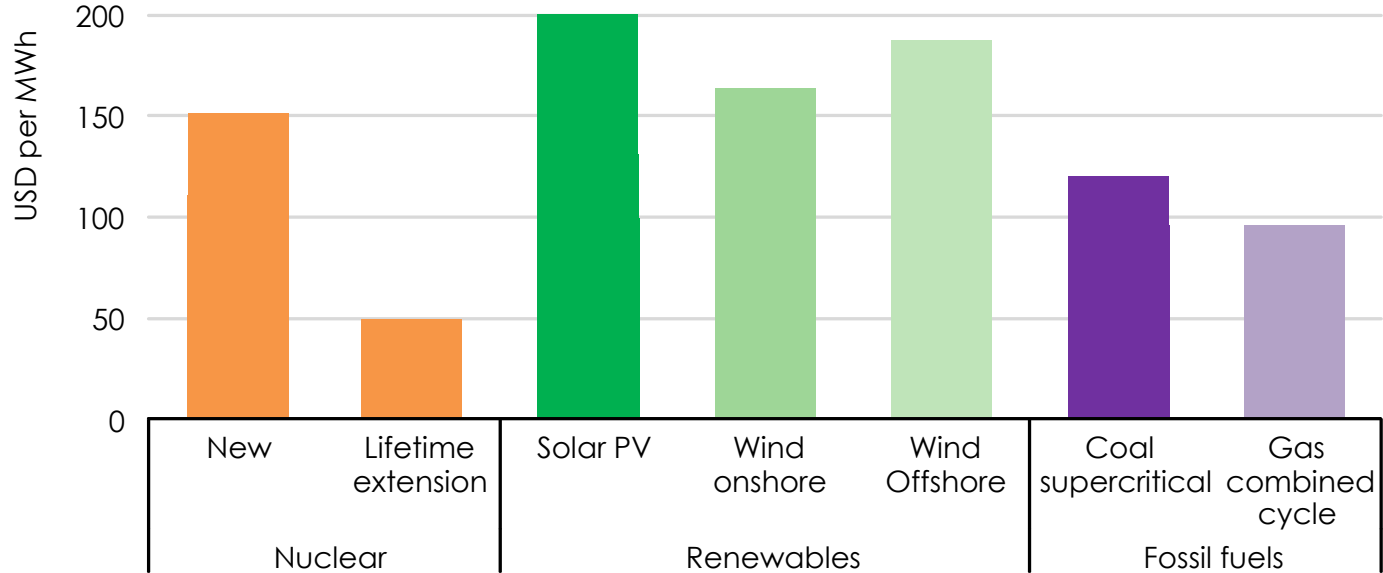
Nuclear power capacity (operational) in advanced economies in the *Nuclear Fade Case*, 2018-2040



Without additional lifetime extensions or new projects, nuclear capacity in advanced economies would decline by two-thirds by 2040

Nuclear lifetime extensions provide cheap clean electricity

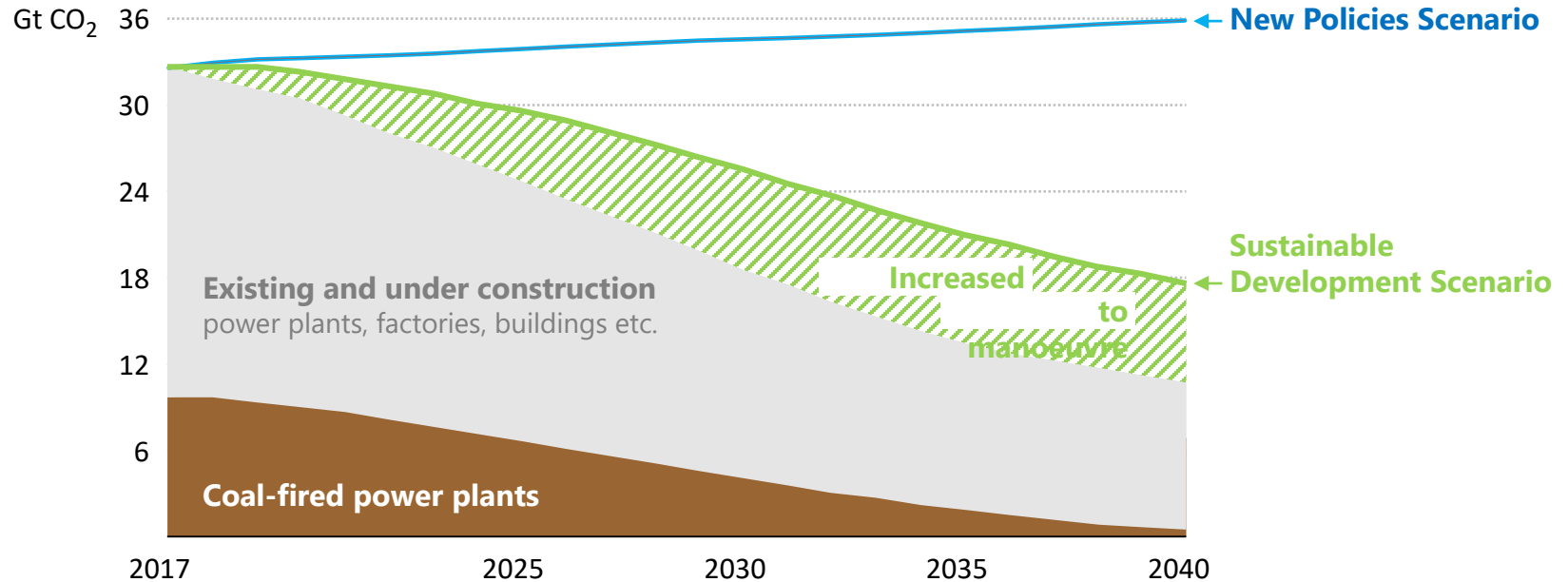
Levelised cost of electricity (LCOE) in Japan by technology in 2018



Nuclear lifetime extensions are cost-competitive with new solar and wind, and provide a dispatchable source of clean electricity

Can we unlock a different energy future?

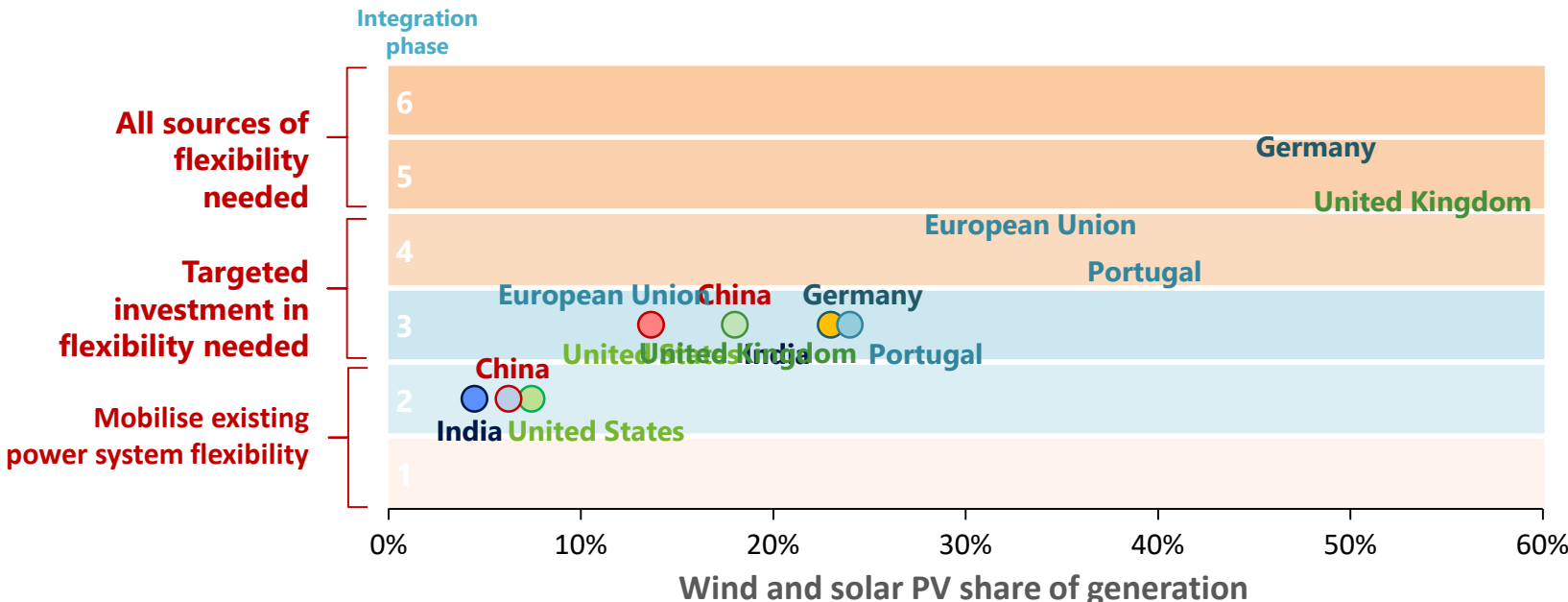
Global energy-related CO₂ emissions



Coal plants make up one-third of CO₂ emissions today and half are less than 15 years old; policies are needed to support CCUS, efficient operations and technology innovation

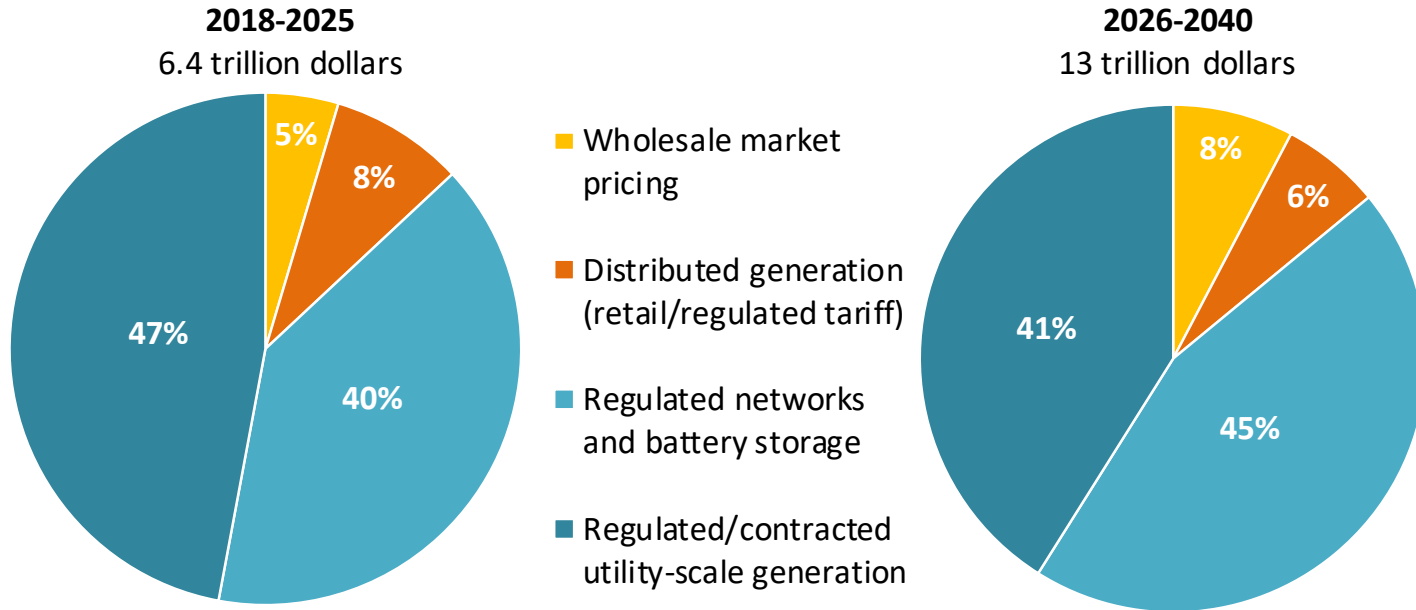
Flexibility: the cornerstone of tomorrow's power systems

Phases of integration with variable renewables share, 2030



Higher shares of variable renewables raise flexibility needs and call for reforms to deliver investment in power plants, grids & energy storage, and unlock demand-side response

The need for clear investment frameworks



Source: World Energy Outlook 2018

Power sector investment continues to be driven by regulated market frameworks, though falling costs for renewables help raise investment in competitive markets

- The current pace of investments in low-carbon power generation sources is far too slow to achieve the emission targets in Paris Agreement
- Governments should not be lulled into complacency by the current growth in wind and solar PV
- Governments should do their best to ensure diversity in generation sources in the decarbonized power generation fleet of the near future.
- Power market design should be improved so that remuneration to generators reflect their environmental and system security values
- Liberalised electricity markets requires additional measures to ensure investments in low carbon generation sources and flexibilities



www.iea.org

