



# Achieving net zero electricity sectors in G7 members

Laura Cozzi, Chief Energy Modeller, IEA

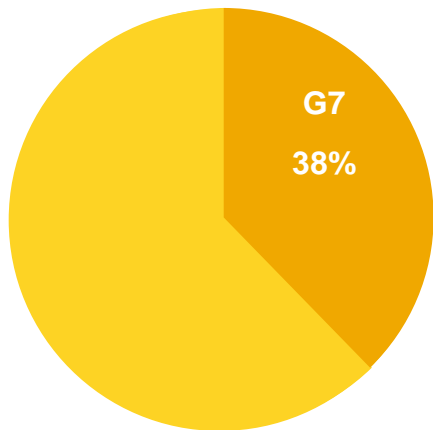
Brent Wanner, Head of WEO Power Sector Unit, IEA

Paris, 20 October 2021

# The G7 can drive action towards net zero emissions

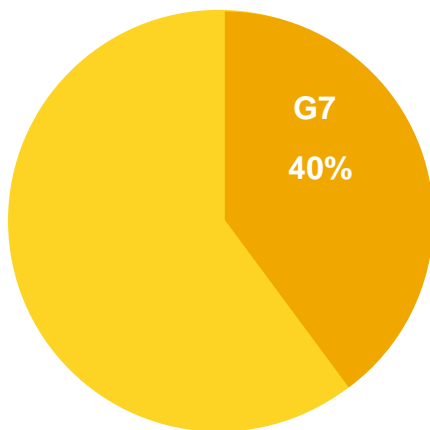
Energy-related emissions  
(1990-2020)

878 Gt CO<sub>2</sub>



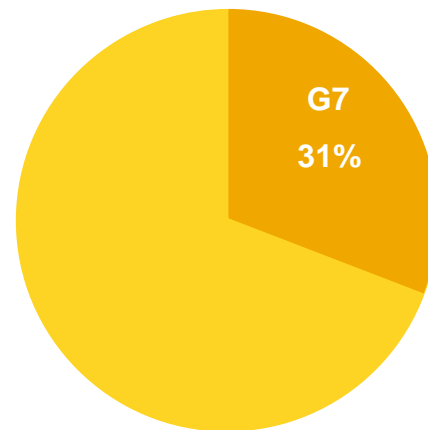
Electricity sector emissions  
(1990-2020)

301 Gt CO<sub>2</sub>



Investment in low emissions  
electricity sources in 2020

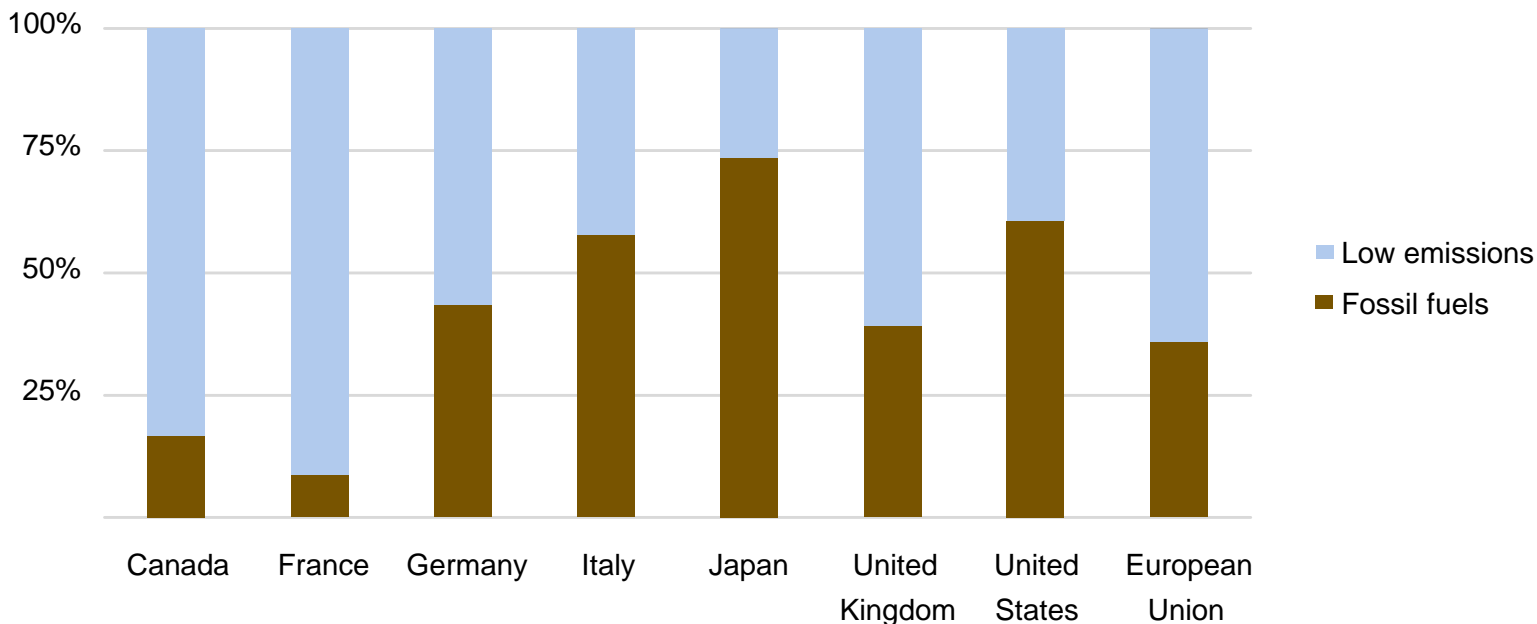
USD 400 billion



**The G7 has an opportunity to be a driving force to accelerate clean energy transitions, making domestic gains and catalysing global action by advancing technologies and accelerating cost reductions**

# G7 members start from different places

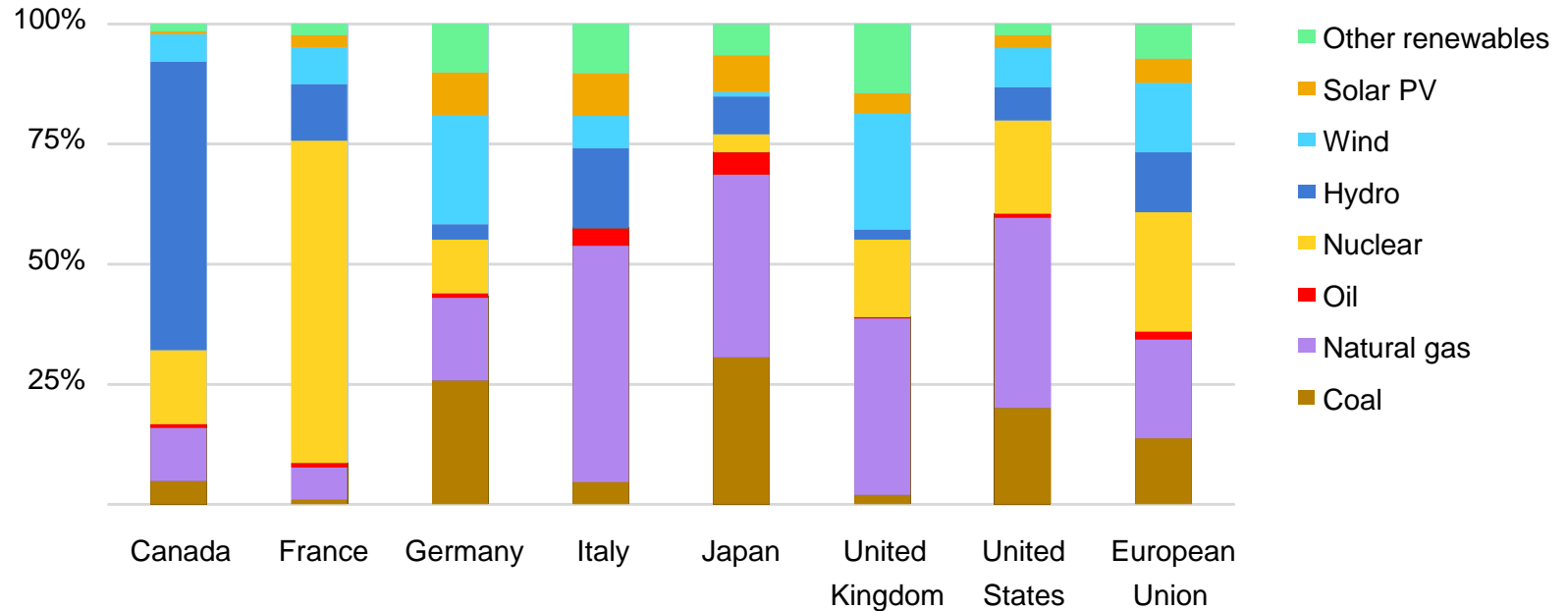
Share of electricity generation by technology in 2020



**All G7 members have already seen the peak of coal-fired generation and electricity sector emissions by 2007, but each has its own unique electricity mix, available resources and technology preferences**

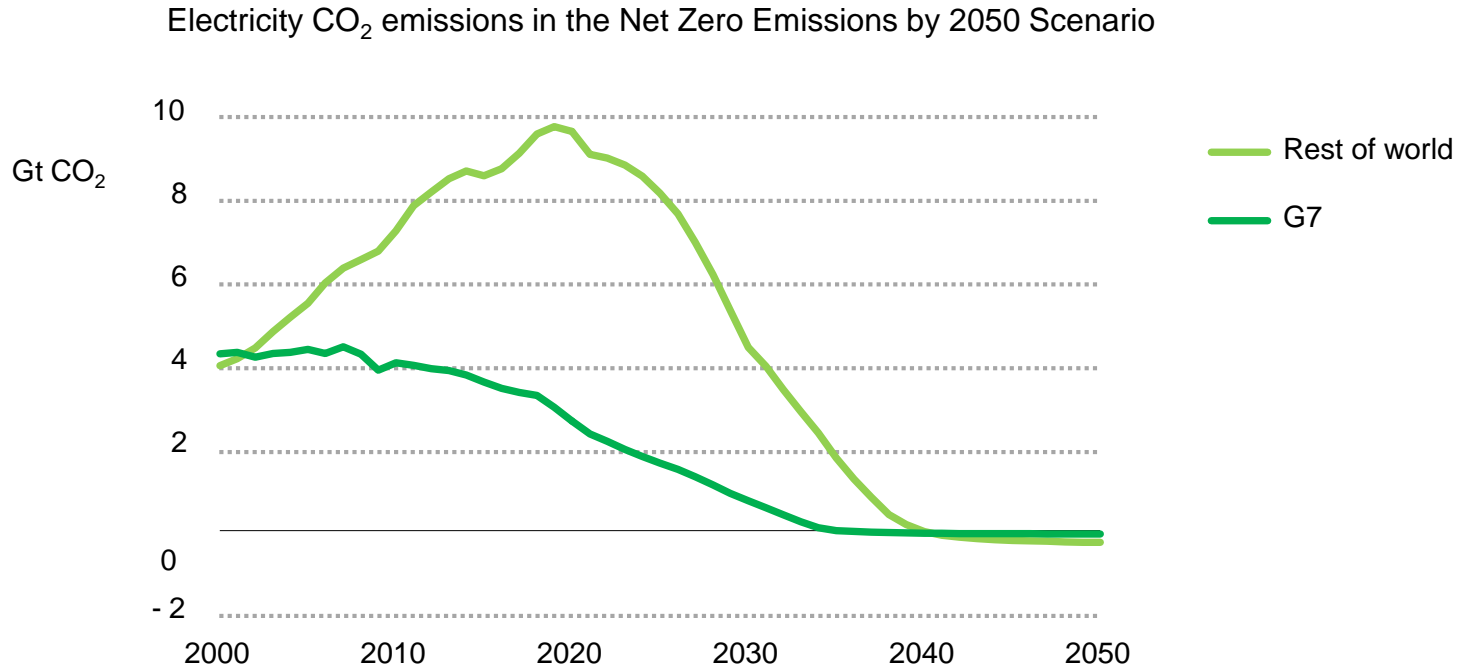
# G7 members start from different places

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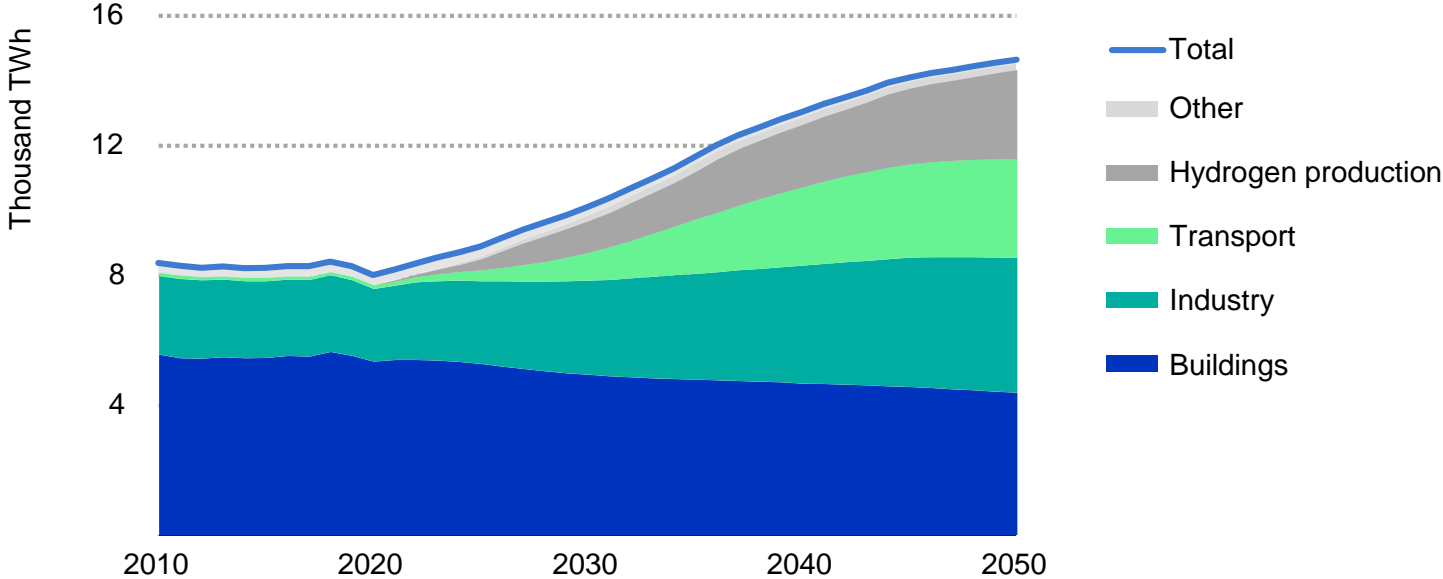
# The G7 can lead by example to reach net zero electricity



**G7 electricity emissions have been falling, mainly due to the switch from coal to natural gas and rising renewables, though the pace of reductions needs to accelerate to reach net zero by 2035**

# Electrification drives electricity demand growth

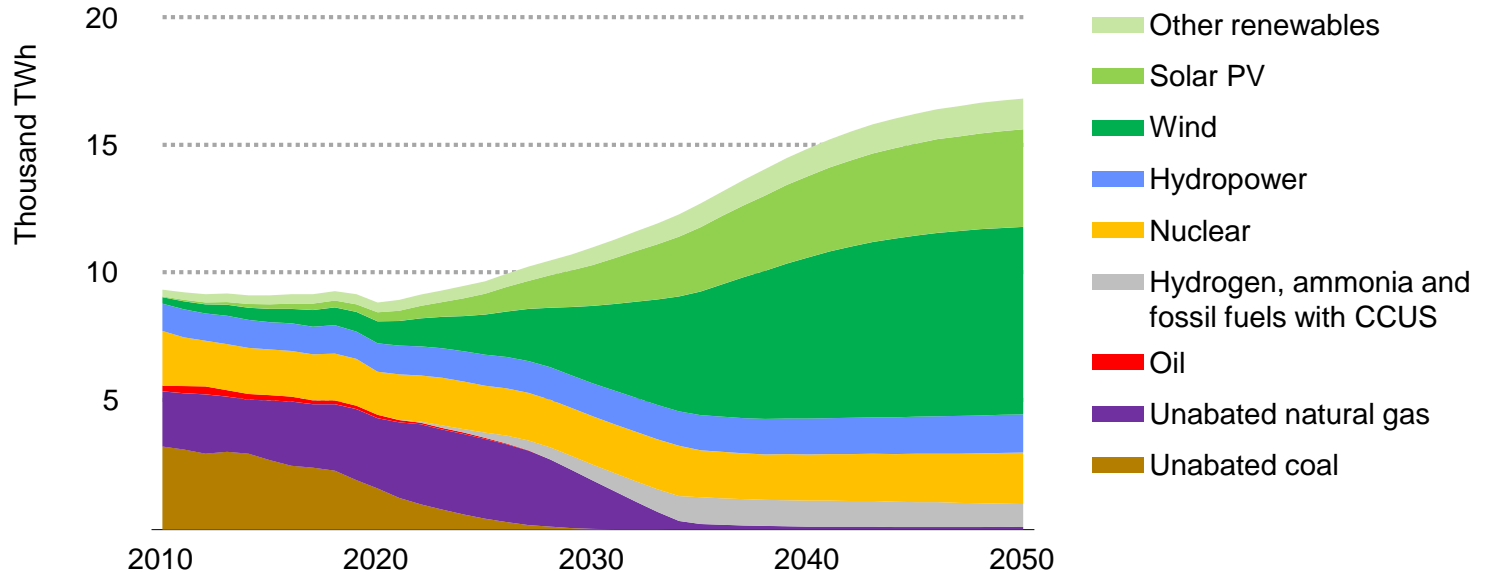
G7 electricity demand by sector in the Net Zero Emissions by 2050 Scenario



**Electricity demand returns to growth on a path to net zero, raising the share in final consumption to 56% by 2050, driven by electrification of transport & industry and hydrogen production, moderated by energy efficiency**

# The electricity mix is re-imagined for net zero electricity

G7 electricity generation by technology in the Net Zero Emissions by 2050 Scenario



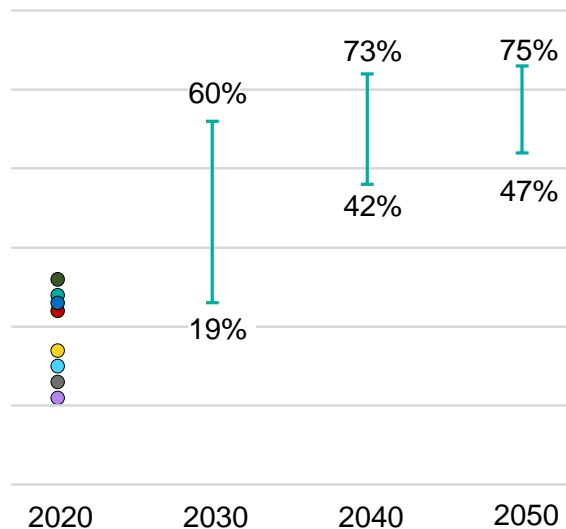
**Unabated fossil fuels fall from half of electricity supply while wind and solar PV rise from 14% in 2020 to 66% in 2050, re-shaping the nature of electricity supply and system operations**

# New challenges emerge for electricity security

G7 phases of integration in the Net Zero Emissions by 2050 Scenario

**2020 wind and solar PV share:**

- Germany 29%
- United Kingdom 29%
- European Union 20%
- Italy 15%
- United States 11%
- Japan 9%
- France 8%
- Canada 6%



I Range for G7 members

- Phase 6** Wind & solar PV lead to excess or deficit over months and seasons
- Phase 5** Frequent periods of wind & solar PV exceeding demand
- Phase 4** Require advanced technologies
- Phase 3** Flexibility investment in all measures
- Phase 2** Draw on existing flexibility
- Phase 1** System integration not a relevant issue

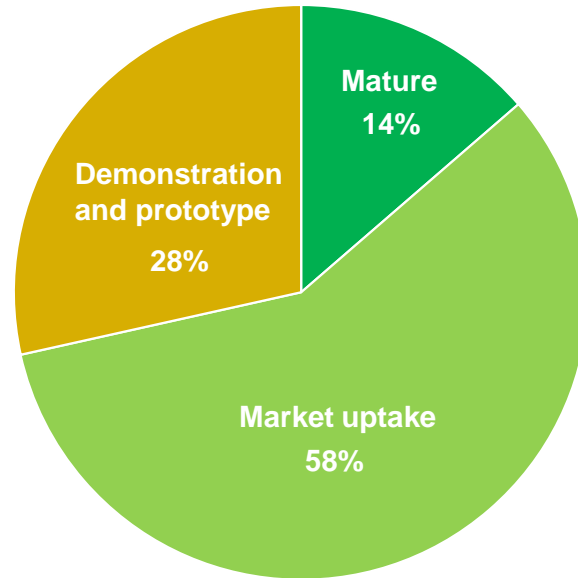
**G7 members have pushed forward on wind and solar PV, moving through the early phases of renewables integration, soon they move into new territory, tripling flexibility needs by 2050 & calling for new approaches to meet challenges**



# Innovation is essential to reaching a global net zero electricity

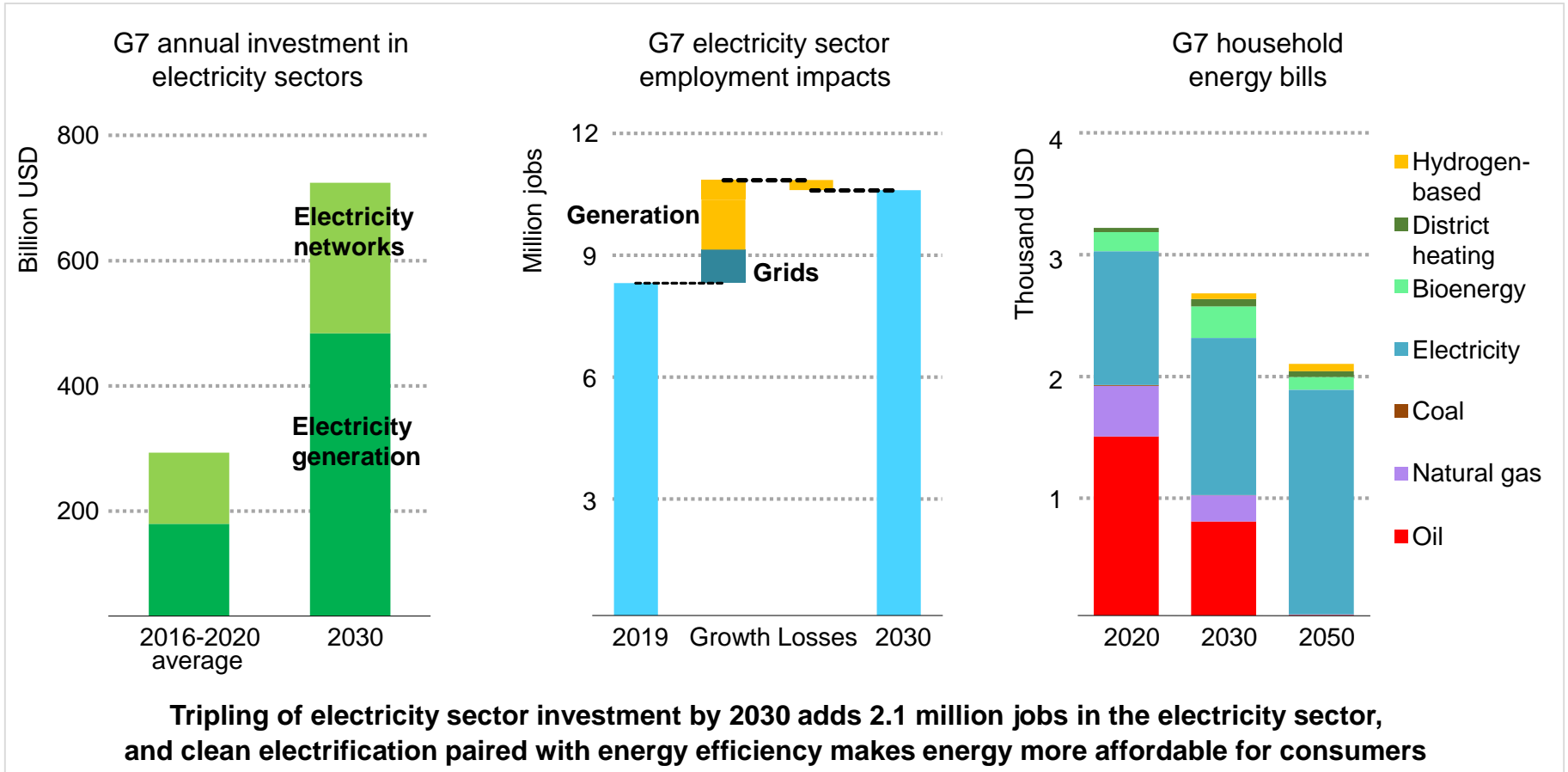
G7 CO<sub>2</sub> reductions by technology maturity in 2050

2.7 Gt CO<sub>2</sub>



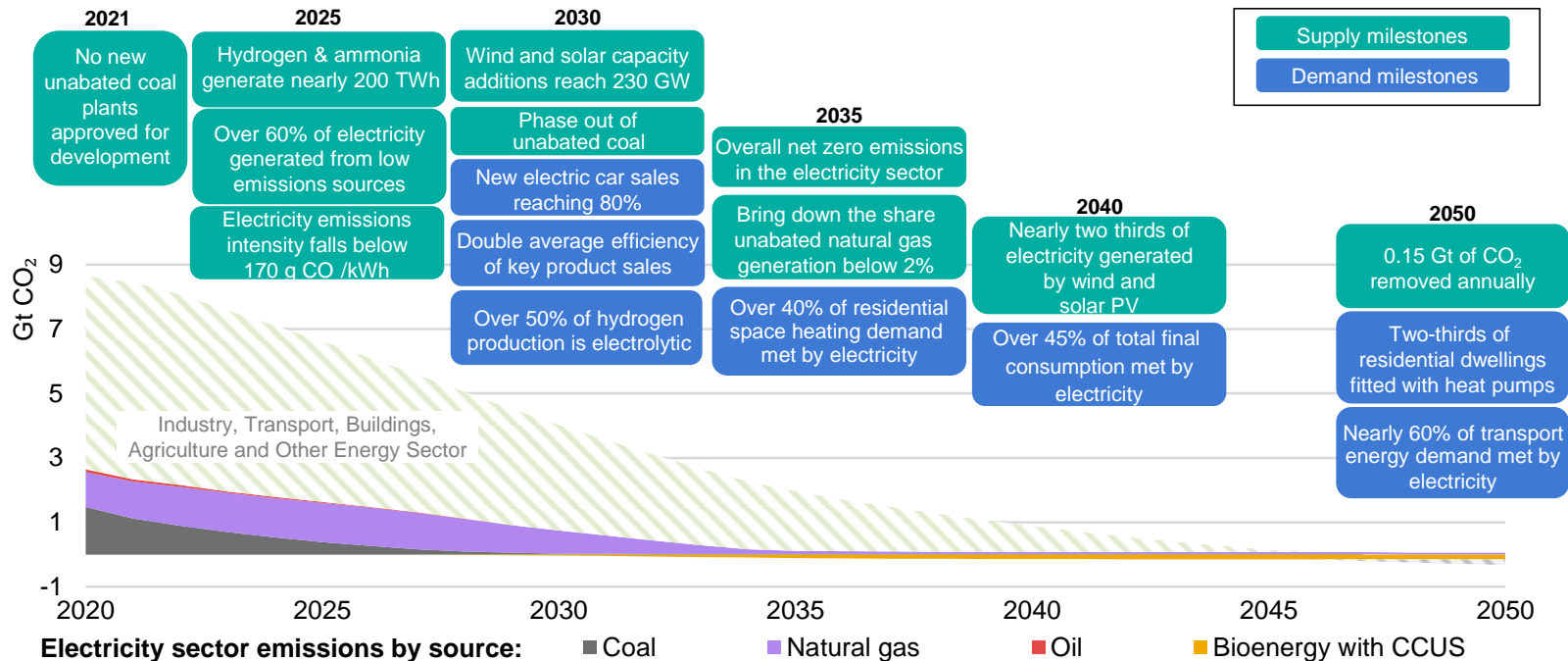
**Innovation delivers about 30% of G7 electricity sector emissions reductions in the NZE to 2050 by bringing additional technologies to market. The G7 taking the lead on international cooperation is a key to accelerating innovation**

# Investing in a clean transition boosts employment and affordability



# The G7 can achieve net zero electricity by 2035

G7 energy-related emissions and milestones in the Net Zero Emissions by 2050 Scenario



**Key milestones include no new unabated coal plants approved post 2021, wind and solar PV capacity additions reaching 230 GW by 2030, and average efficiency of key product sales doubling by 2030**