# Nuclear Power in the World Energy Outlook

Peter Fraser,

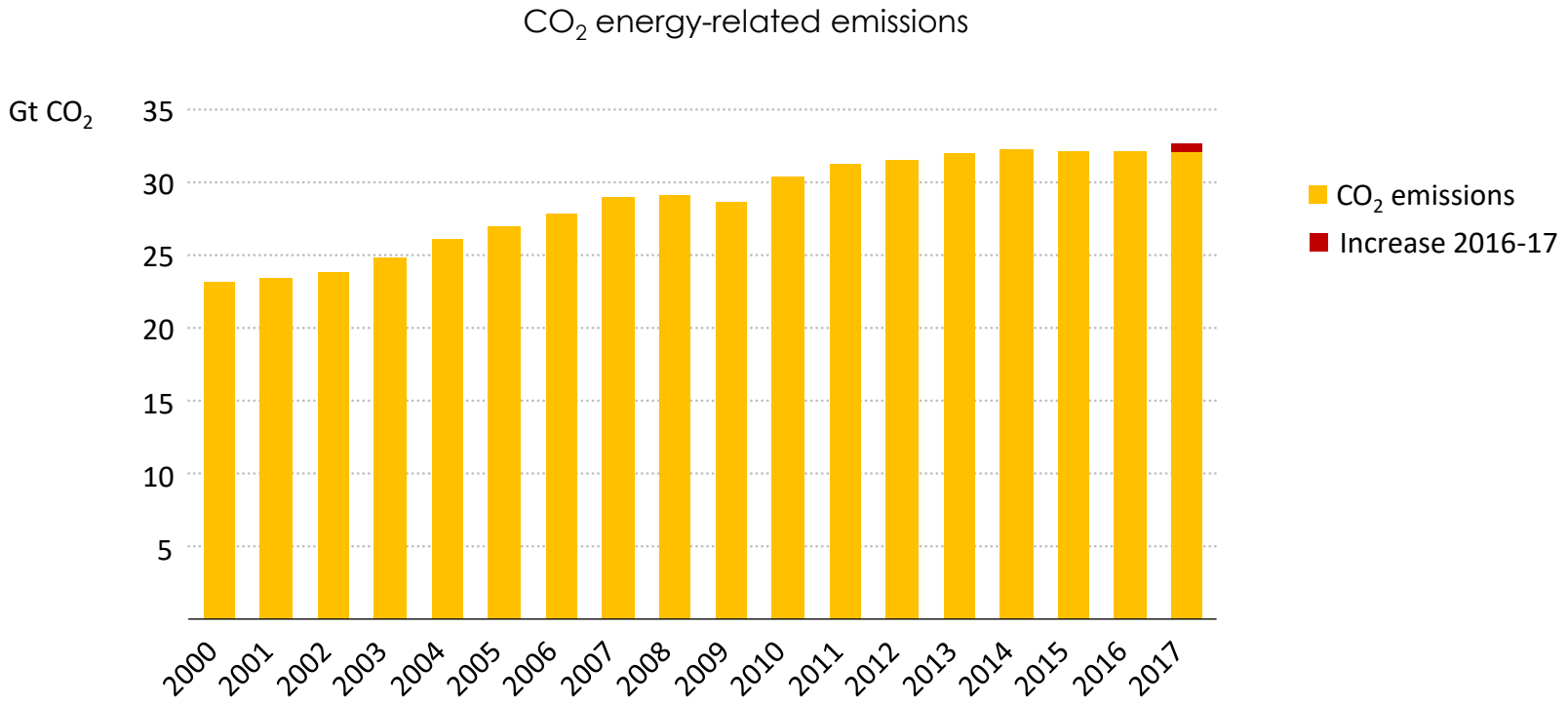
51st Annual JAIF Annual Conference

Tokyo, 9 April 2018

# Overview

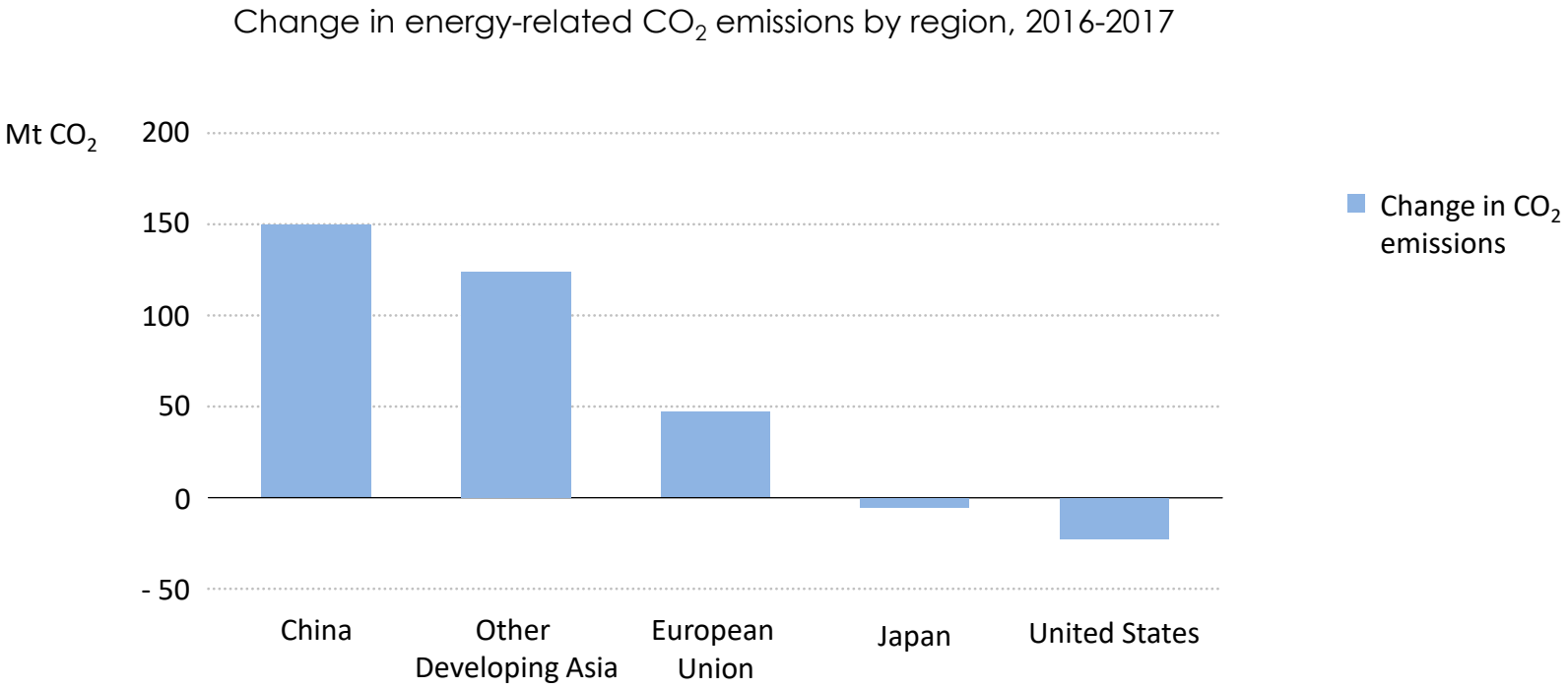
- Current trends in global carbon dioxide emissions
- Decarbonising the energy system through the electricity system – the World Energy Outlook's Sustainable Development Scenario
- How has the fall in renewables costs changed our outlook about the decarbonisation pathway?
- Where does new nuclear investment fit in the picture?
- How does the existing fleet of nuclear power plants affect how quickly we can decarbonise?

# After three years of plateau, global emissions increase again



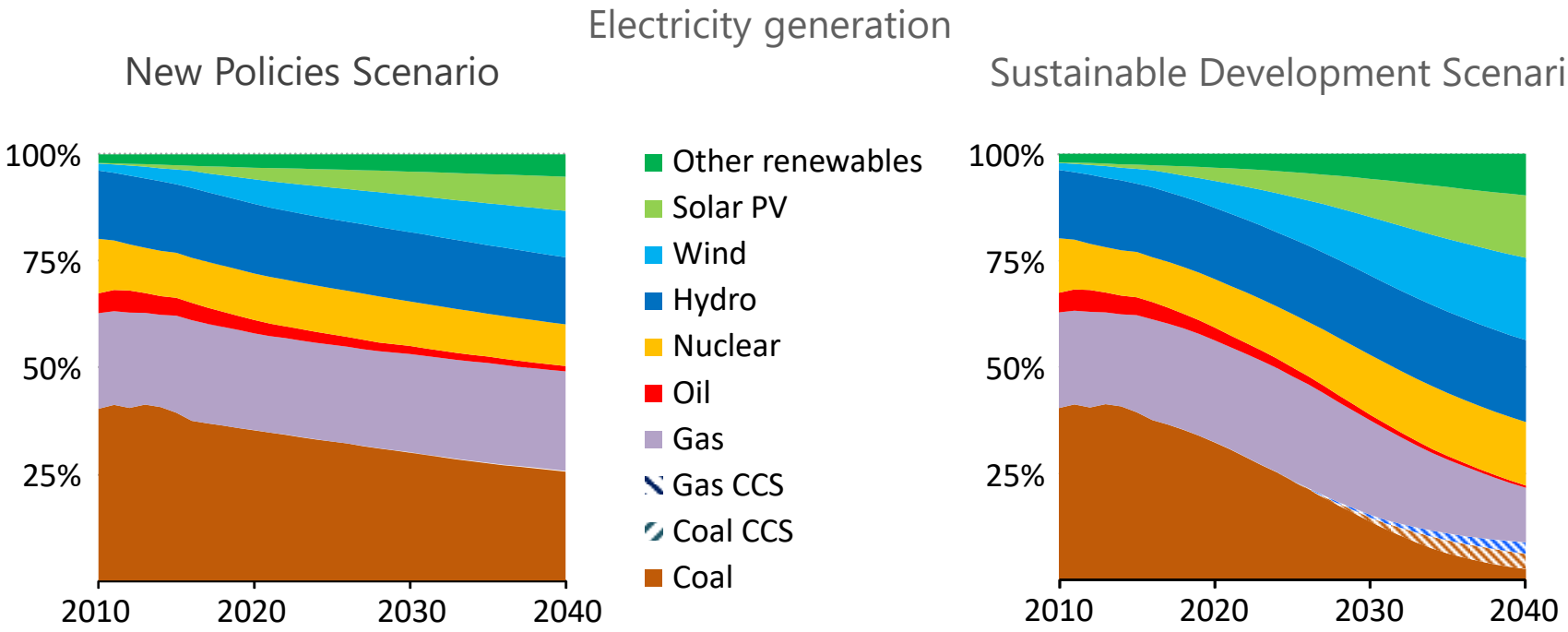

*IEA estimates show that global energy-related $CO_2$ emissions reached a historic high in 2017, telling us that current efforts to combat climate change are far from sufficient*

# Emissions growth was not universal




*Emissions increased in most major economies,*
*In Japan, renewables growth and nuclear restart exceeded demand growth, reducing generation from fossil fuels*

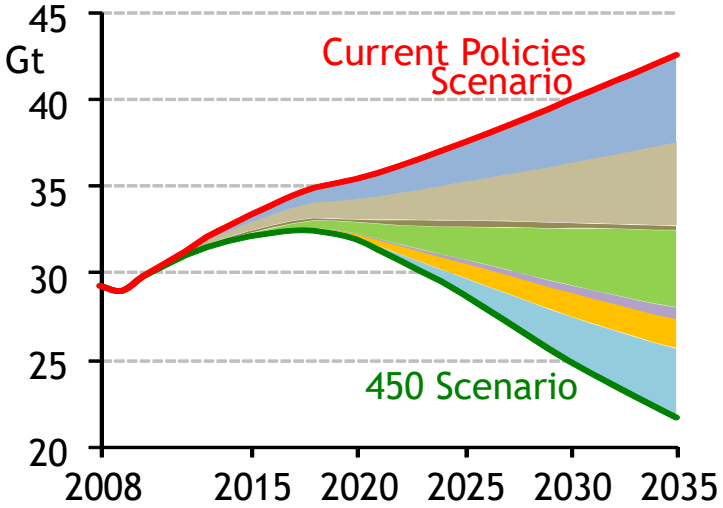
# Towards a low-carbon power sector




*Electricity generation in 2040 is all but decarbonised in the Sustainable Development Scenario, with renewables complemented by nuclear and CCS*

# In WEO 2010, strong reliance on efficiency, renewables, CCS, and nuclear to decarbonise power supply by 2035

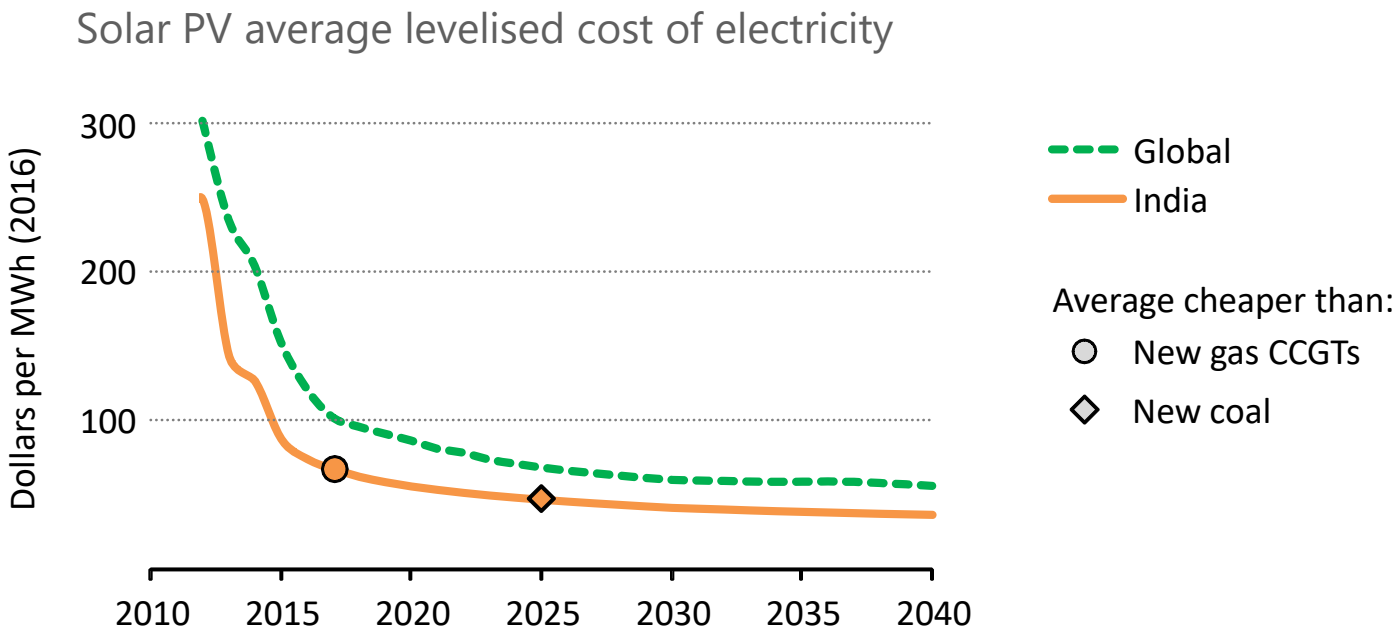
World energy-related $CO_2$ emissions savings in the 450 Scenario compared with the Current Policies Scenario, by measure




| | Abatement 2020 | 2030 | 2035 |
|---|---|---|---|
| Efficiency | 71% | 49% | 48% |
| *- End-use (direct)* | *34%* | *24%* | *24%* |
| *- End-use (indirect)* | *33%* | *23%* | *23%* |
| *- Power plants* | *3%* | *2%* | *1%* |
| Renewables | 18% | 21% | 21% |
| Biofuels | 1% | 3% | 3% |
| Nuclear | 7% | 9% | 8% |
| CCS | 2% | 17% | 19% |
| Total (Gt $CO_2$) | 3.5 | 15.1 | 20.9 |

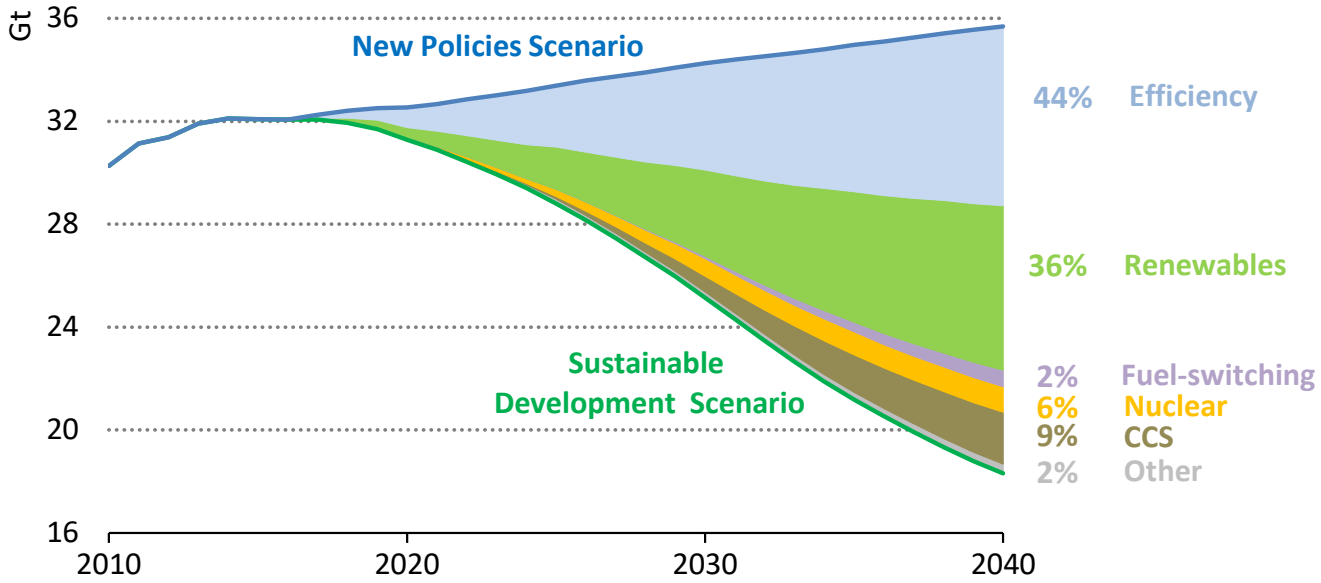
*Nuclear contribution was 8%*

# But renewables have become much cheaper …



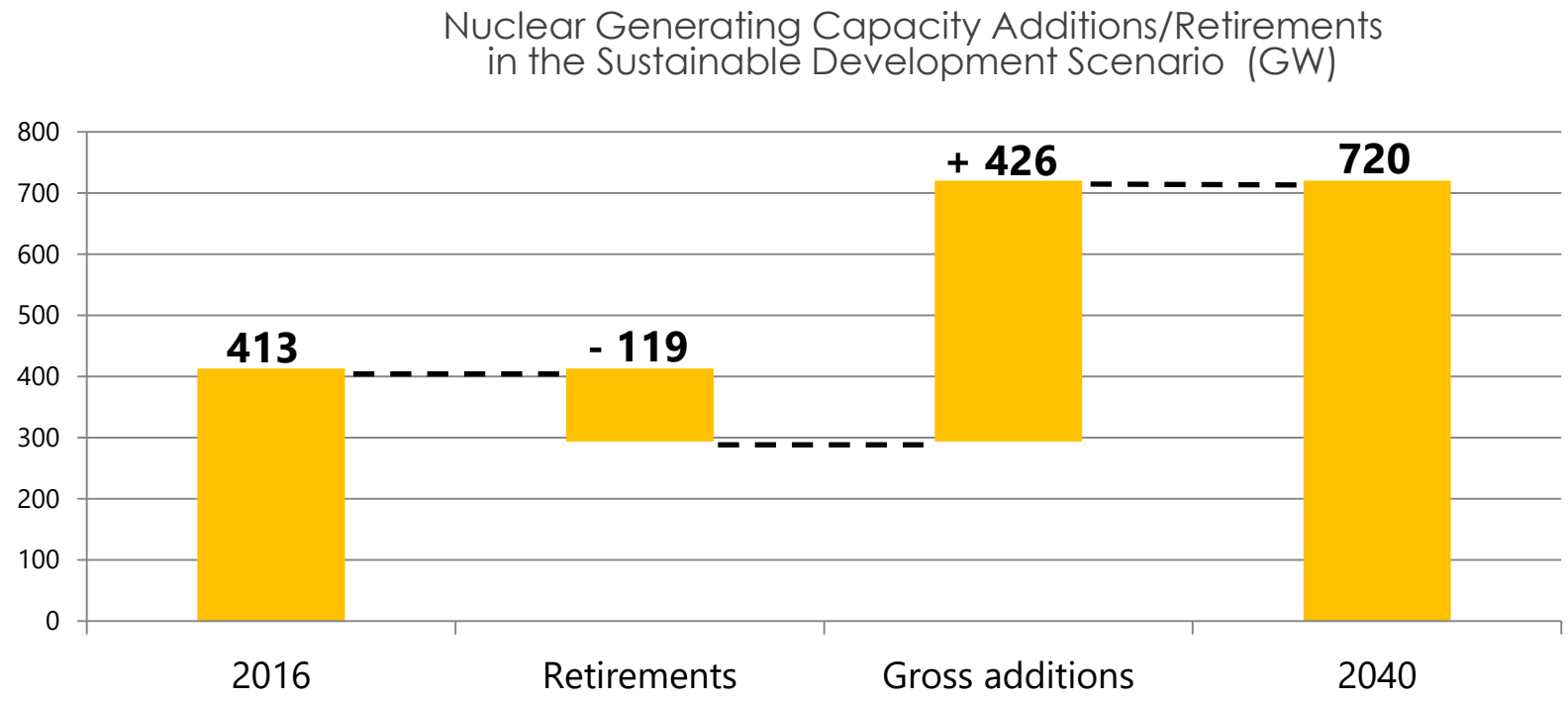

*The falling costs of clean energy technologies, including solar PV, wind power and batteries, set the stage to reshape electricity supply*

# …increasing their role in decarbonisation scenarios



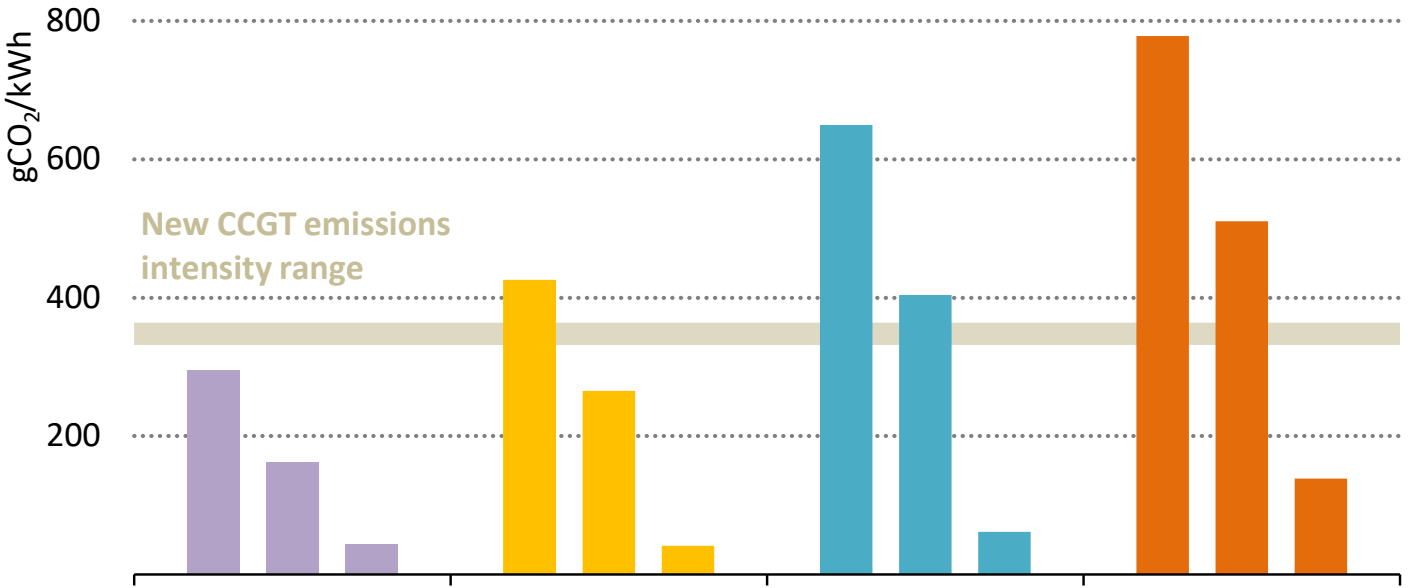

*Nuclear accounts for 6% of the incremental reductions in the SDS*

# Significant nuclear investment in the SDS




*426 GW of nuclear additions and $1.7 trillion of investment (including life extension)*

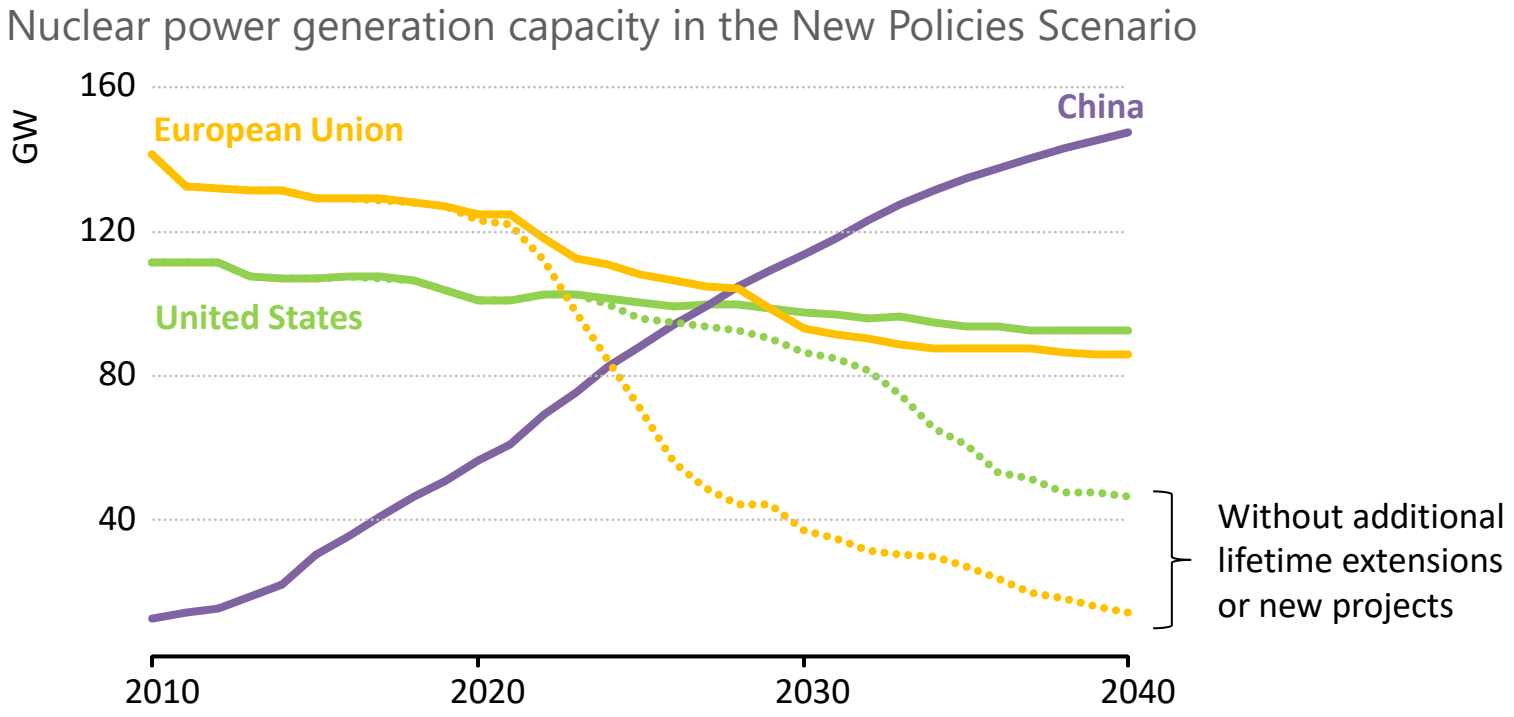
# Nuclear's contribution varies by region




**Nuclear Share**: 23 22 24 | 20 19 18 | 4 10 17 | 3 10 11

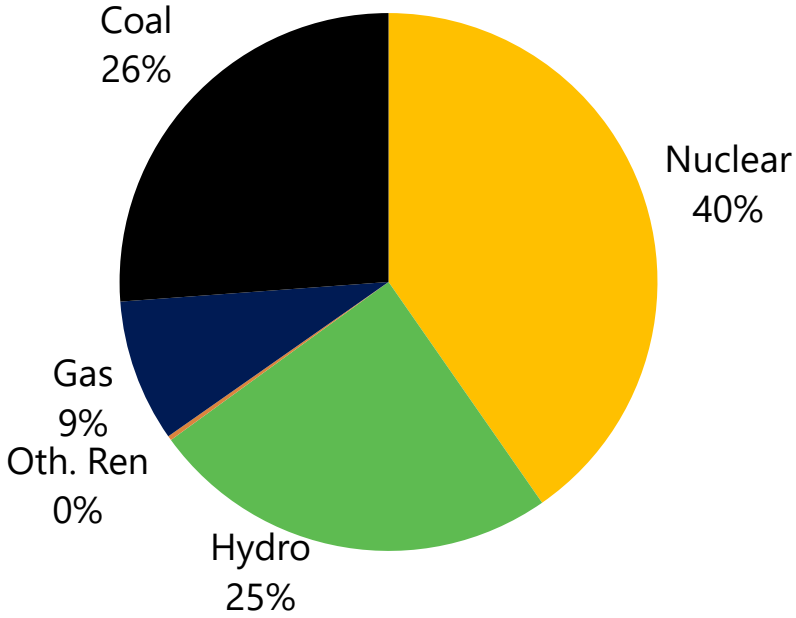
*Power sector emissions intensity is a key measure of progress*

# How long will existing plants last?

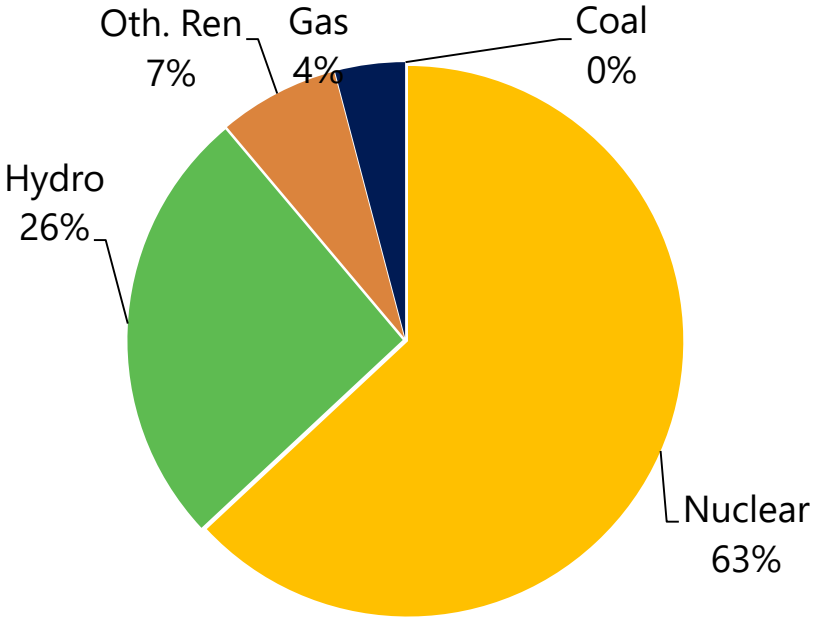



*Any region where nuclear declines quickly would have a steeper path to decarbonisation*

# Is there an opportunity to decarbonise more quickly?




Emissions intensity (2000): 280 g/kWh




Emissions intensity (2017): ~20* g/kWh

*Ontario reinvested in nuclear power, gas and renewables then closed its coal plants – leading to a low carbon power system*

* Based on preliminary data

# Summary

- Global energy-related carbon dioxide emissions are increasing.
- The path to decarbonising the global energy system starts by decarbonising the power system.
- In the past, efficiency, nuclear and hydro power have lowered the carbon dioxide emissions of the power sector. In the future, efficiency, renewables, nuclear and CCS are all needed to move the global energy system down this path.
- The falling costs of clean energy technologies, including solar PV, wind power and batteries, set the stage to reshape electricity supply.
- The remaining operating life of existing nuclear plants will affect how quickly those power systems can decarbonise.


www.iea.org

IEA