

Harvard Climate Forum

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The Basics of Climate Change: What to Know to Be “Action-Ready”

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Agenda

- Climate Science – What do we know?
- Action on Climate – Who and What? And, why is it so hard?
- How to Leverage Tools for Action?



Climate Science



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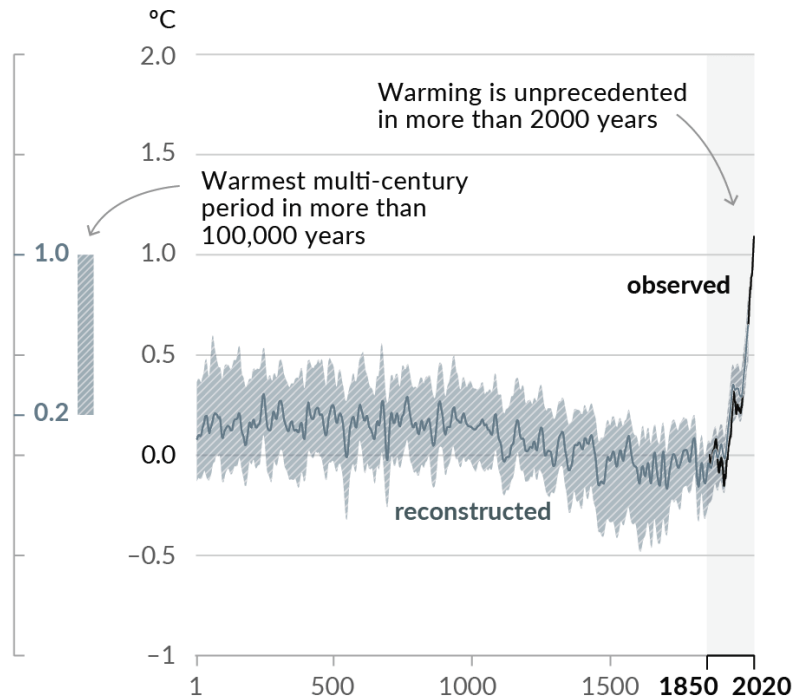
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The Challenge: Anthropogenic Climate Change

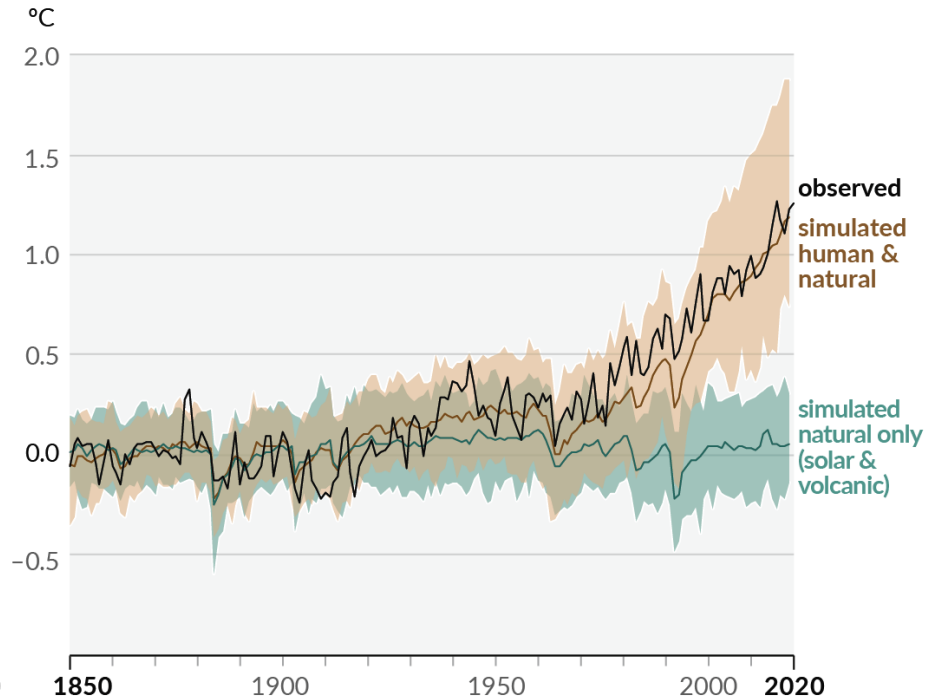
Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850–1900

(a) Change in global surface temperature (decadal average) as reconstructed (1–2000) and observed (1850–2020)



(b) Change in global surface temperature (annual average) as observed and simulated using human & natural and only natural factors (both 1850–2020)

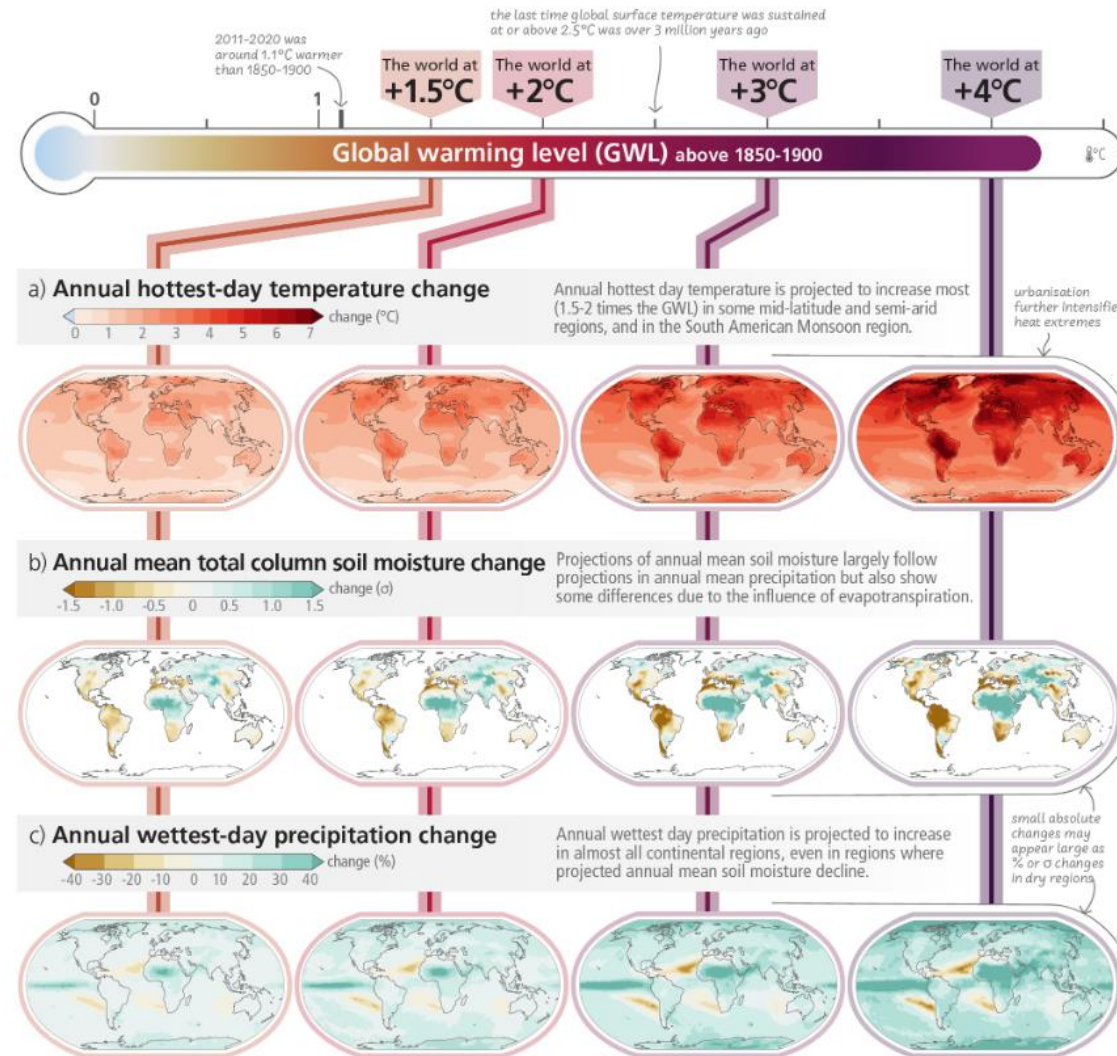


Climate Change: A change of climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere, which is distinct from natural climate variability over comparable time periods. (Framework Convention on Climate Change Article 1)

Greenhouse gas (GHG) emissions: Carbon dioxide, methane, and other gaseous constituents of the atmosphere, both natural and human-caused, that absorb and emit radiation at specific wavelengths that cause the heat-trapping greenhouse effect. (IPCC Glossary)

The Impact: Widespread, Rapid, Disproportionate Harms

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



1.5 degrees: In the Paris Agreement, countries committed to pursue efforts to limit the rise in the average global temperature to 1.5°C above pre-industrial levels. Climate commitments designed to meet this target are considered “Paris aligned.” (UNFCCC)

International Framework



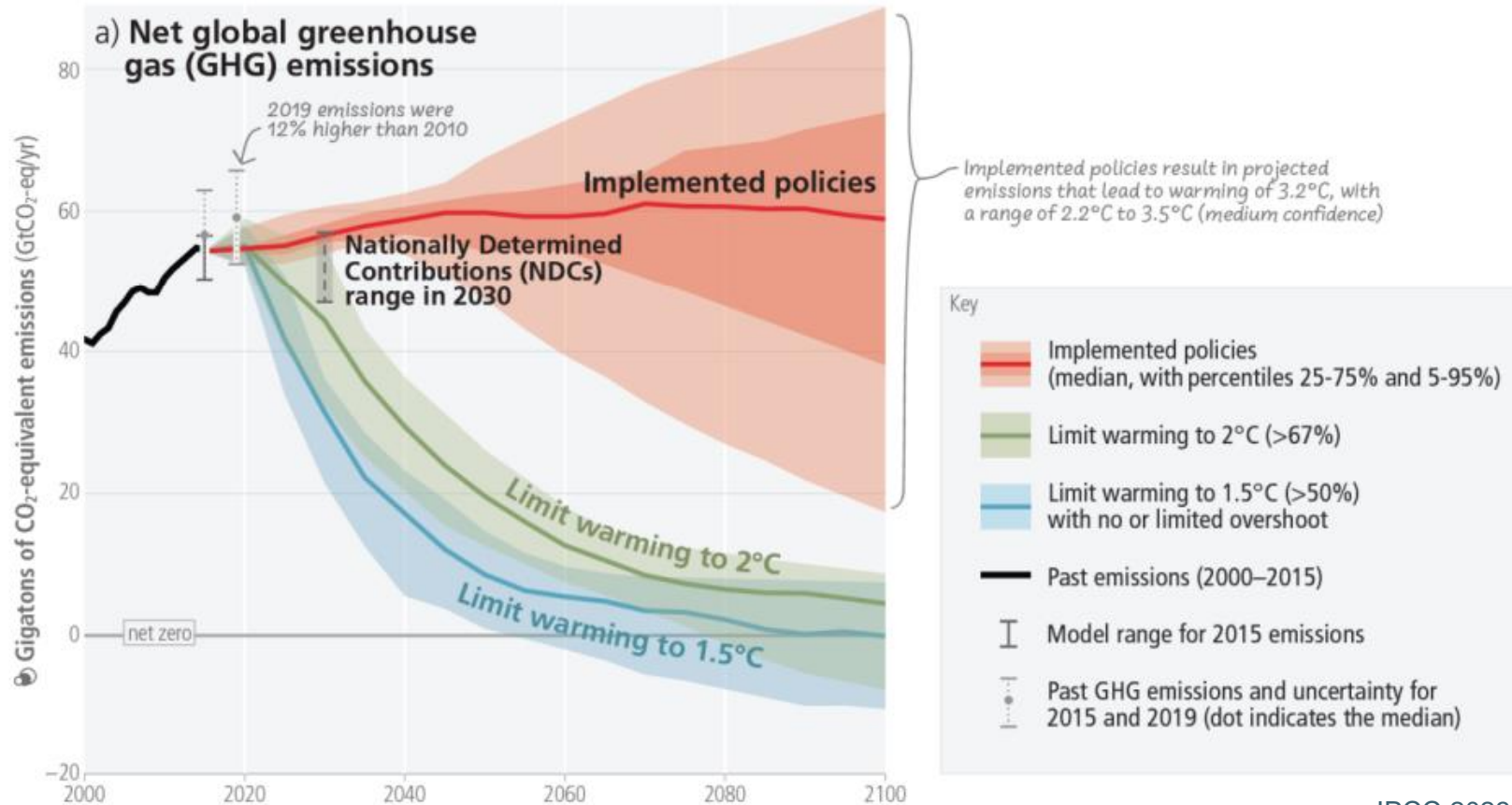
***Paris Agreement:** Adopted by 196 parties in December 2015 at the 21st session of the Conference of the Parties (COP) to the UNFCCC in Paris. One of the goals is to hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change. (IPCC Glossary)*



The Solution: Collective Global Action to Cut Emissions

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

Net zero CO₂ and net zero GHG emissions can be achieved through strong reductions across all sectors

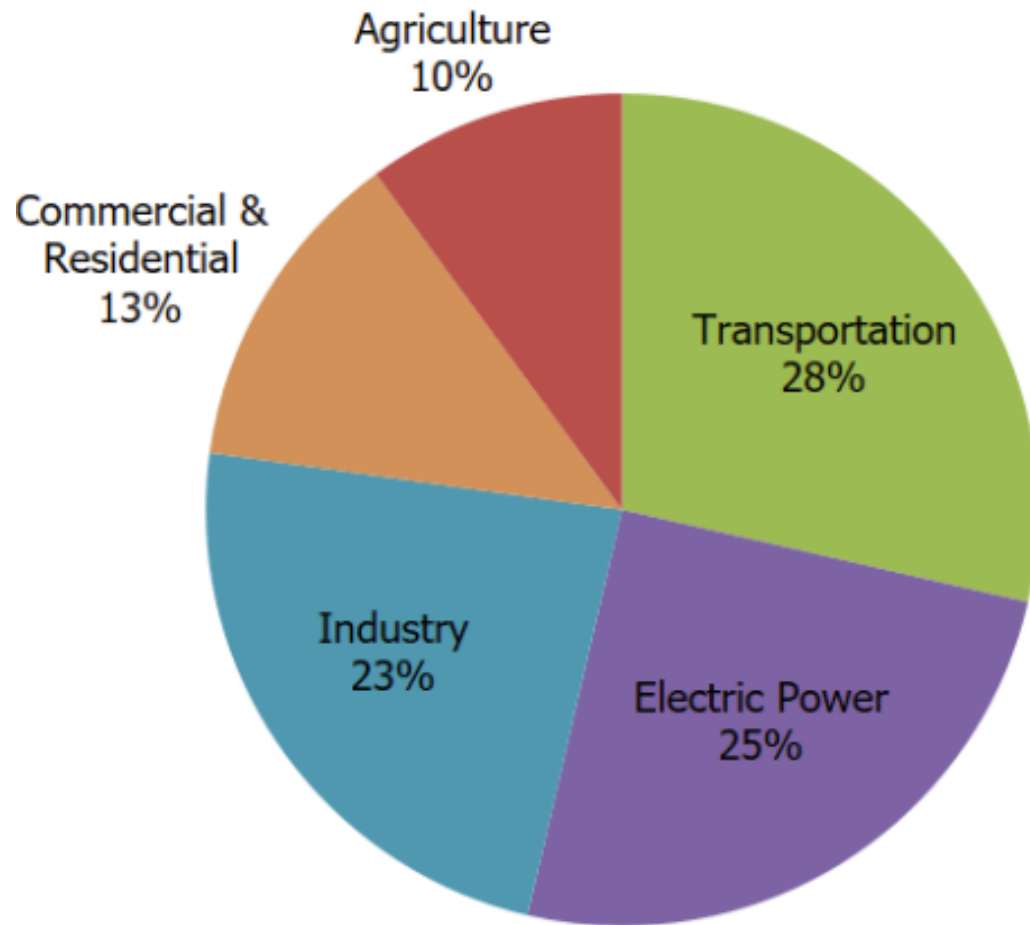


IPCC 2023

Decarbonization: The process by which countries, companies, individuals or other entities aim to achieve zero fossil carbon existence, usually through a reduction of the carbon emissions associated with electricity, industry and transport. (IPCC Glossary)

Net zero: Net zero emissions are achieved when anthropogenic emissions of GHGs to the atmosphere are balanced by GHG removals over a specified period. (IPCC Glossary)

U.S. Greenhouse Gas Emission Sources (2021)



EPA

Adaptation: The process of adjustment to the actual or expected climate and its effects.

Mitigation: A human intervention to reduce emissions or enhance the sinks of greenhouse gases.

Resilience: The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance.

(IPCC Glossary)

US Climate Action: Who and What



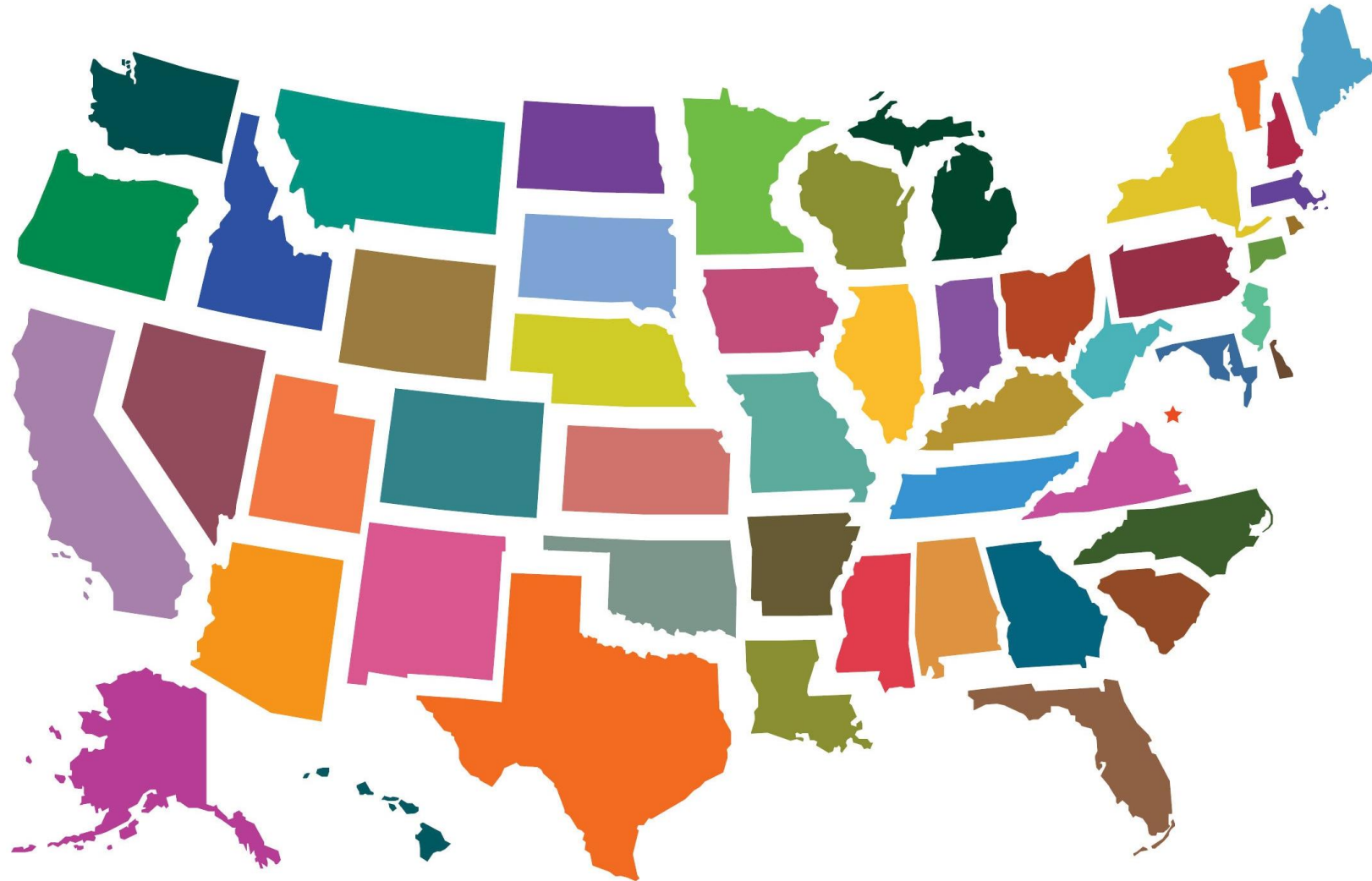
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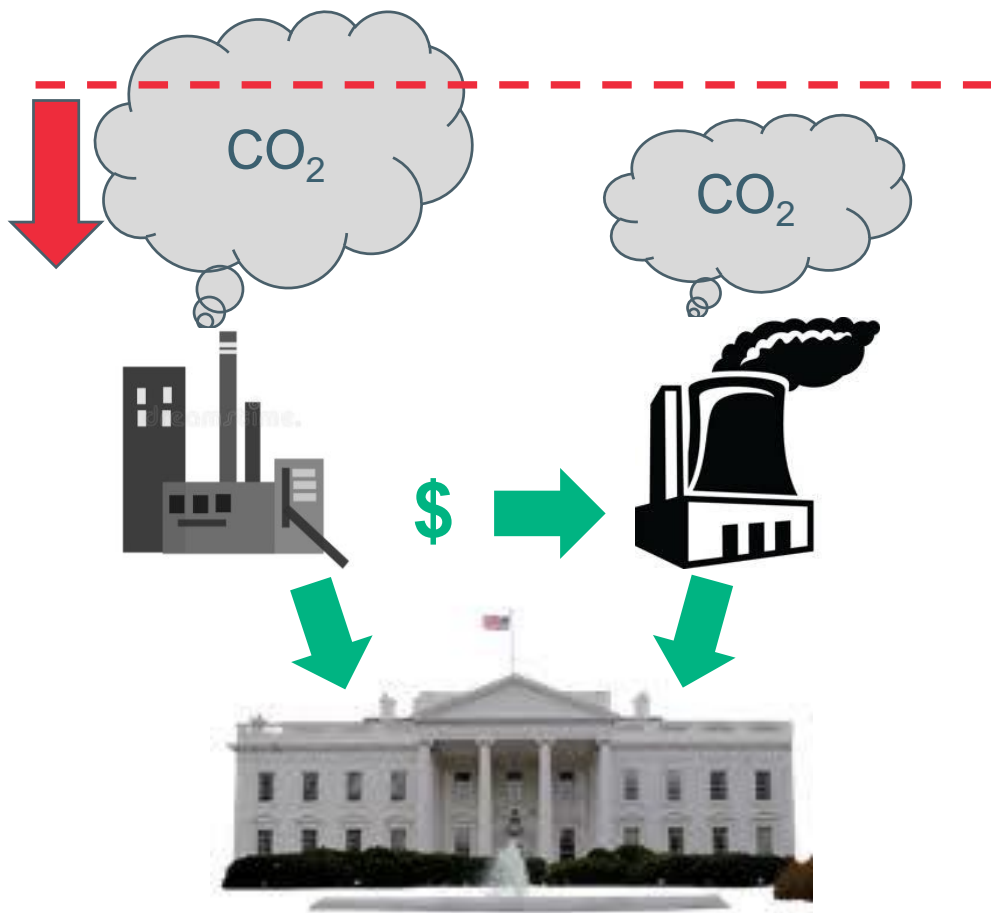
US Government – Climate Policy Process



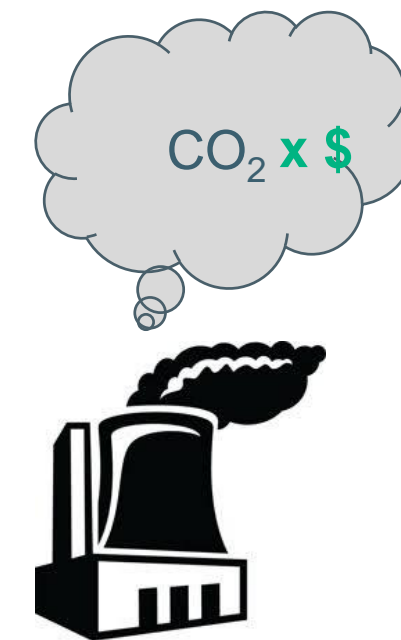
State and Local Governments



Tools – Carbon Pricing

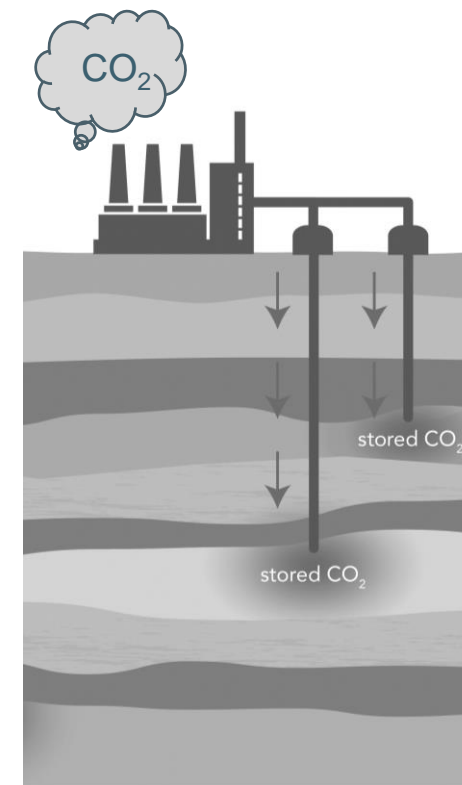


Cap & Invest



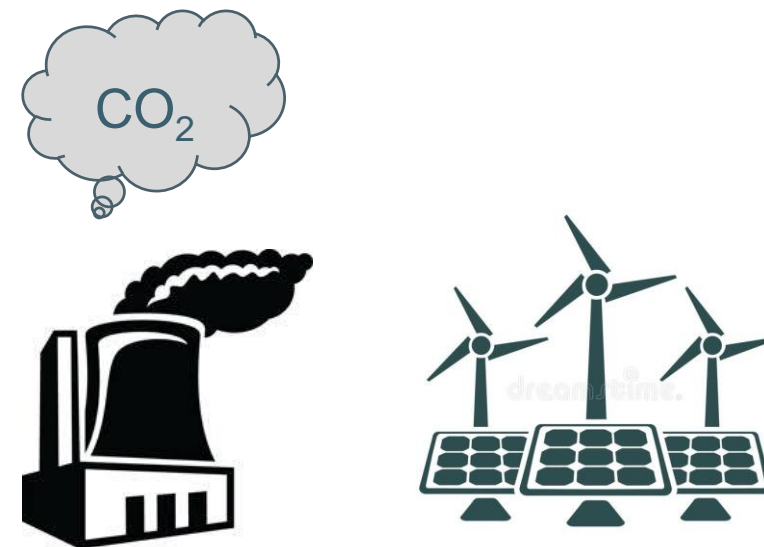
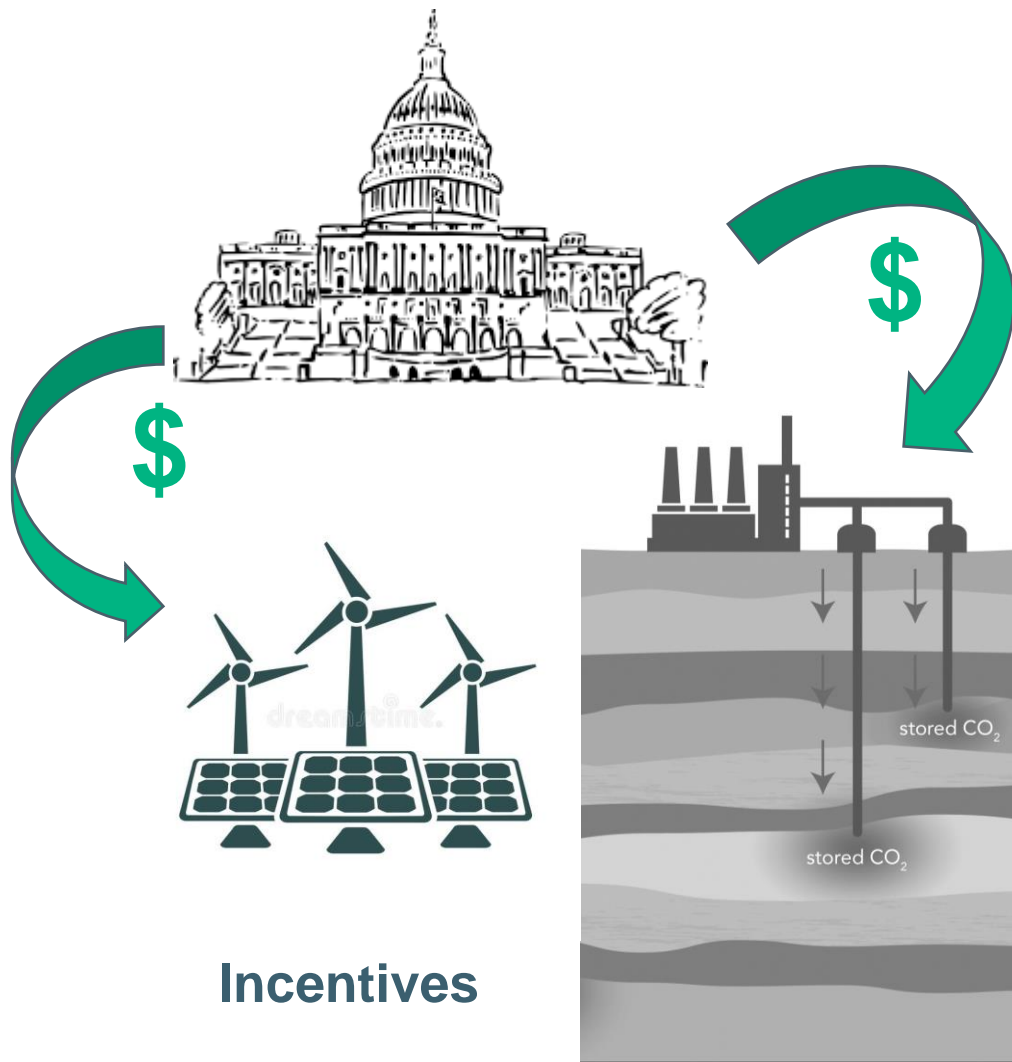
Carbon Tax

Emission rate (lb CO₂/MWh)
based on 90% capture



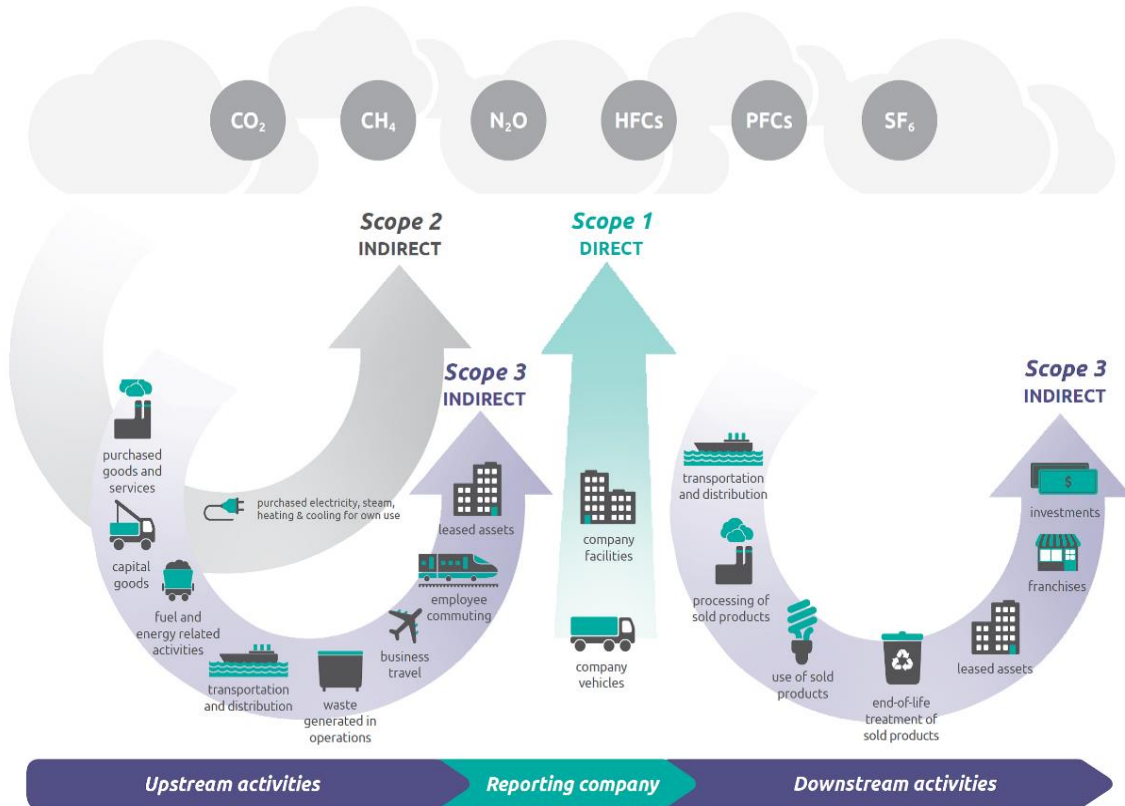
Command and Control

Tools - Incentives and Voluntary



Voluntary Decarbonization

Third Parties



Scope 1 emissions are direct GHG emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).

Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.

Scope 3 emissions are the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly affects in its value chain.

(EPA Center for Corporate Climate Leadership)

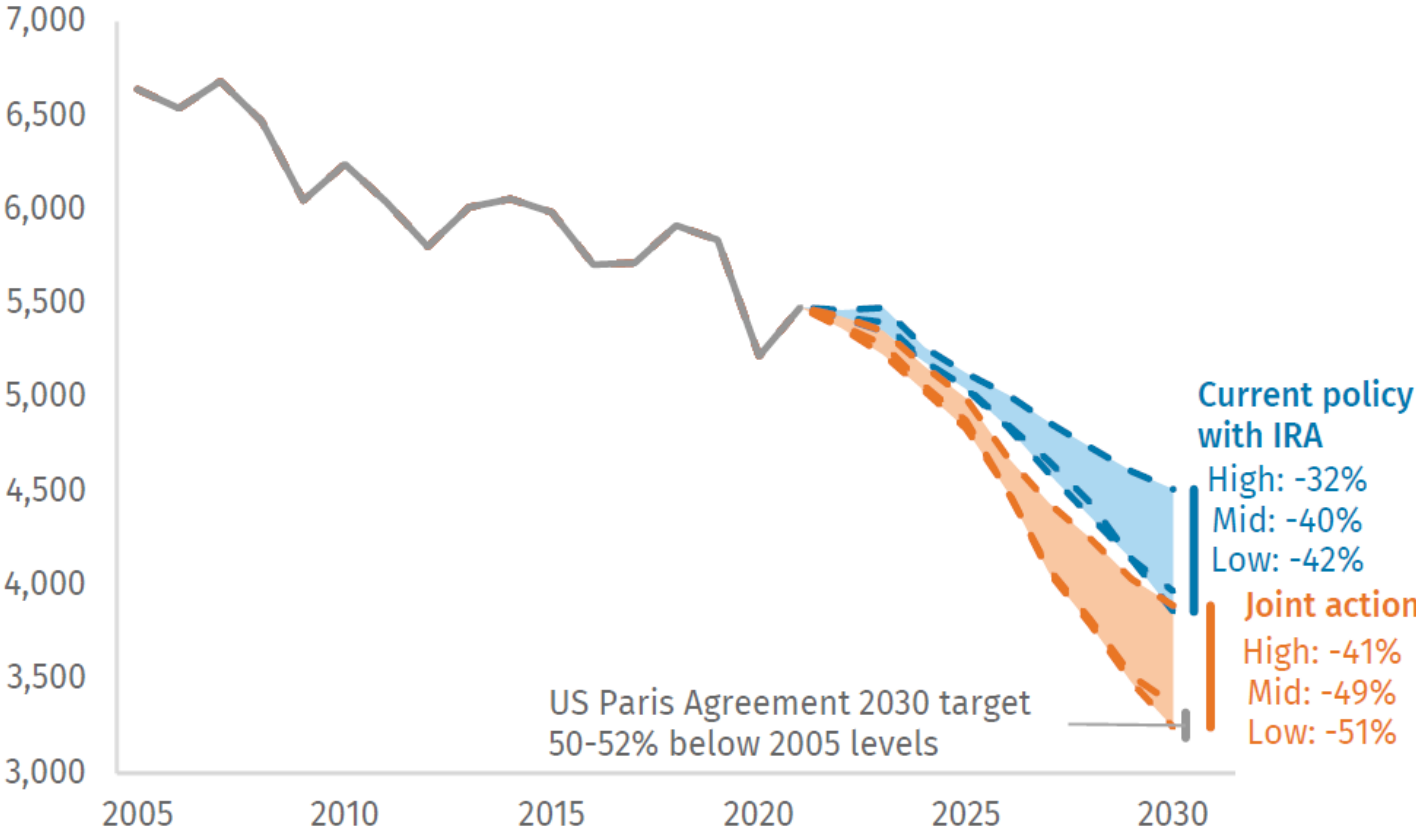
Third Parties



US Progress

US greenhouse gas emissions under a joint action scenario

Net million metric tons (mmt) of CO₂-e



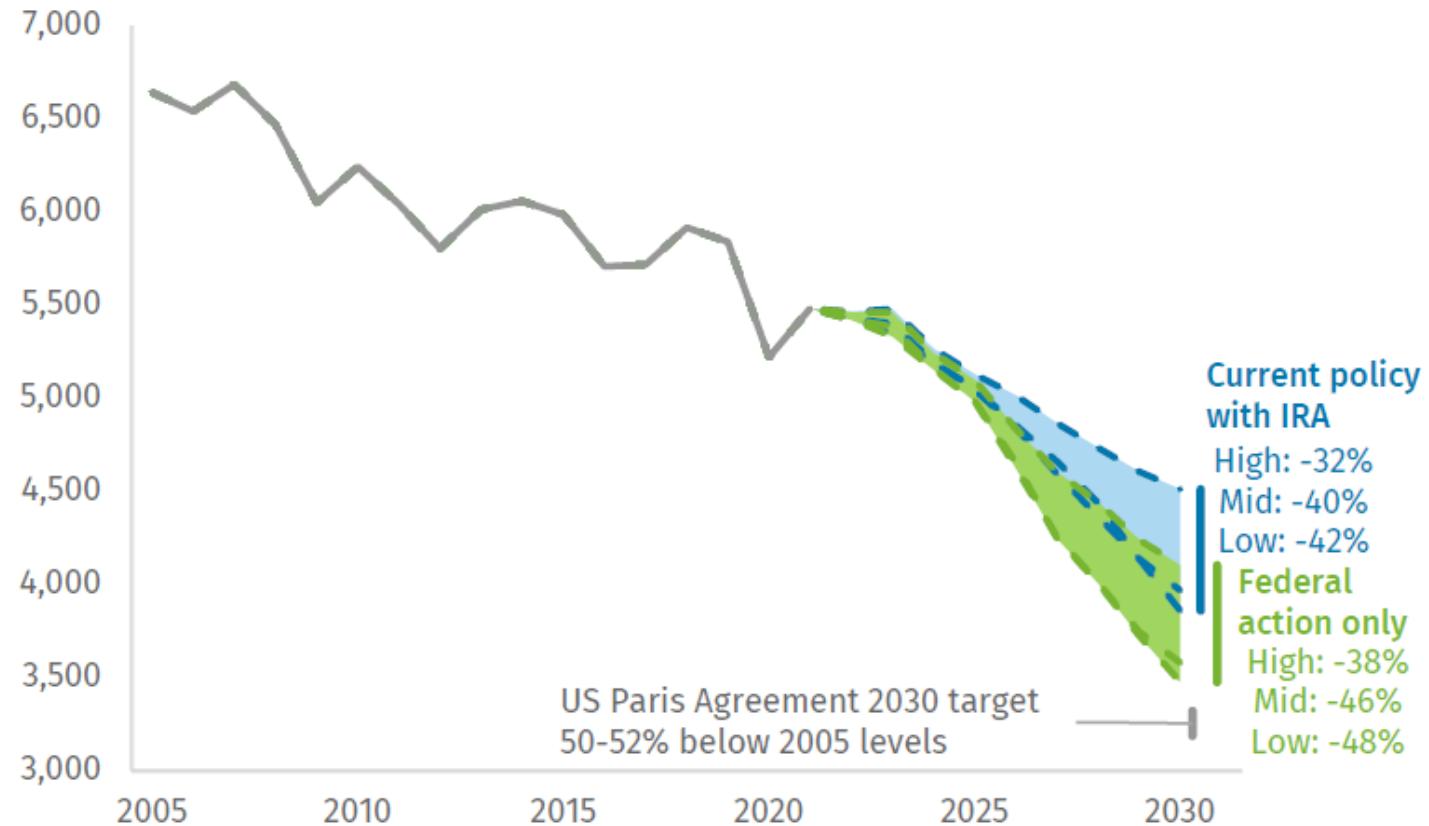
Source: Rhodium Group. The high, mid, low ranges reflect uncertainty around future fossil fuel prices, economic growth, and clean energy technology costs.

<https://rhg.com/wp-content/uploads/2023/03/Pathways-to-Paris-Post-IRA-Policy-Action-to-Drive-US-Decarbonization.pdf>

US Progress

US greenhouse gas emissions under a federal action-only scenario

Net million metric tons (mmt) of CO₂-e



Source: Rhodium Group. The high, mid, low ranges reflect uncertainty around future fossil fuel prices, economic growth, and clean energy technology costs.

<https://rhg.com/wp-content/uploads/2023/03/Pathways-to-Paris-Post-IRA-Policy-Action-to-Drive-US-Decarbonization.pdf>

Why is climate policymaking so difficult?



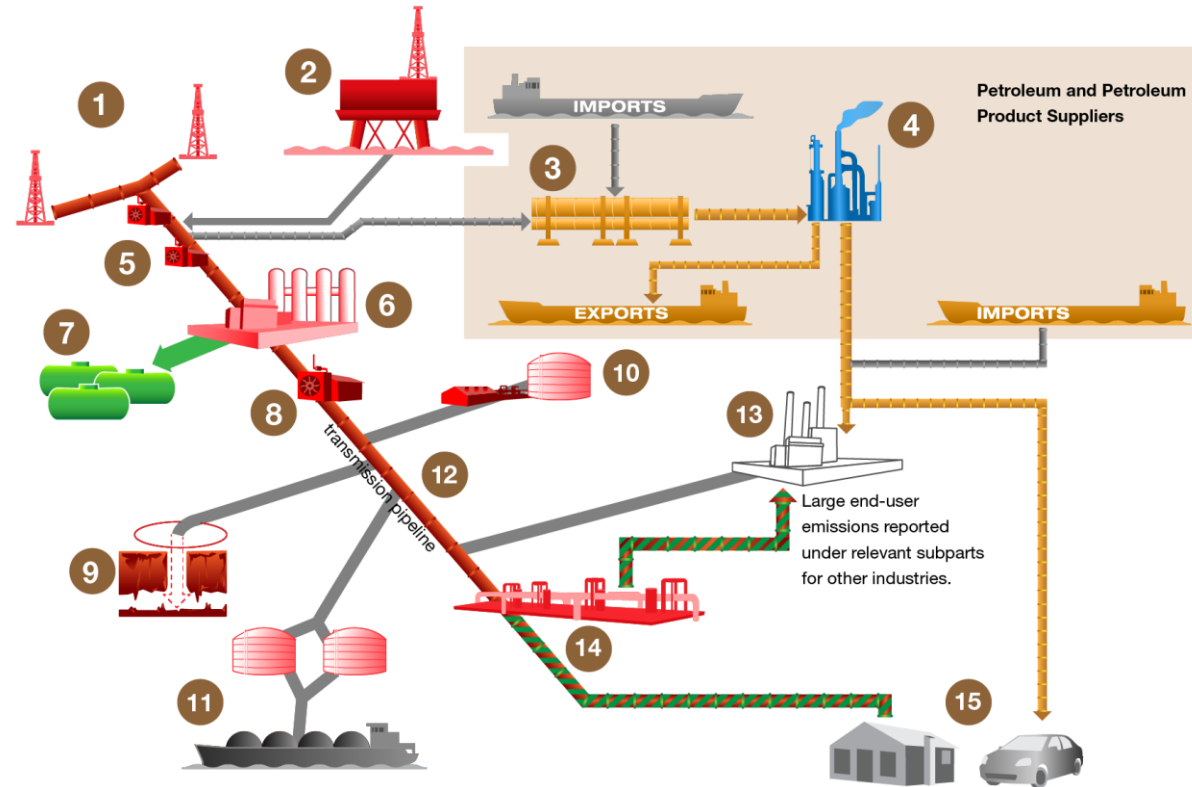
Leveraging Tools



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Example – Oil and Gas Sector Methane



Climate Policy – Key Tools

