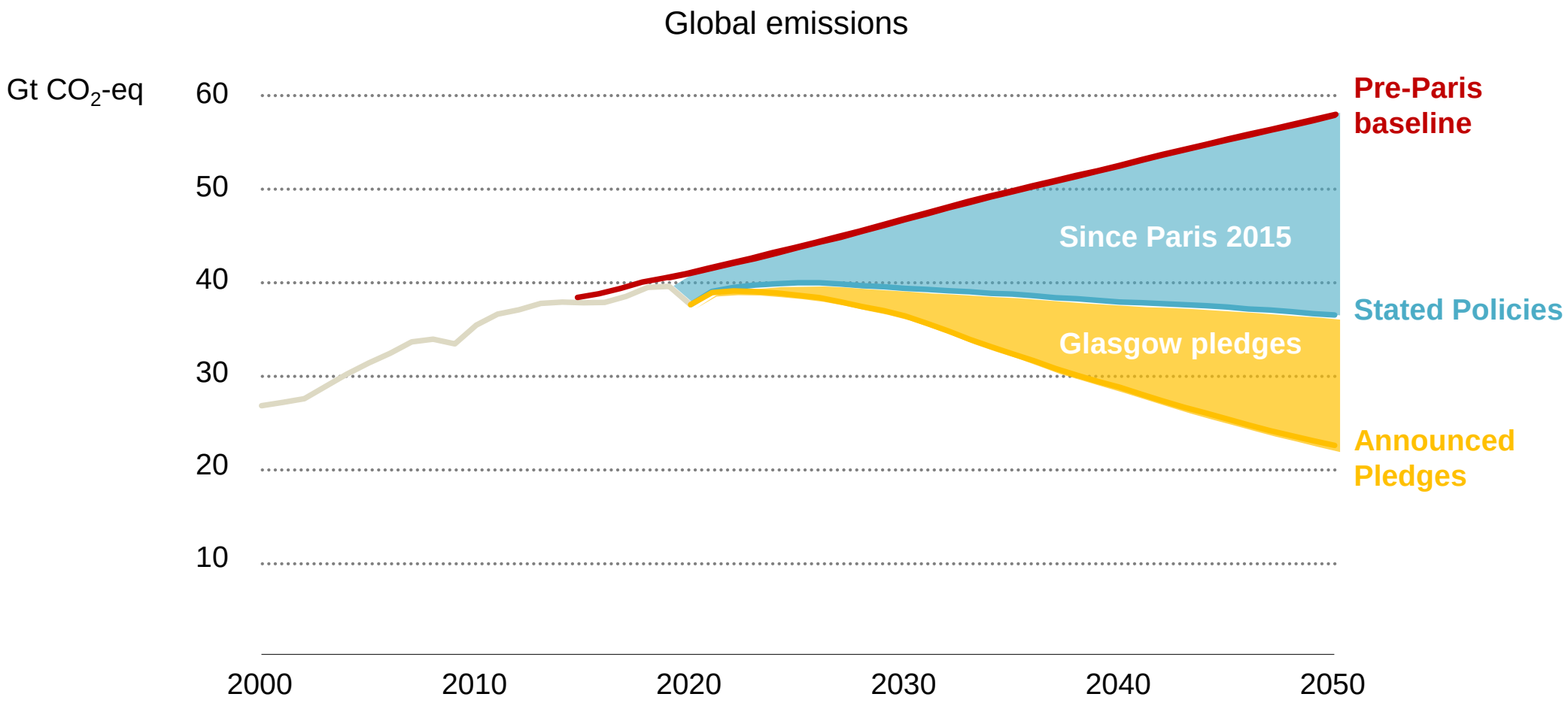
International Energy Agency

Net Zero and Electrification: An Opportunity for Canada?

Peter Fraser, Head of Gas, Coal and Power Markets Division

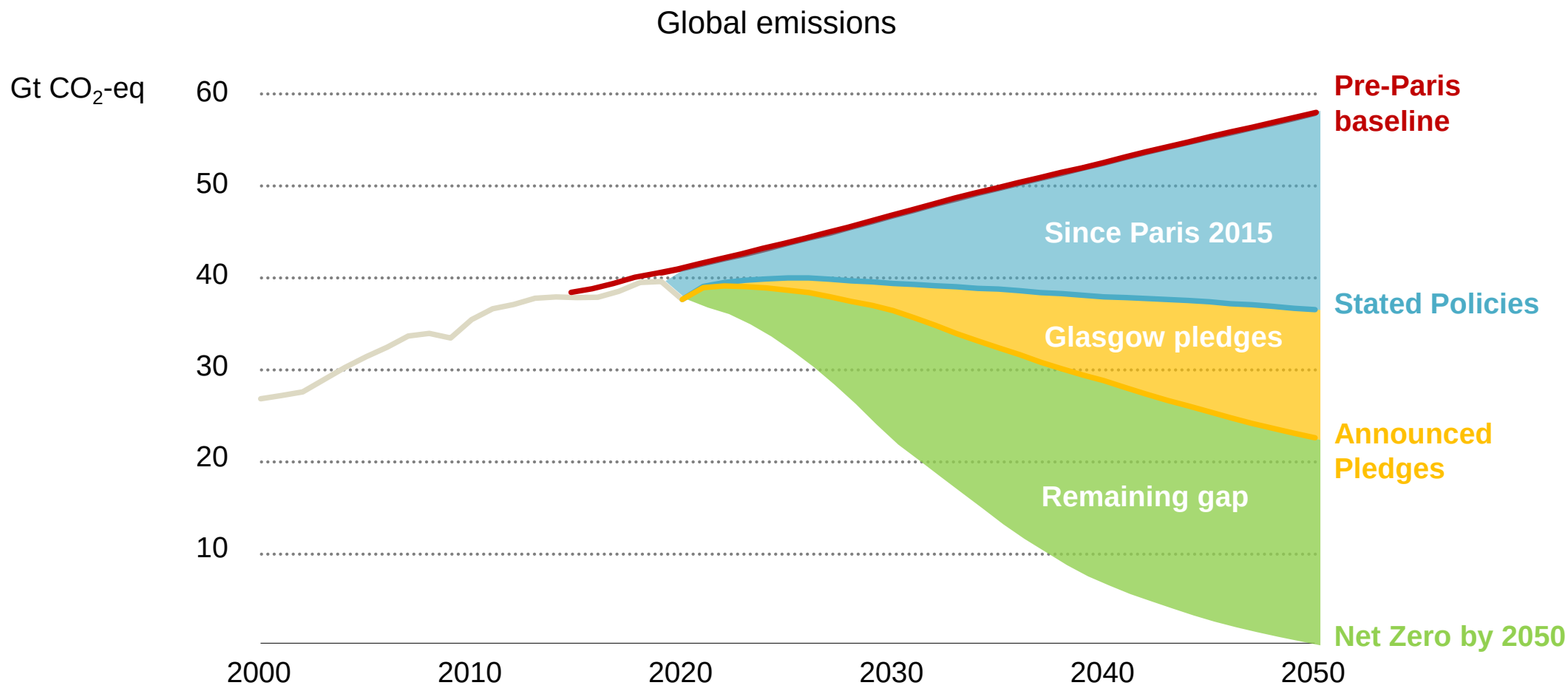
23 February 2022

The world is starting to bend the emissions curve …



New policies, technology cost reductions, and the pandemic have pulled the projected emissions curve down. Updated NDCs & long-term net zero pledges decouple emissions and economic growth this decade.

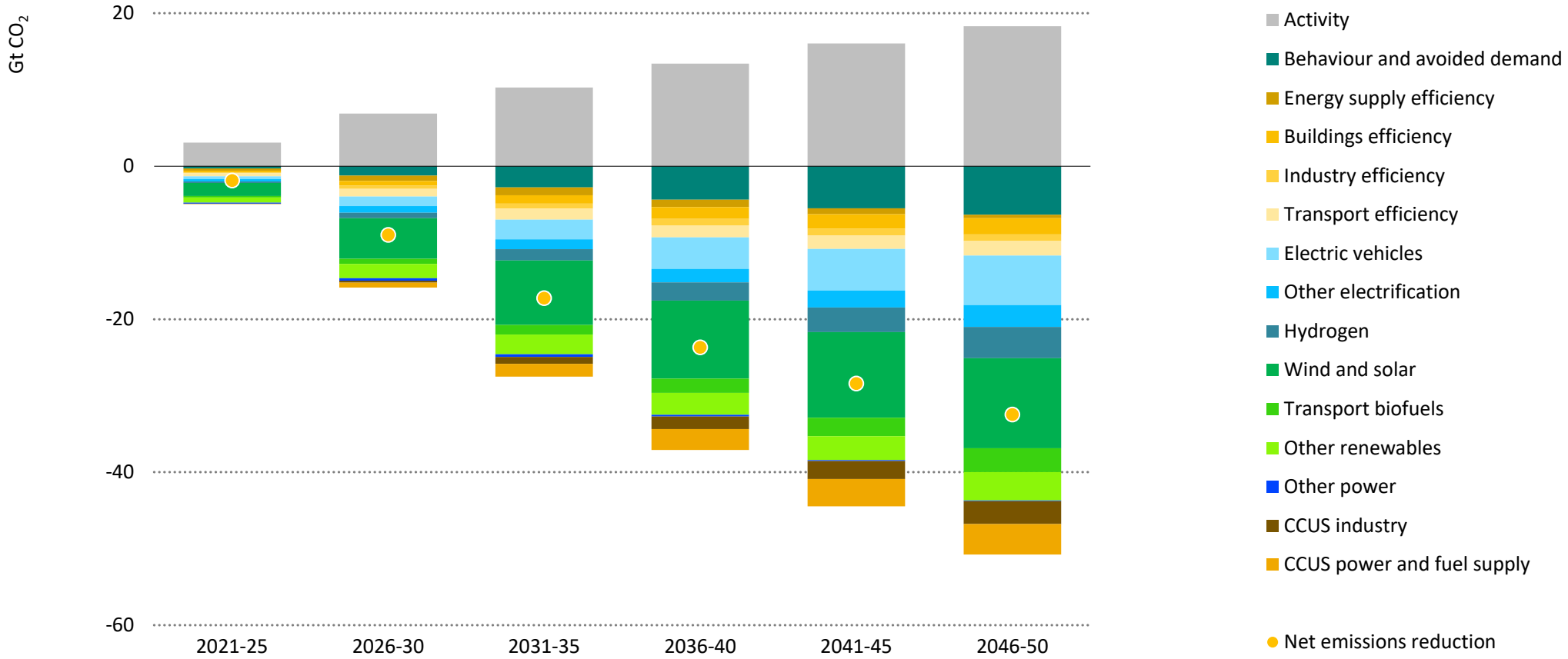
Yet a large ambition gap remains



Despite some positive signs, today's pledges close less than 20% of the gap to the Net Zero by 2050 scenario: countries with net zero pledges and countries without each account for about half the remaining ambition gap

Net zero will take more than “electrify everything”

Average annual CO2 reductions from 2020 in the NZE

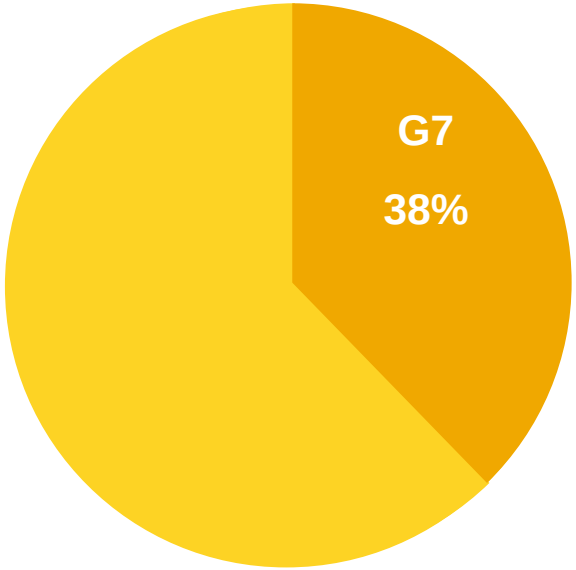


Efficiency, decarbonising generation, electrification, hydrogen, biofuels, and CCUS are all needed

The G7 can drive action towards net zero emissions

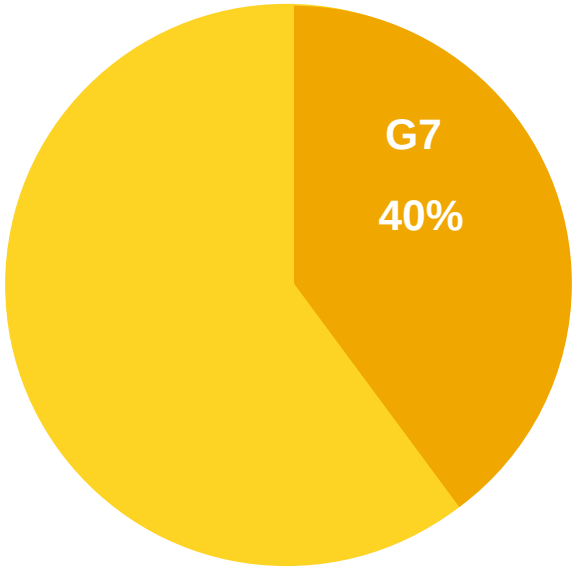
Energy-related emissions (1990-2020)

878 Gt CO_2



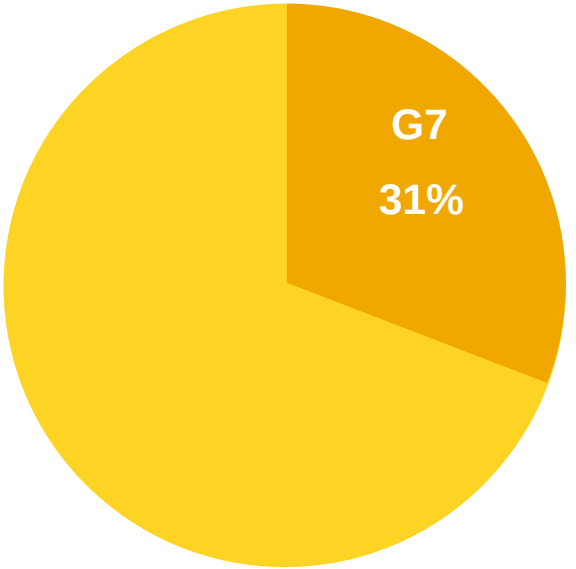
Electricity sector emissions (1990-2020)

301 Gt CO_2



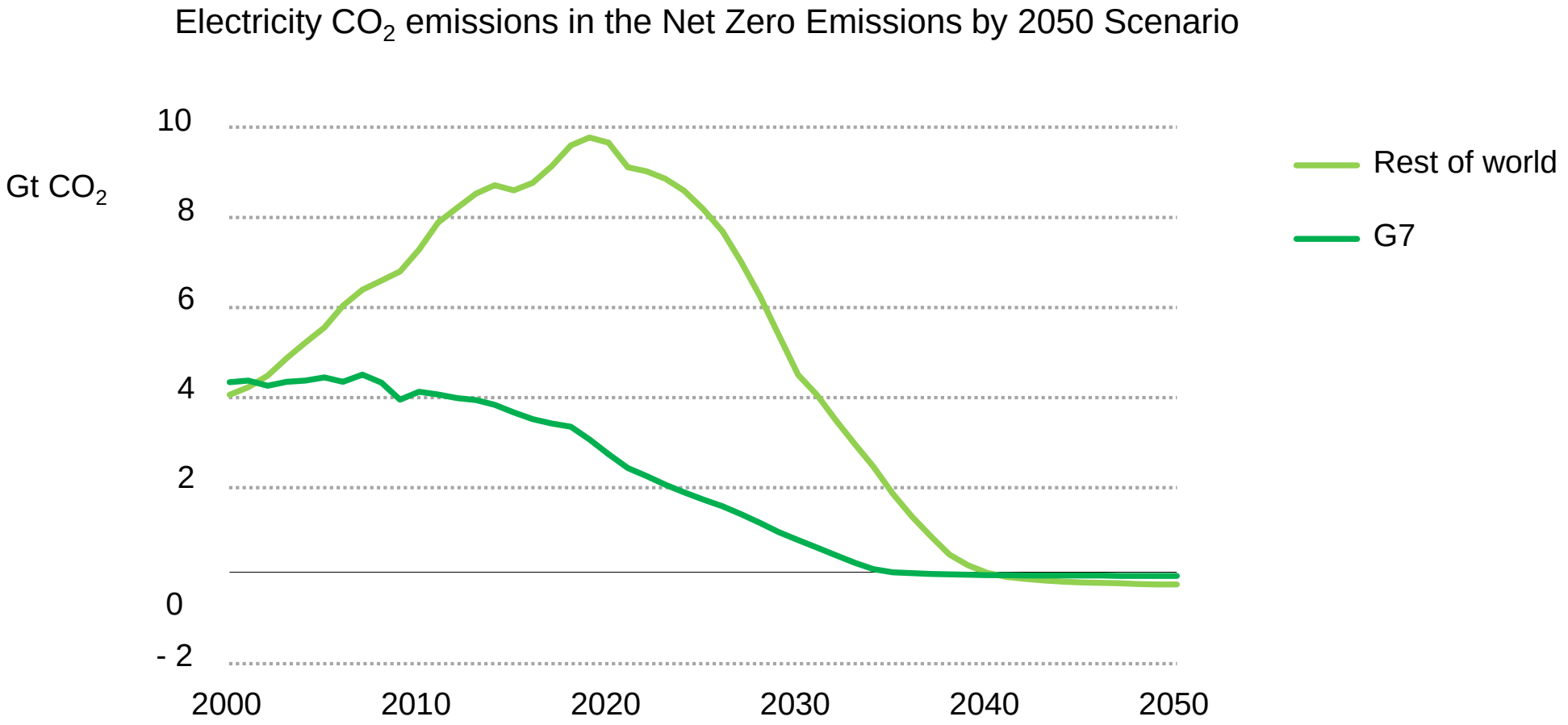
Investment in low emissions electricity sources in 2020

USD 400 billion



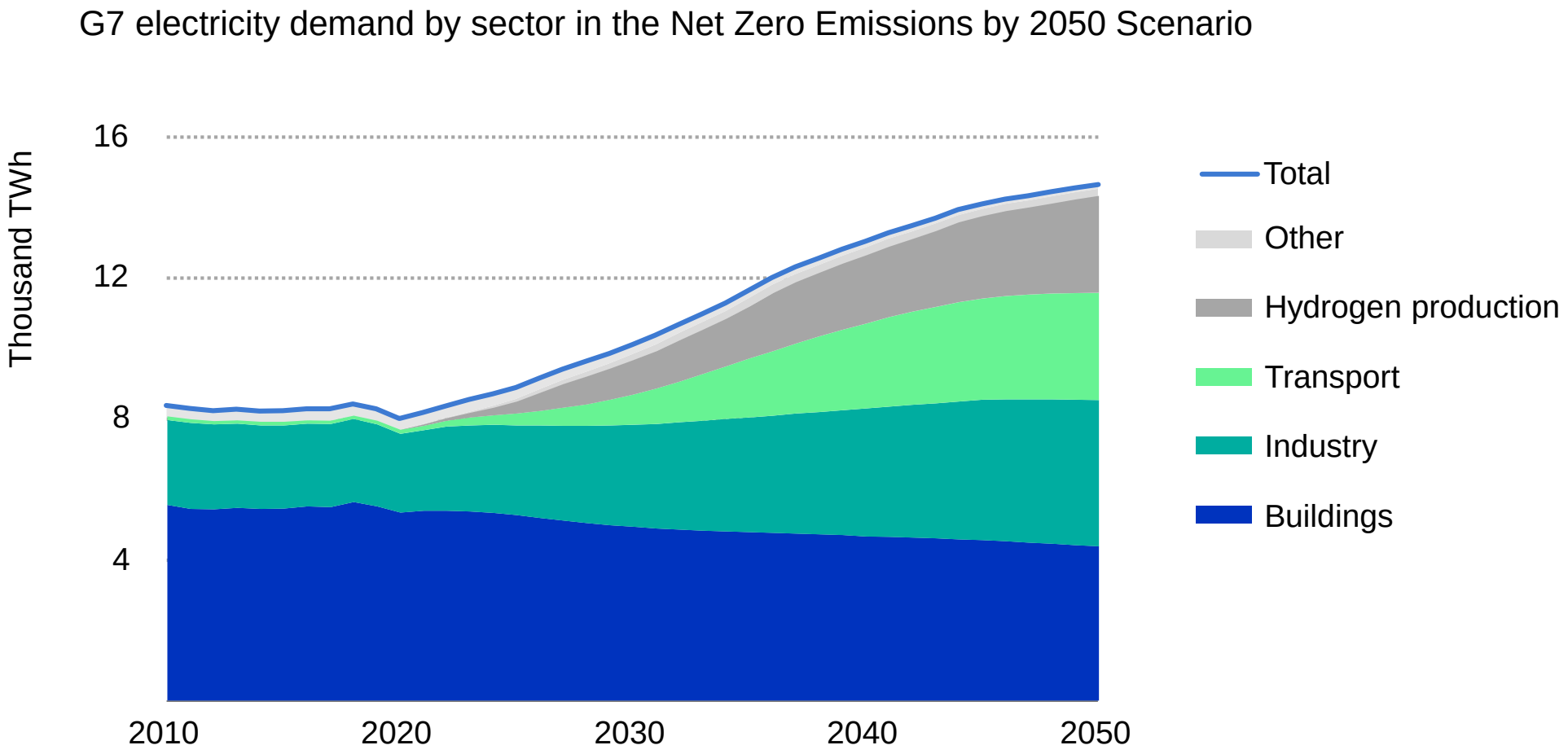
The G7 has an opportunity to be a driving force to accelerate clean energy transitions, making domestic gains and catalysing global action by advancing technologies and accelerating cost reductions

The G7 can lead by example to reach net zero electricity



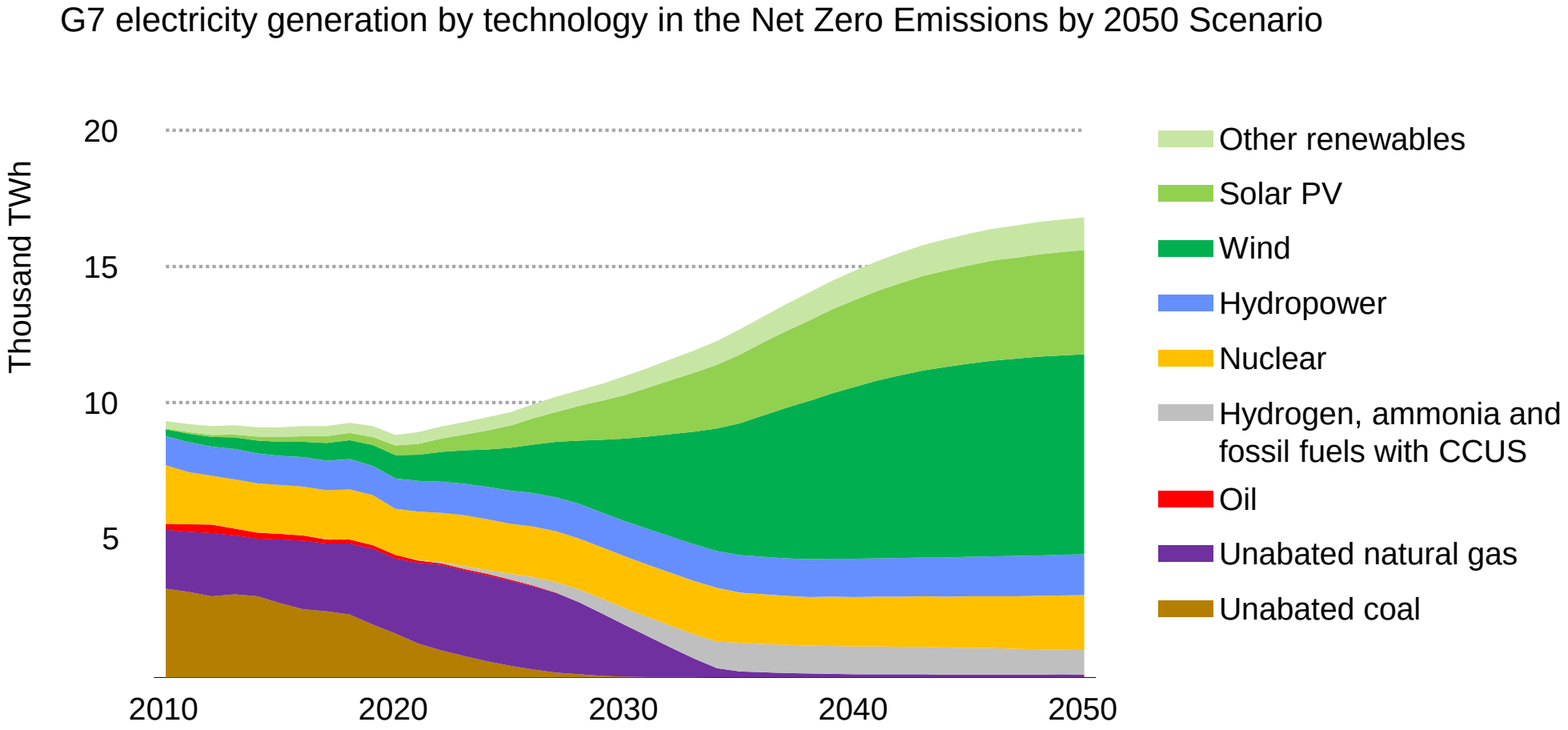
G7 electricity emissions have been falling, mainly due to the switch from coal to natural gas and rising renewables, though the pace of reductions needs to accelerate to reach net zero by 2035

Electrification drives electricity demand growth



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

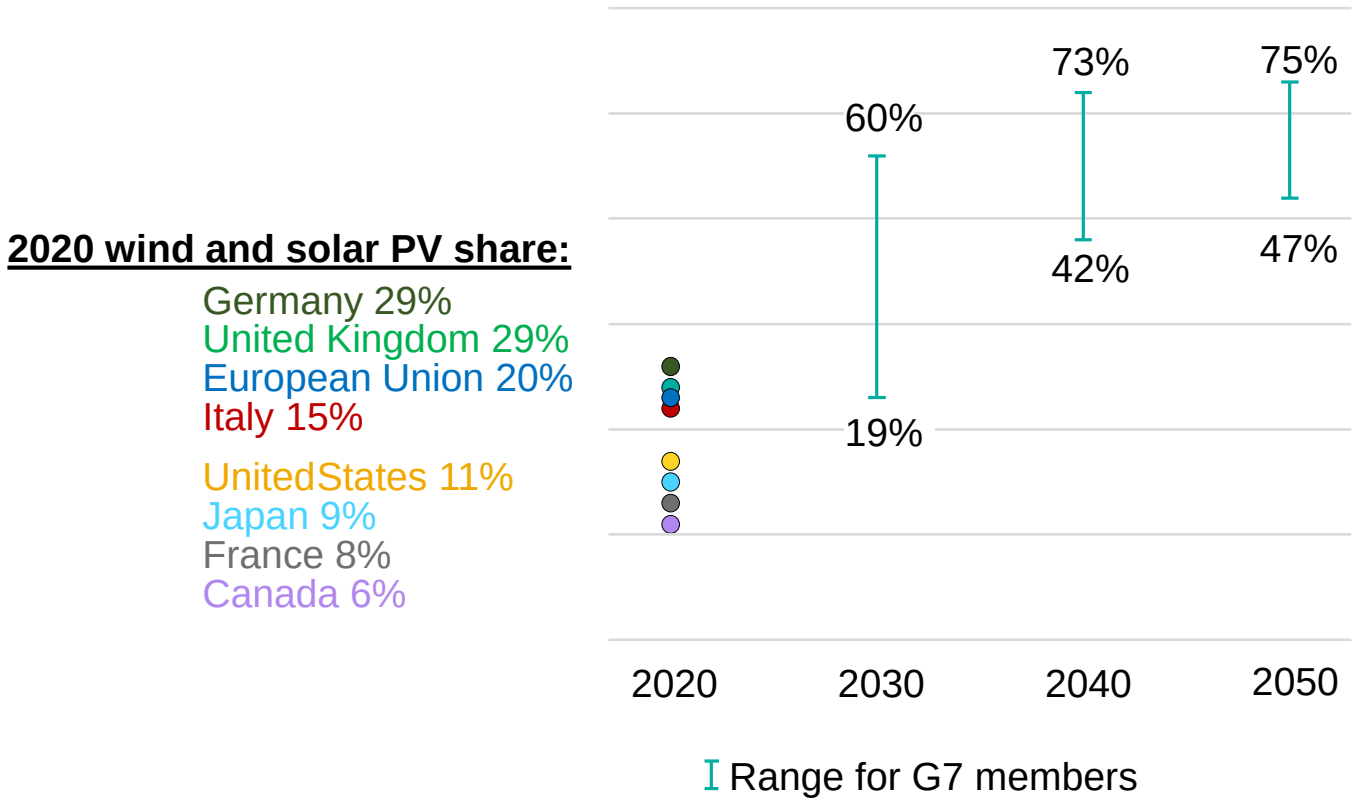
The electricity mix is re-imagined for net zero electricity



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



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

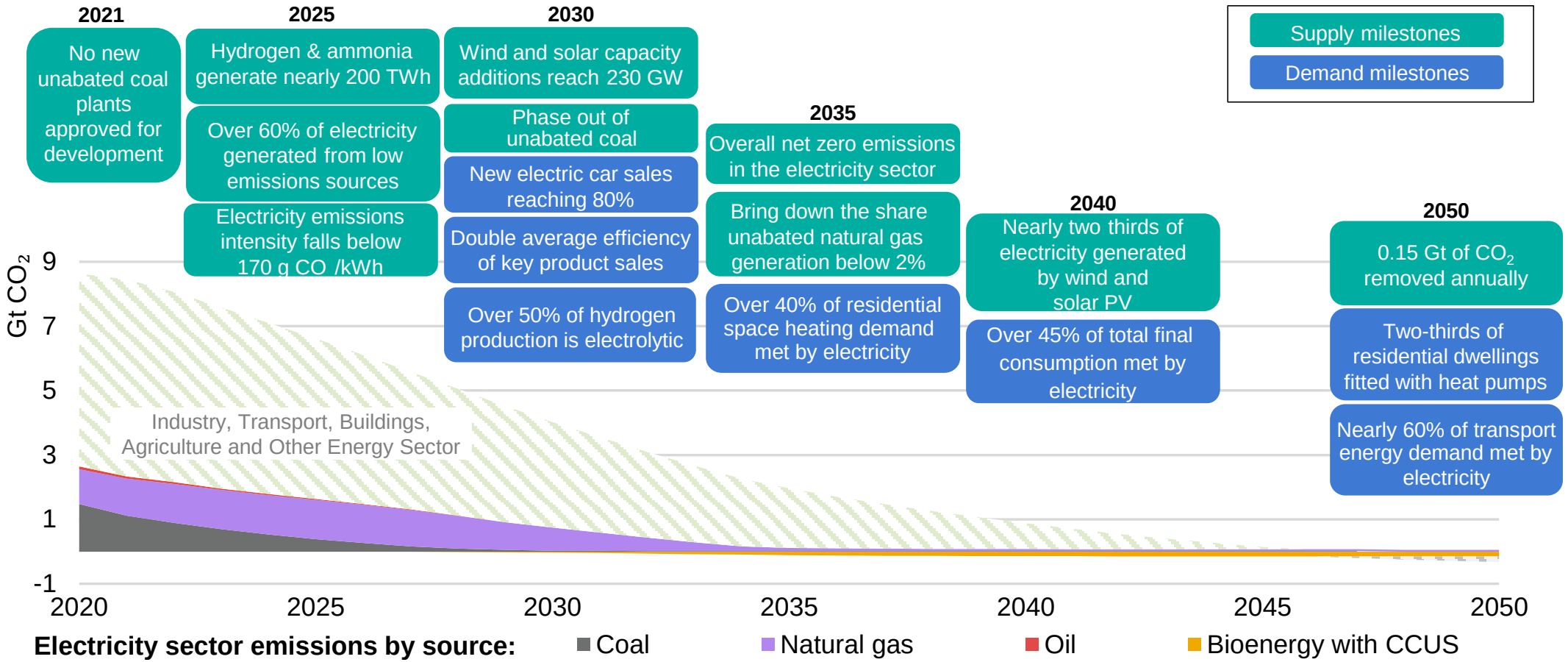
Phase 2 Draw on existing flexibility

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

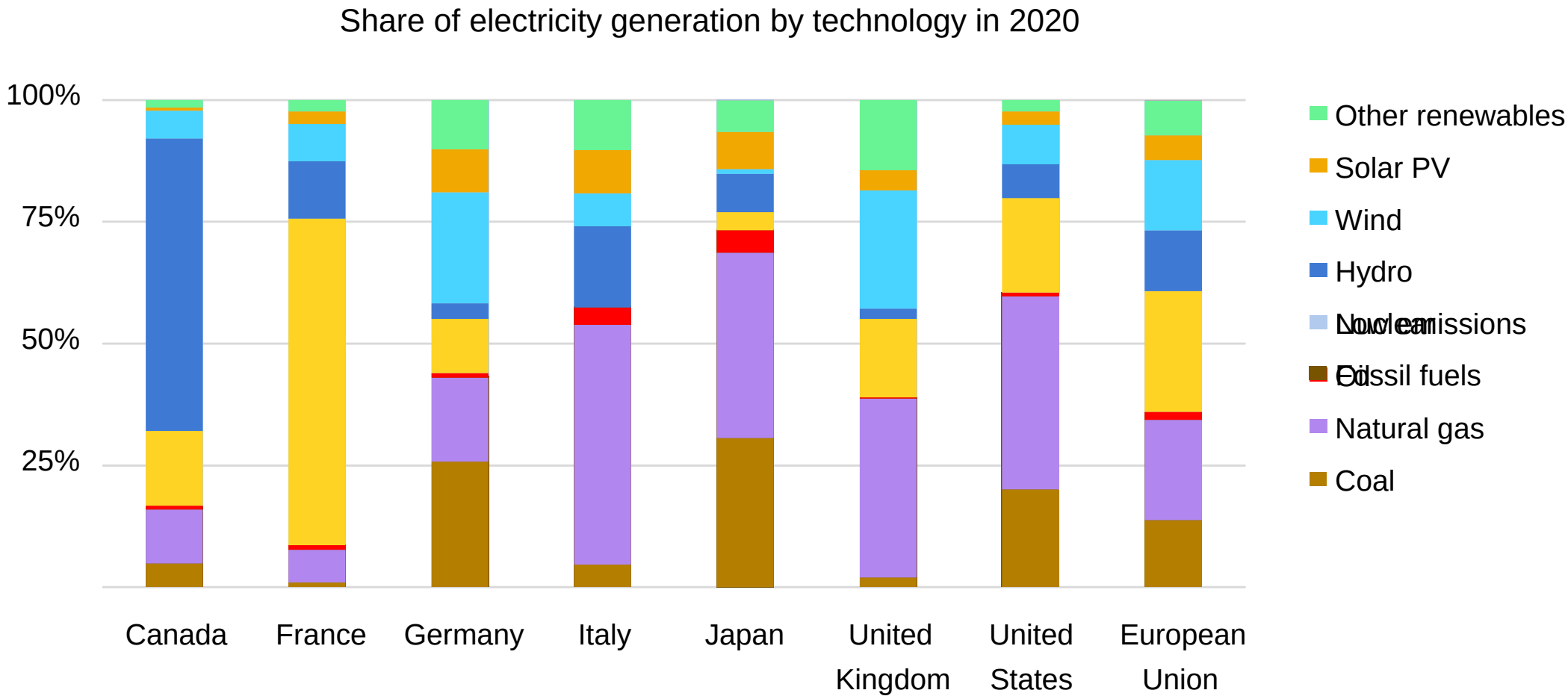
The G7 can achieve net zero electricity by 2035

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

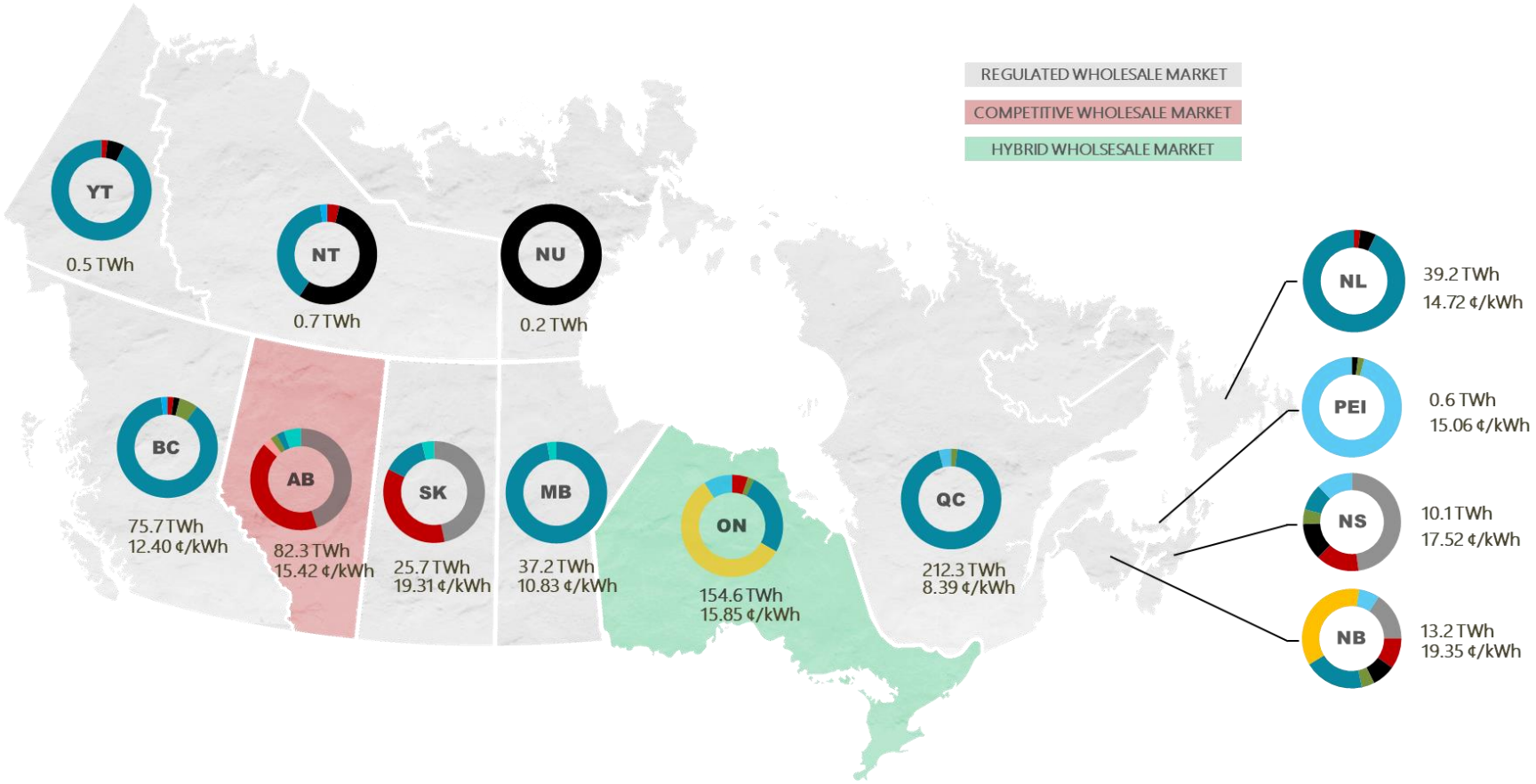
Canada has a relatively advantageous position



Next to France, the lowest share of fossil generation

Canada’s power sector is well-positioned for a transition

Electricity market structures and sources in Canadian provinces and territories



Canada has diverse electricity market structures and power mixes across its provinces and territories, with limited interconnectivity.

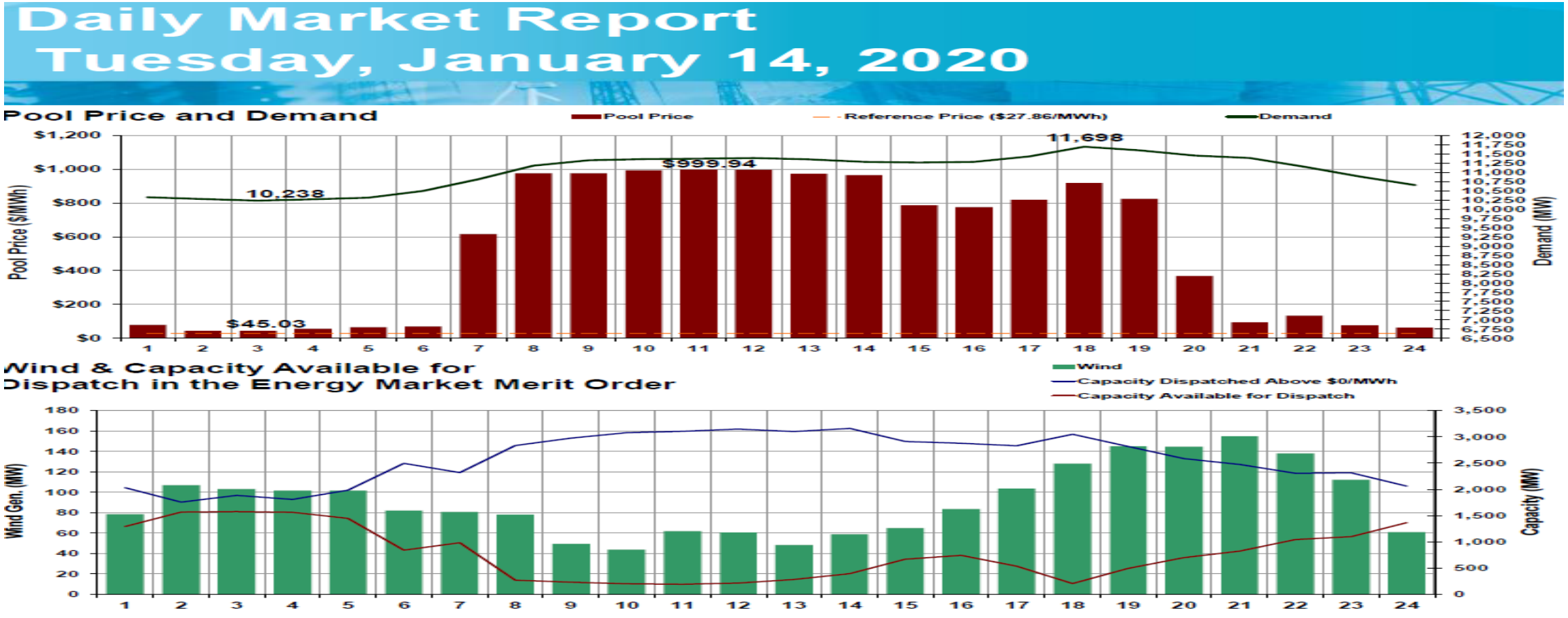
The Canadian opportunity?

- High share of dispatchable low carbon generation that could supply flexibility to support low cost clean energy from new renewables.
- Three challenges:

- Pricing at marginal rather than average cost per kWh
- Electrification as a carbon efficiency program
- Complementary provincial systems

Perhaps the neighbours could help…

AESO Daily Market Report, 14 January 2020 (source: AESO)



Canadian winter conditions could be challenging for power systems with high wind/solar mixes.

Concluding thoughts

- Net zero has become the standard
- Net zero power plus electrification play a major role.
- Industrialized economies will have lead on this – the challenge is much greater for developing economies.
- Canada could be a leader among industrialized economies, but reforms are needed to make it happen.