



**UNIVERSITY  
OF ALBERTA**

# ECON 366: Energy Economics

## Topic 2.3: Canada's Climate Challenge in 12 Charts

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# Canada's Climate Change Challenge

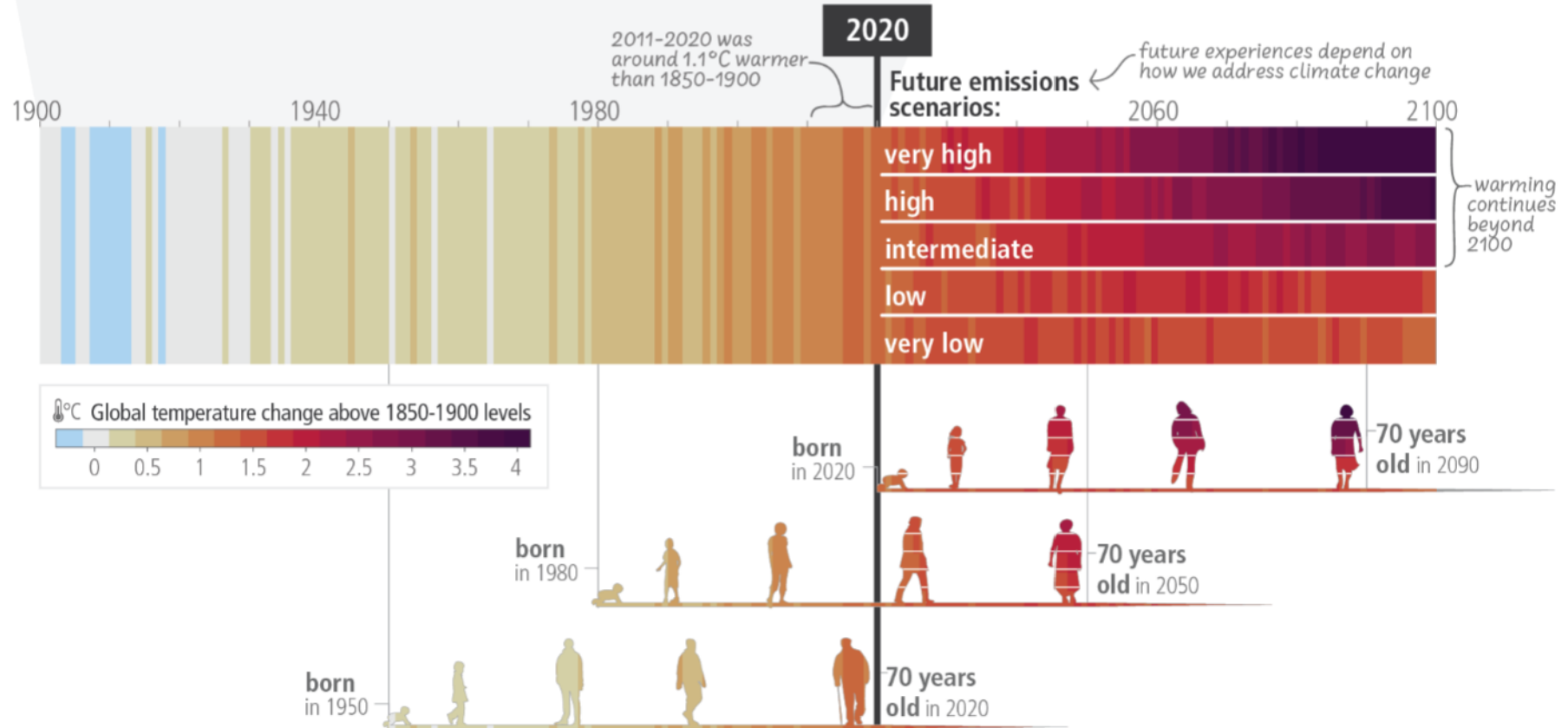
The goal of this session is to get you to think about key aspects of Canada's (and the world's) climate change challenge through 10 graphs and charts. By the end of this session, you should have a sense of:

- the basic problem of climate change;
- the scale of the climate mitigation challenge;
- the basics of emissions-reduction pathways;
- Canada's emissions inventory;
- Canada's emissions projections;

Let's get started.

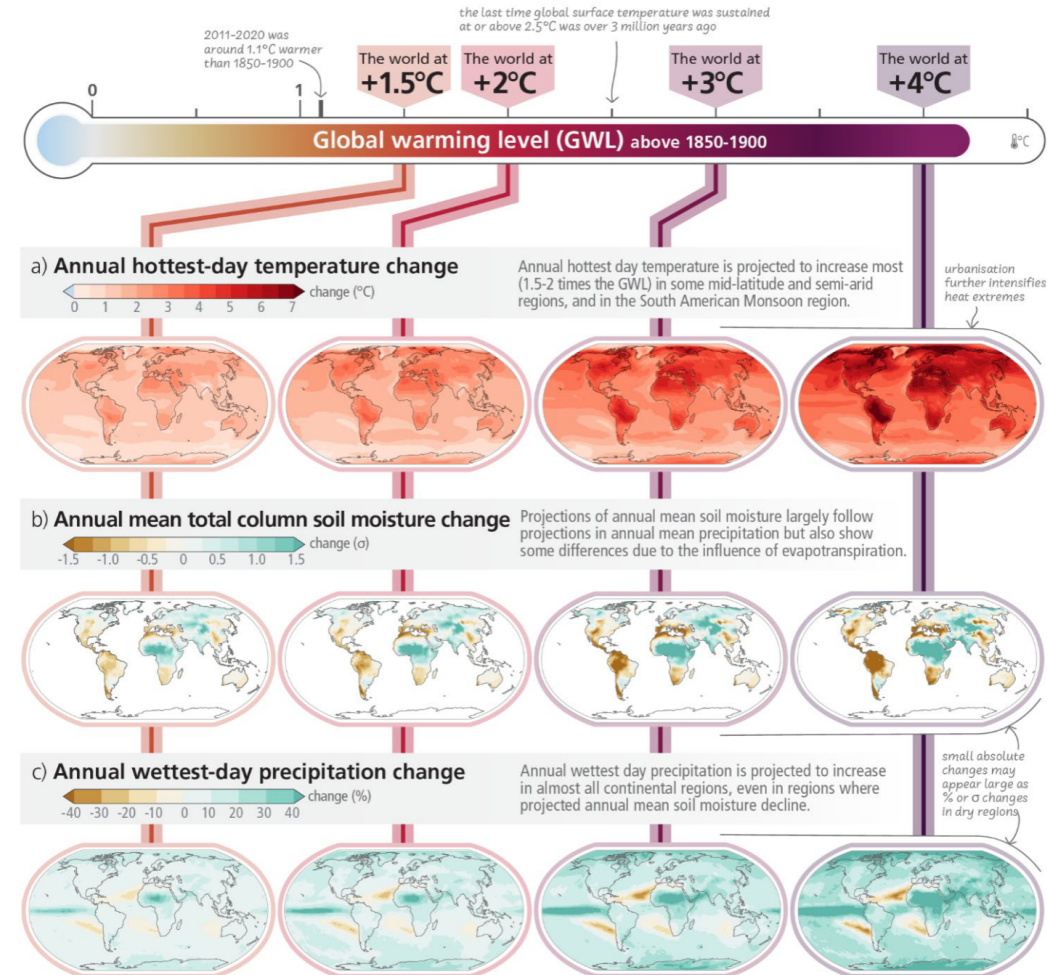
# We'll all live in a warming world

c) The extent to which current and future generations will experience a hotter and different world depends on choices now and in the near-term



# Not just about the heat

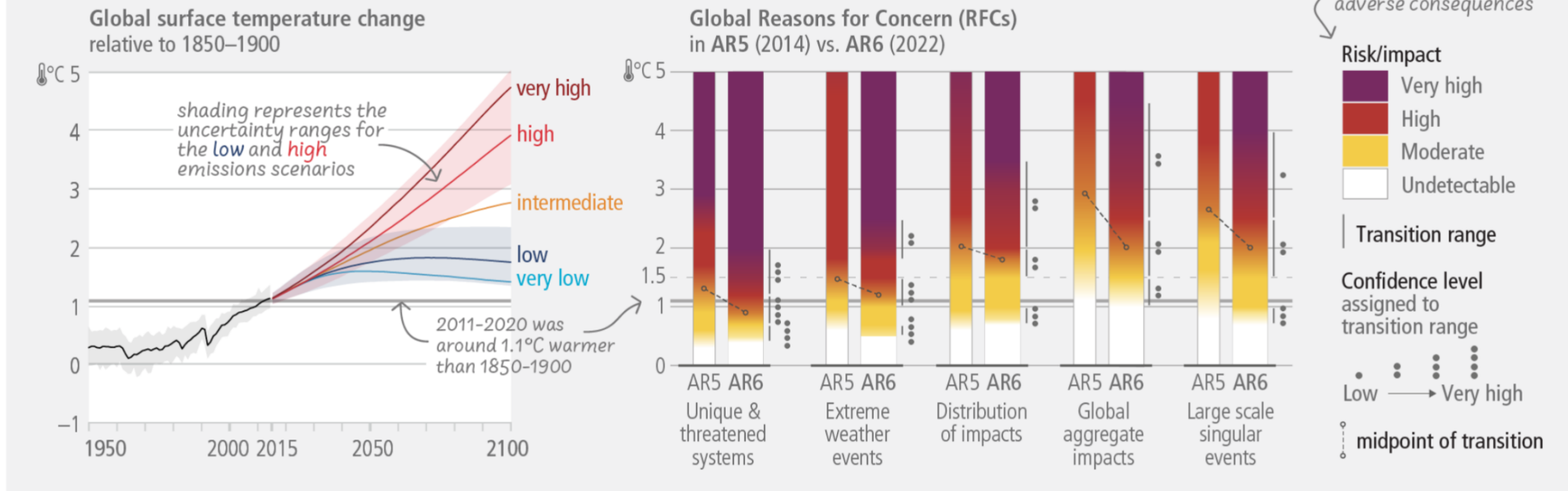
With every increment of global warming, regional changes in mean climate and extremes become more widespread and pronounced



# As we learn more, we get more worried

## Risks are increasing with every increment of warming

### a) High risks are now assessed to occur at lower global warming levels

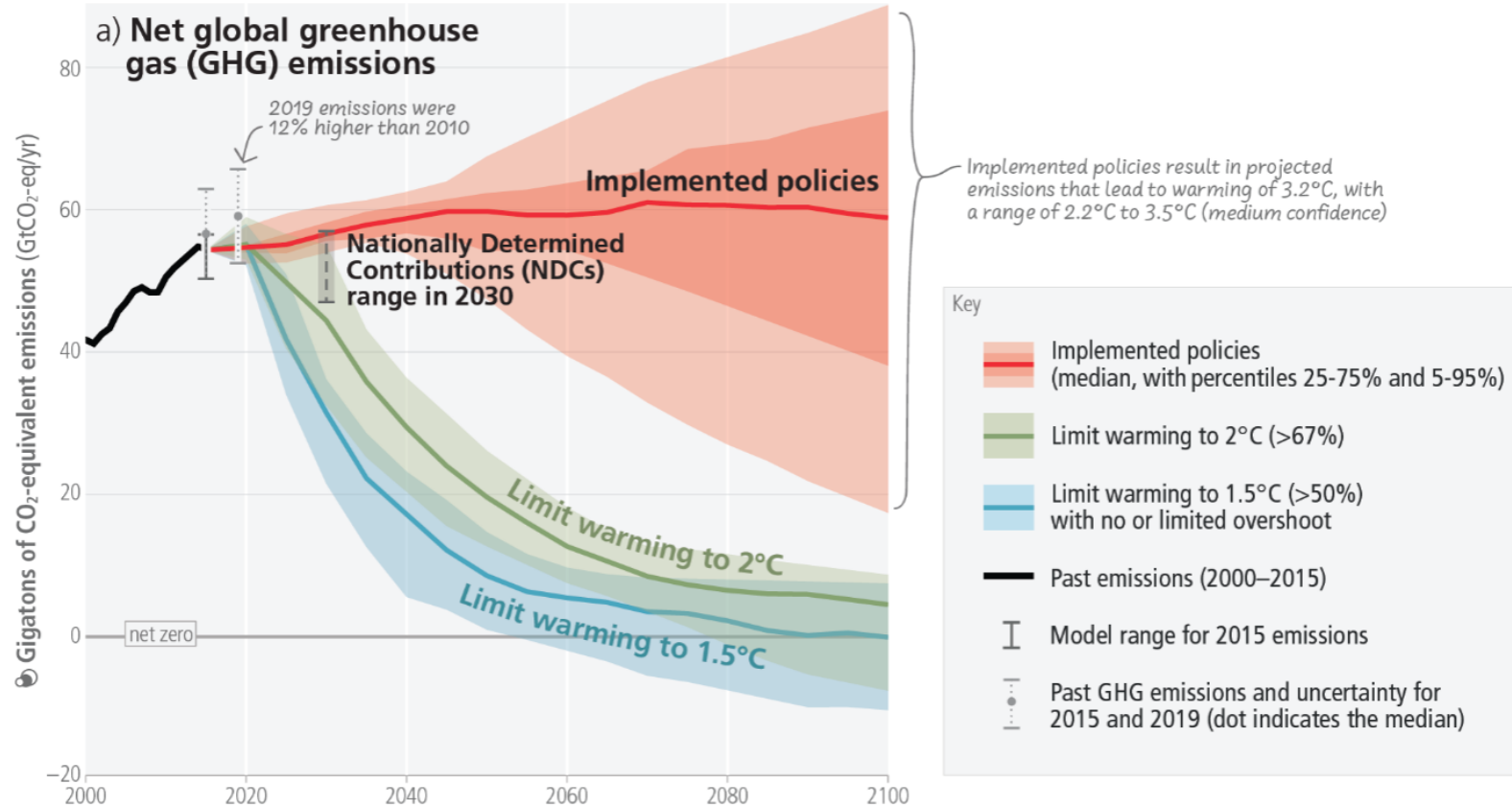


Source: [IPCC AR6 Synthesis Report](#)

# We're not on track

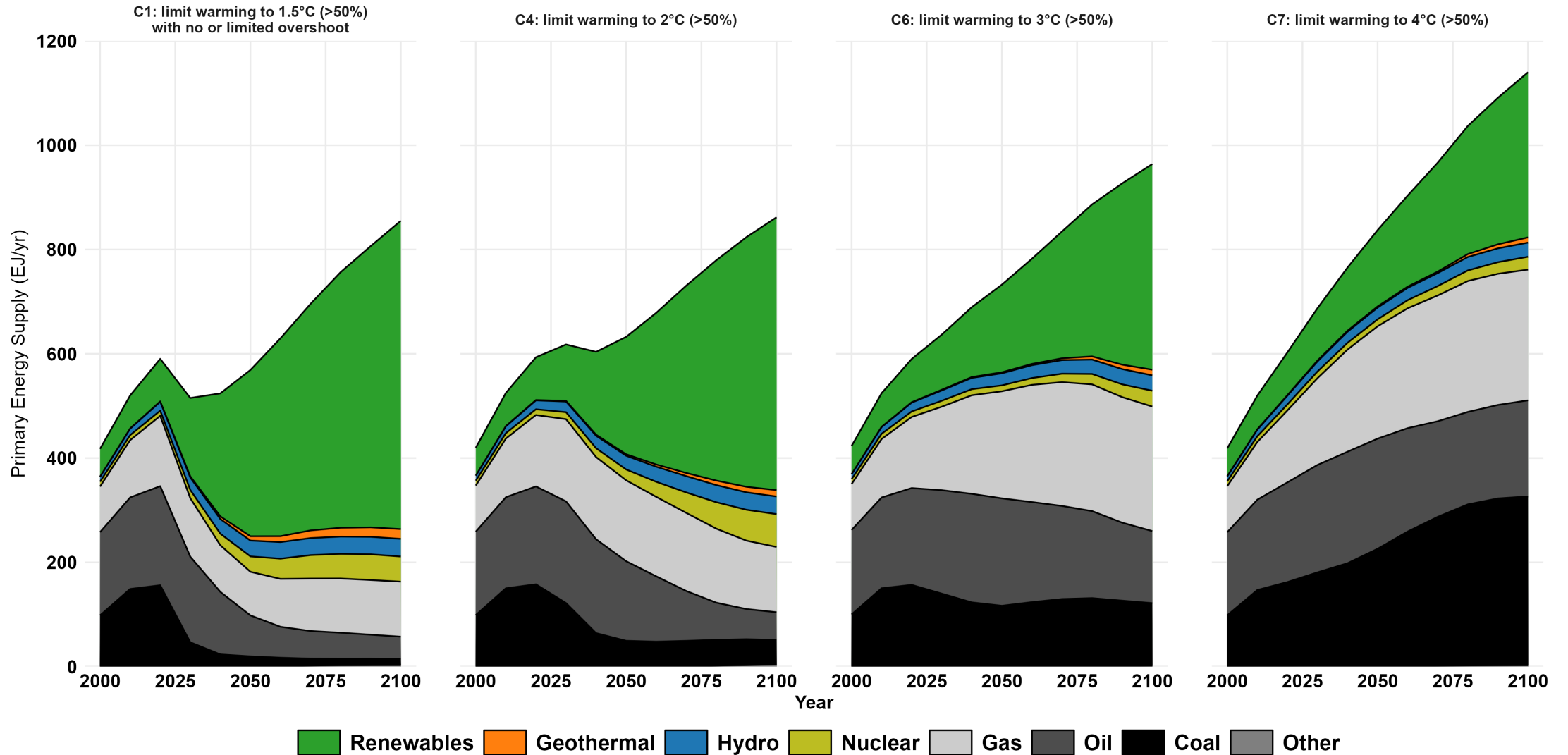
## Limiting warming to 1.5°C and 2°C involves rapid, deep and in most cases immediate greenhouse gas emission reductions

Net zero CO<sub>2</sub> and net zero GHG emissions can be achieved through strong reductions across all sectors



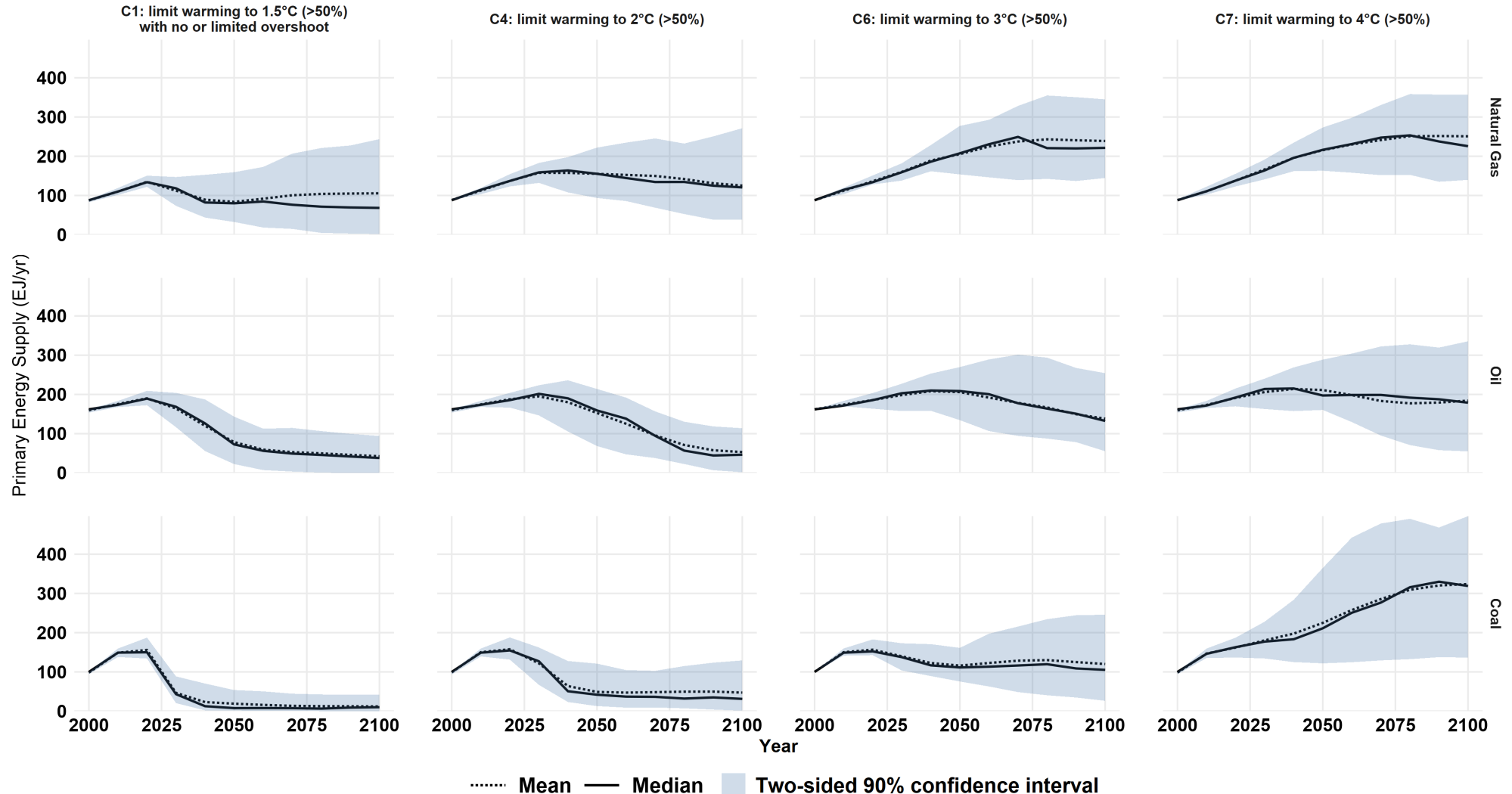
Source: [IPCC AR6 Synthesis Report](#)

# The required energy system transition is dramatic



# Acting on climate change means burning fewer fossil fuels

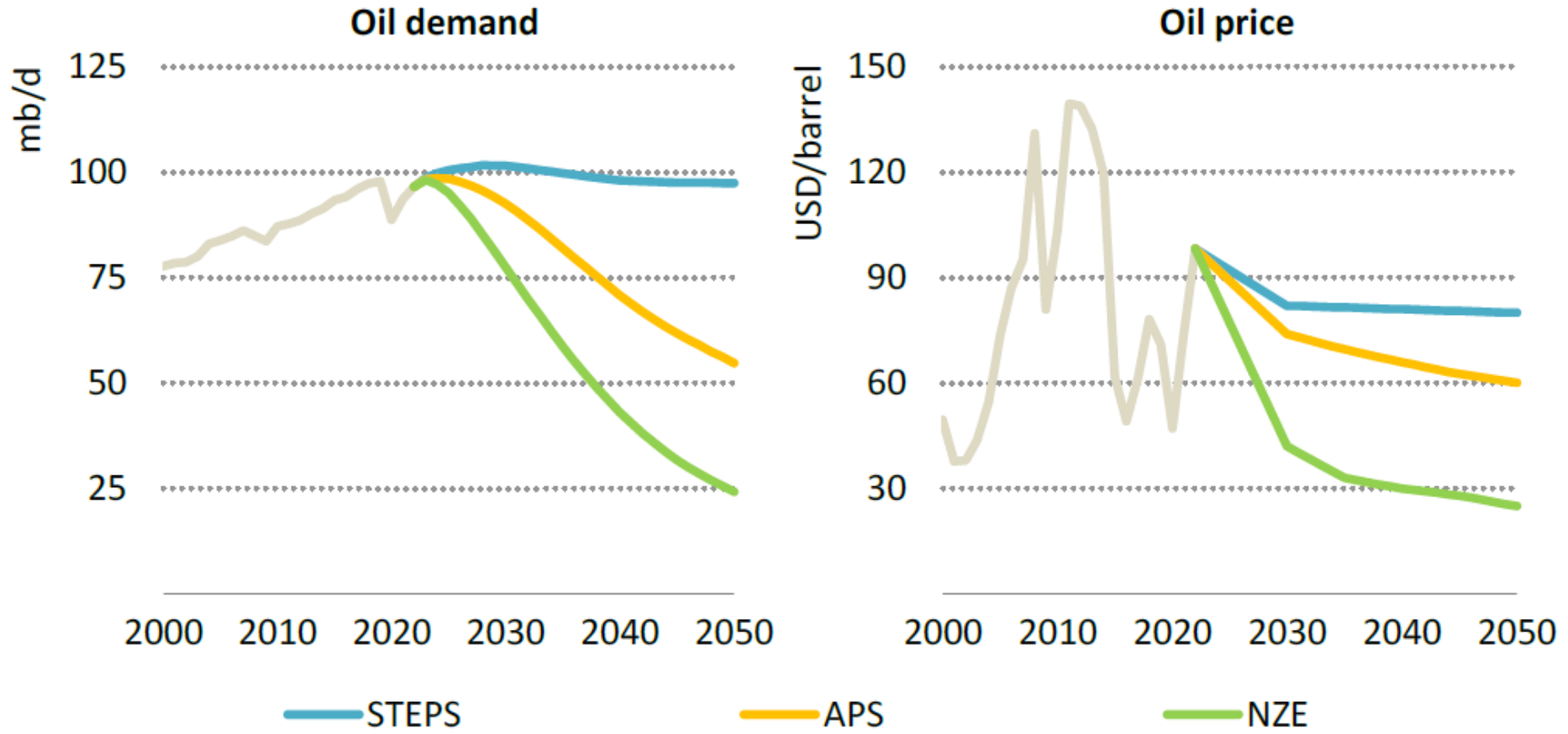
Mean, median, and 90% confidence interval of estimated fossil energy by source, IPCC AR6 SSP2 model runs



Data: Byers et. al. 2022. AR6 Scenarios Database hosted by the International Institute for Applied Systems Analysis (IIASA). doi: 10.5281/zenodo.5886912 | url: data.ene.iiasa.ac.at/ar6/. Graph by Andrew Leach



# The world isn't going to use as much oil as you think



IEA. CC BY 4.0.

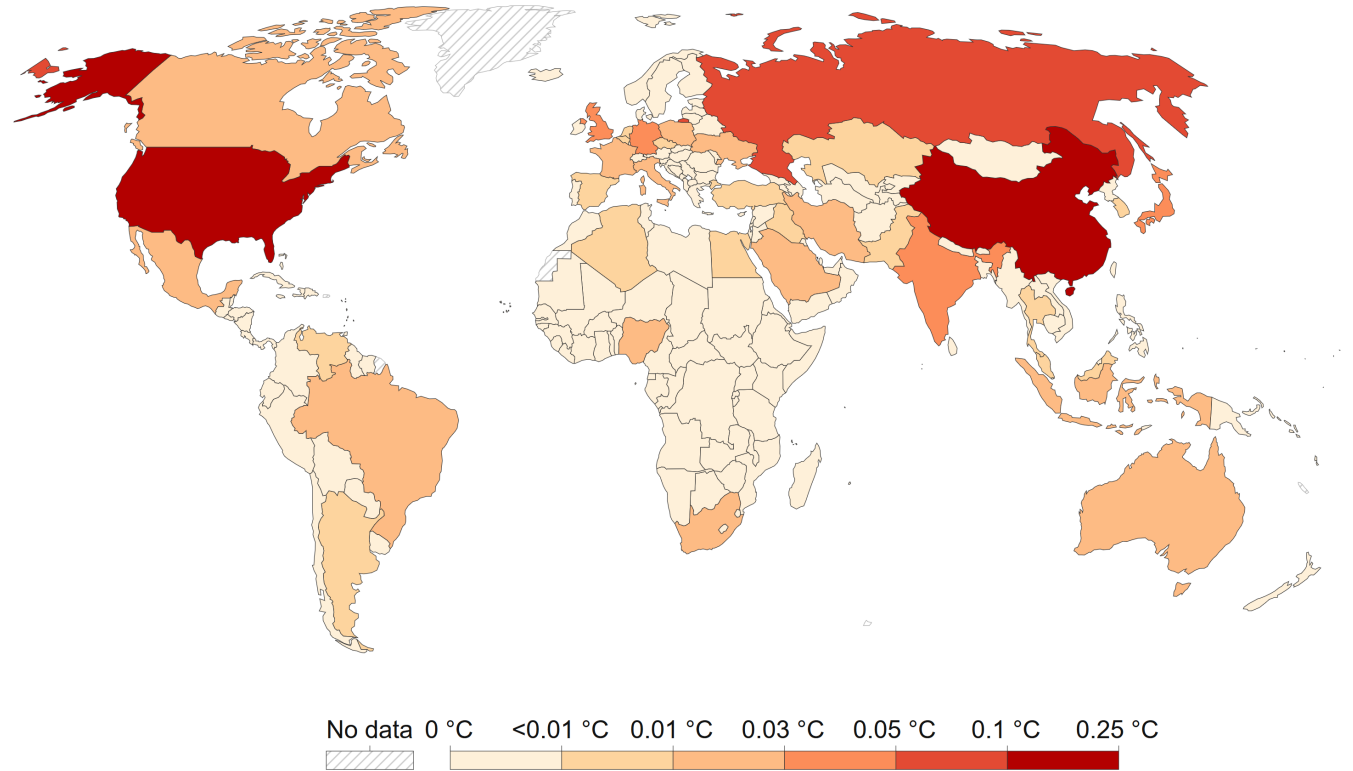
Source: IEA World Energy Outlook, 2023

# Canada is a material part of the problem

## Contribution to global mean surface temperature rise from fossil sources, 2021

Our World in Data

The global mean surface temperature change as a result of a country or region's cumulative emissions of carbon dioxide, methane, and nitrous oxide. This is for fossil fuel and industry emissions only – it does not include land use or agriculture.



Source: Jones et al. (2023). National contributions to climate change due to historical emissions of carbon dioxide, methane and nitrous oxide. OurWorldInData.org/co2-and-greenhouse-gas-emissions • CC BY

# Canada is a material part of the problem (embedded map)

## Contribution to global mean surface temperature rise from fossil sources, 2021

Our World in Data

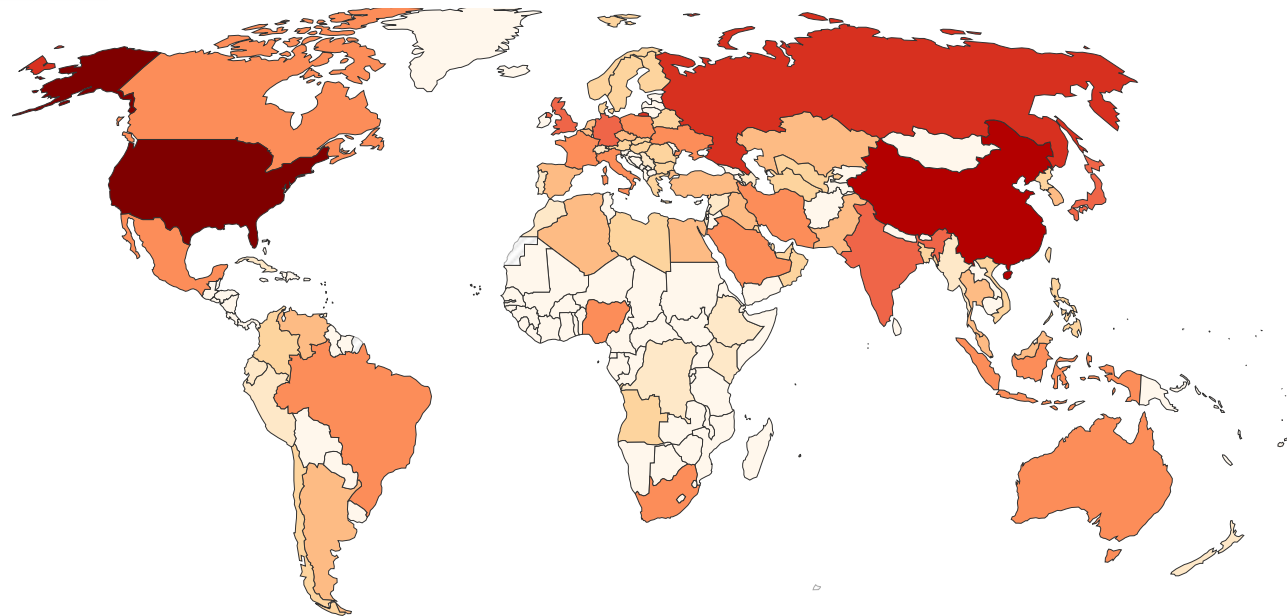
The global mean surface temperature change as a result of a country or region's cumulative emissions of carbon dioxide, methane, and nitrous oxide. This is for fossil fuel and industry emissions only – it does not include land use or agriculture.

Table

Map

Chart

World



No data 0 °C 0.001 °C 0.002 °C 0.005 °C 0.01 °C 0.02 °C 0.05 °C 0.1 °C 0.2 °C

Play time-lapse

1851

2021

Data source: Jones et al. (2023) - [Learn more about this data](#)

OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

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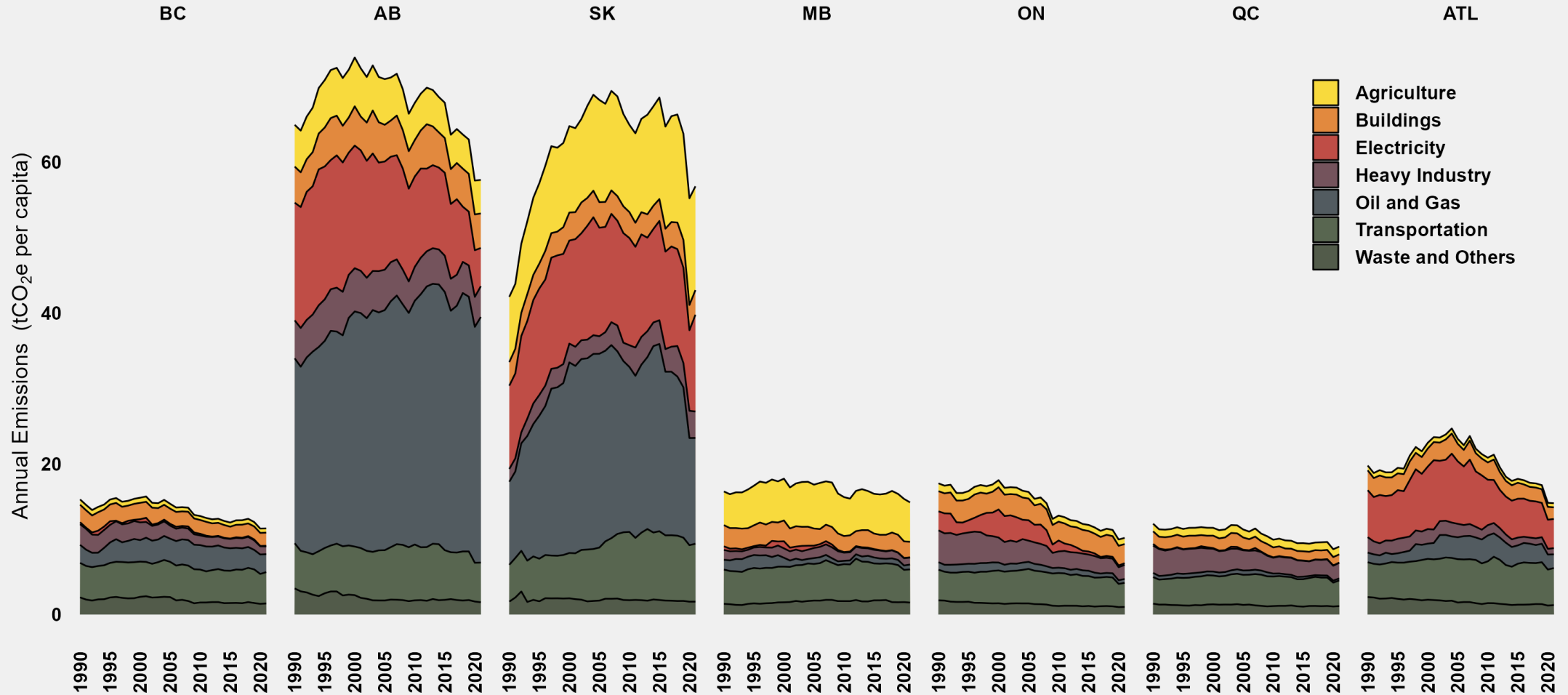
Explore the data →



# Canadian Climate Policy is Challenging

## Canadian GHG Emissions Per Capita by Province

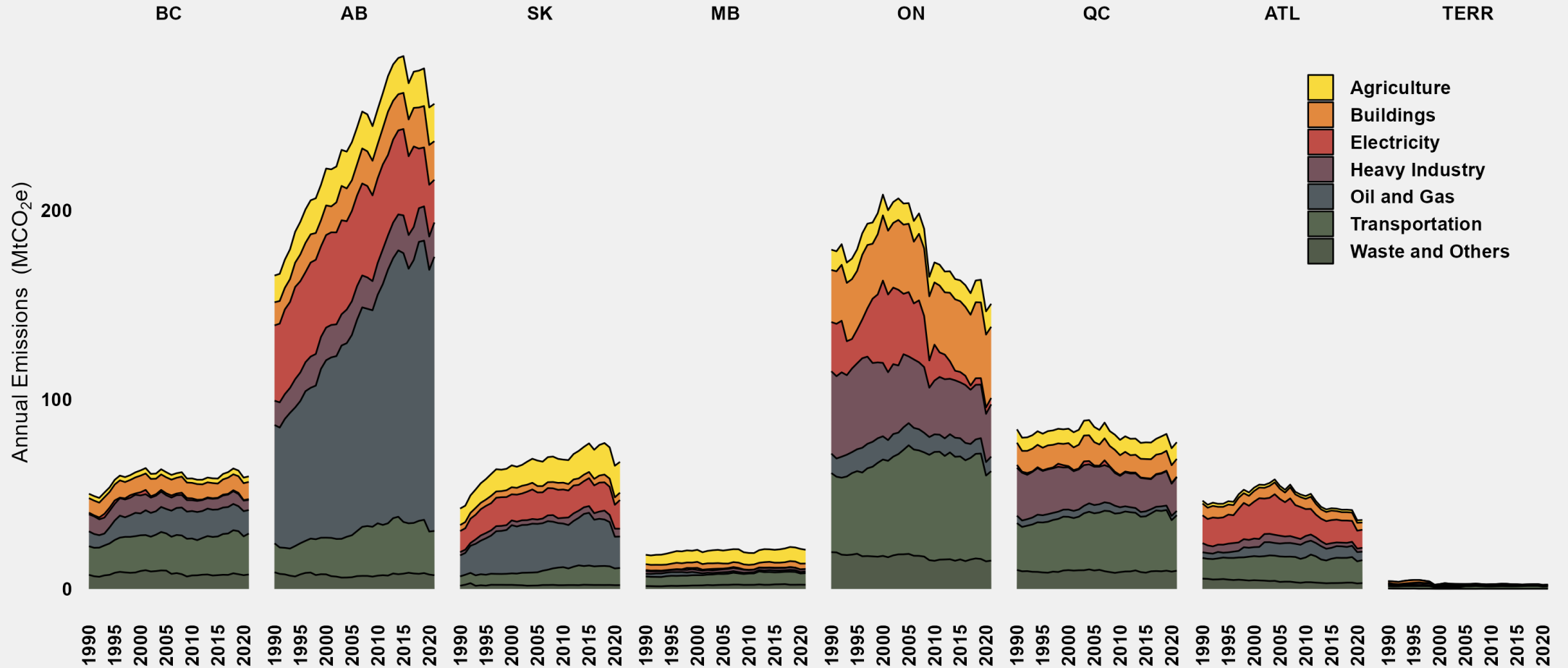
2023 National Inventory (1990-2021) Emissions , Statistics Canada Population Projections



# This Challenge is Close to Home

## Canadian GHG Emissions by Province

2023 National Inventory (1990-2021) Emissions

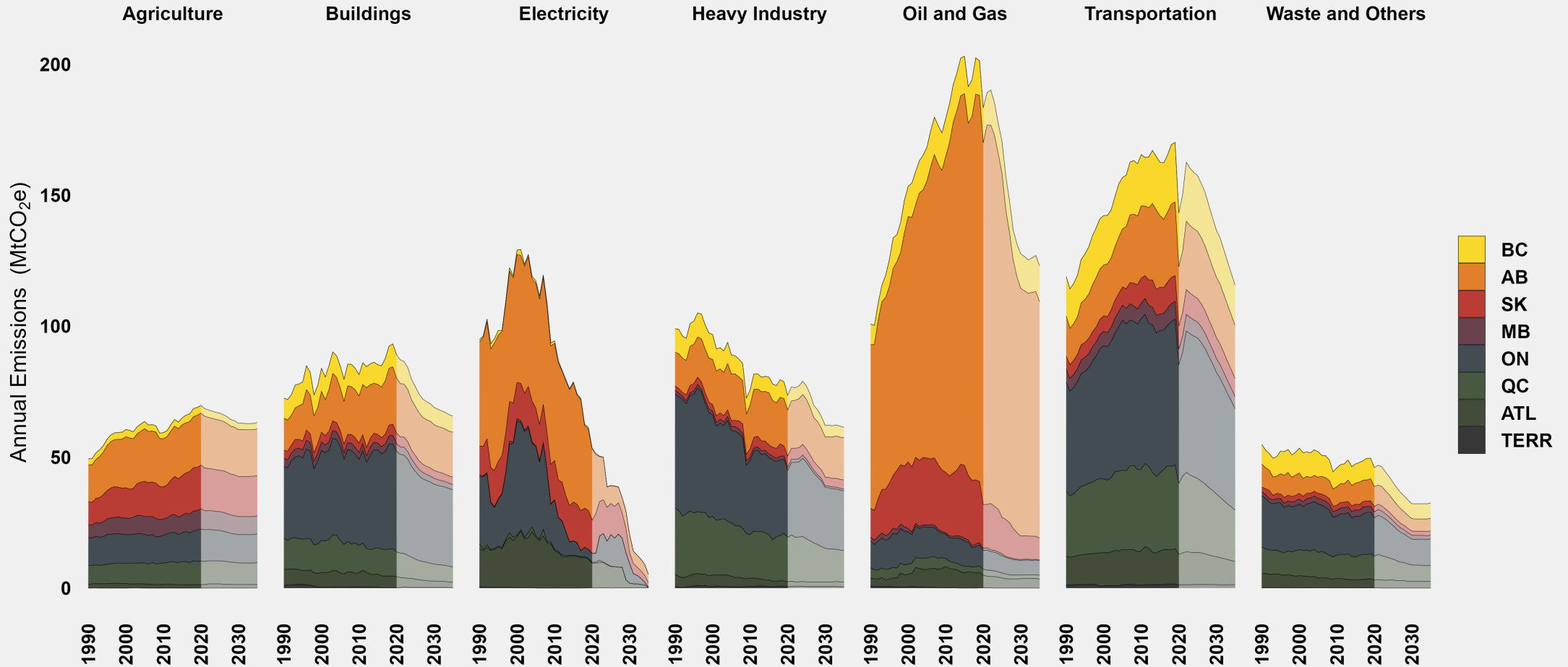


Source: Environment and Climate Change Canada. Graph by @andrew\_leach.

# Policy in Two Sectors Will Decide Canada's Future Emissions

## Canadian GHG Emissions by Sector

2022 National Inventory (1990-2021) levels and 2023 Additional Measures Scenario projections (2022-2035, lighter fill)



Source: Environment and Climate Change Canada. Graph by @andrew\_leach.

# The IPCC Synthesis Report, Summary for Economics Students

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