

Climate Change Economics

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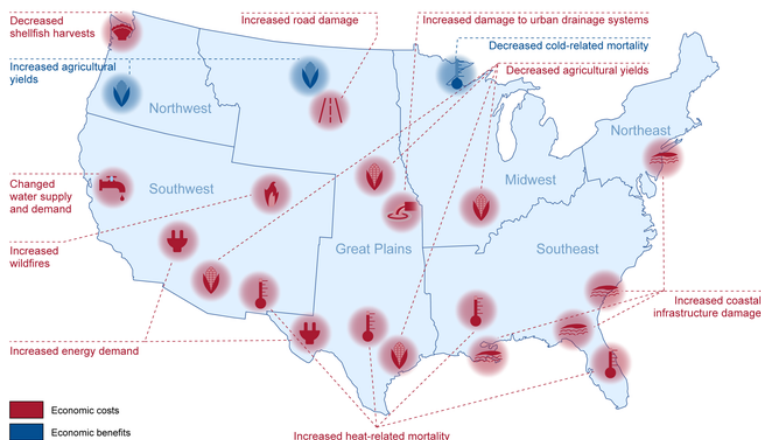
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And How Does Economics Contribute to Thinking about Climate Change? A Preview.

- Account for behavioral reactions to climate change
- Estimate / measure costs of climate change damages and costs of fighting climate change
- Design smart policy to minimize costs of fighting climate change

2

Projected Damages Vary Across the US Estimated at 1.2% of GDP per 1C Increase



Sources: GAO analysis of Environmental Protection Agency, Climate Change Impacts in the United States: Benefits of Global Action (Washington, D.C.: 2015), and Solomon Hsiang et al., "Estimating Economic Damage from Climate Change in the United States," Science, vol. 356 (2017), Map Resources (map). | GAO-17-720

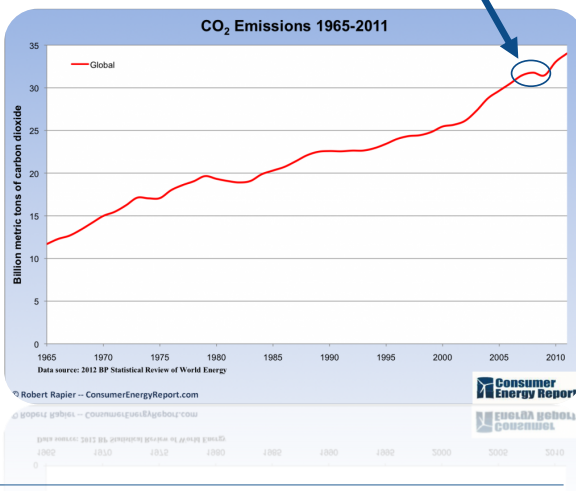


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Recent Progress on Climate Goals

• IPCC's Fifth Assessment Report (2014)

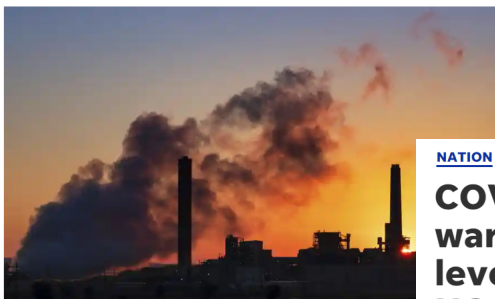
- Goals from previous report (2007) were met!
- ... but mainly because of the Great Recession...
- ... which was not a good thing.



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Carbon emissions to soar in 2021 by second highest rate in history

Global economies forecast to pour stimulus money into fossil fuels as part of Covid recovery



Carbon dioxide levels in atmosphere reach record high

Concentrations are 50% above pre-industrial levels despite dip in emissions during Covid pandemic

NATION

COVID-19 hasn't slowed global warming: Earth's carbon dioxide levels highest in over 3 million years, NOAA says

Doyle Rice USA TODAY

Published 5:42 p.m. ET Apr. 7, 2021 | Updated 10:40 a.m. ET Apr. 8, 2021



Climate Change Policy

Policies to Fight Climate Change that Are Relatively Indirect

- **Subsidizing R&D**
- **Grid / infrastructure**
- **Land use policies**
- **Energy efficiency mandates and subsidies**
- **Mandating renewable energy (e.g. renewable portfolio standards)**



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Policies to Fight Climate Change that Directly Reduce Emissions

- **Emissions standards or limits**
- **Putting a price on emissions**
 - Tax or cap & trade!



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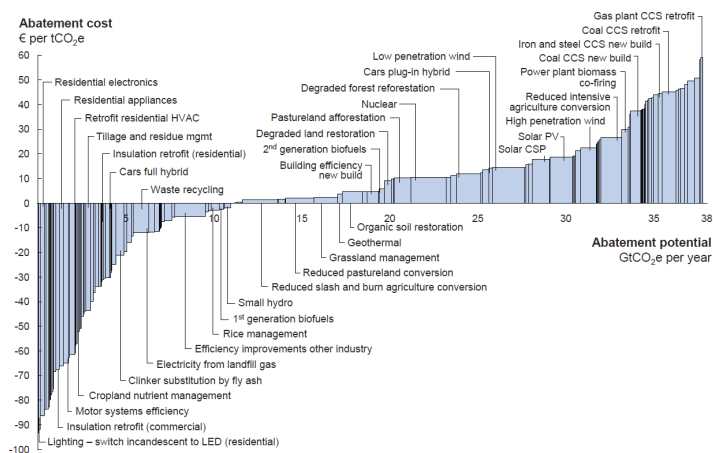
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Social Cost of Carbon

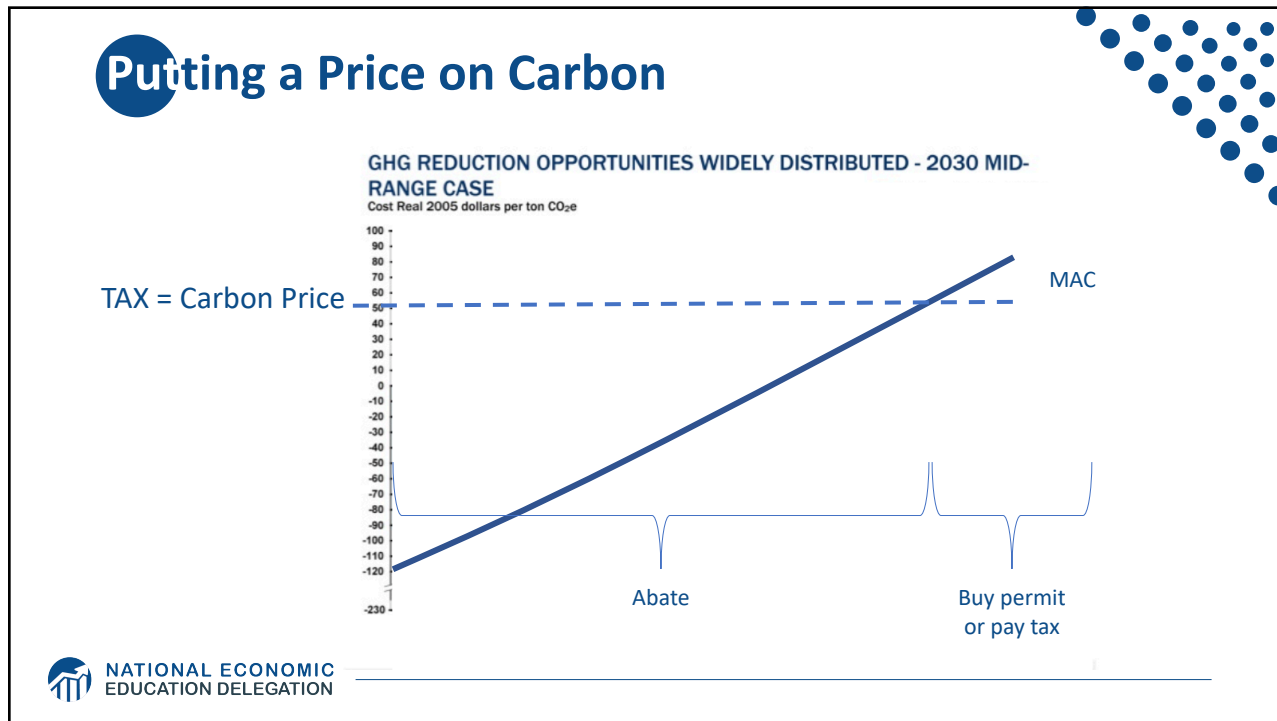
- The expected cost of damages from each unit of greenhouse gas emissions
- Current EPA estimate: ~\$53 per metric ton CO₂
- Social cost of carbon will increase over time into the future



Global GHG Abatement Cost Curve Beyond Business-as-usual - 2030



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €90 per tCO₂e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

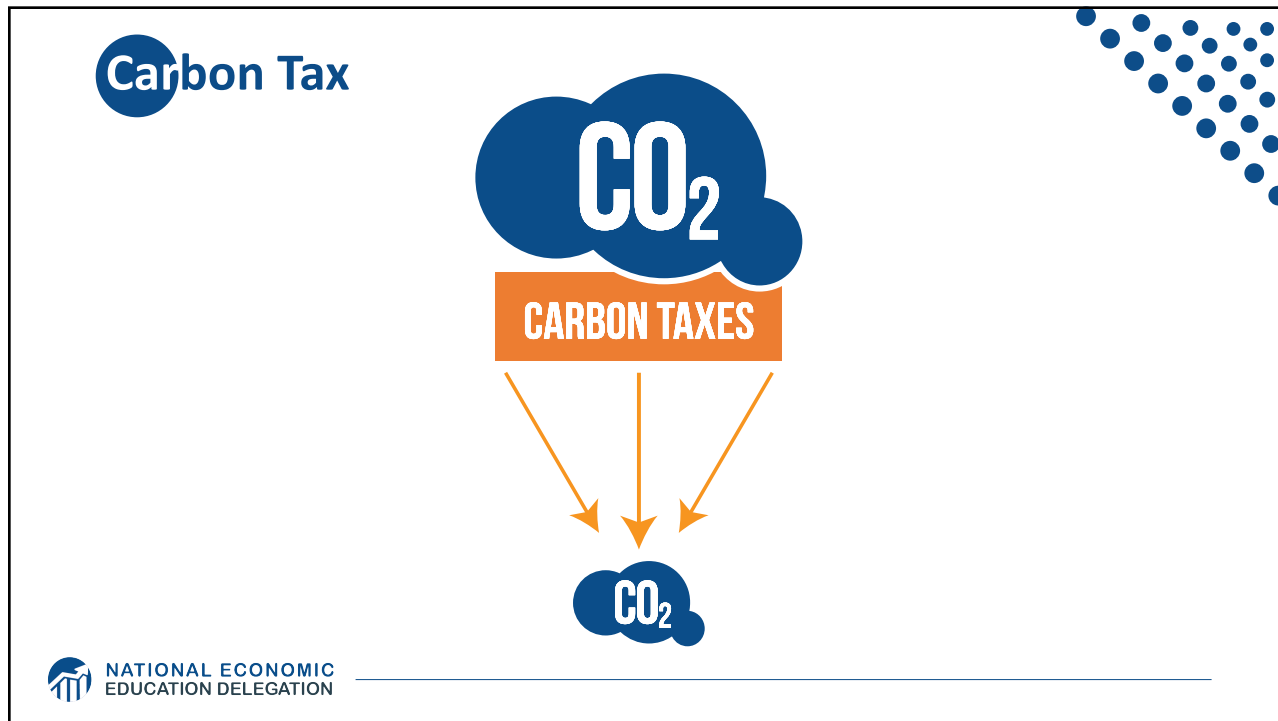


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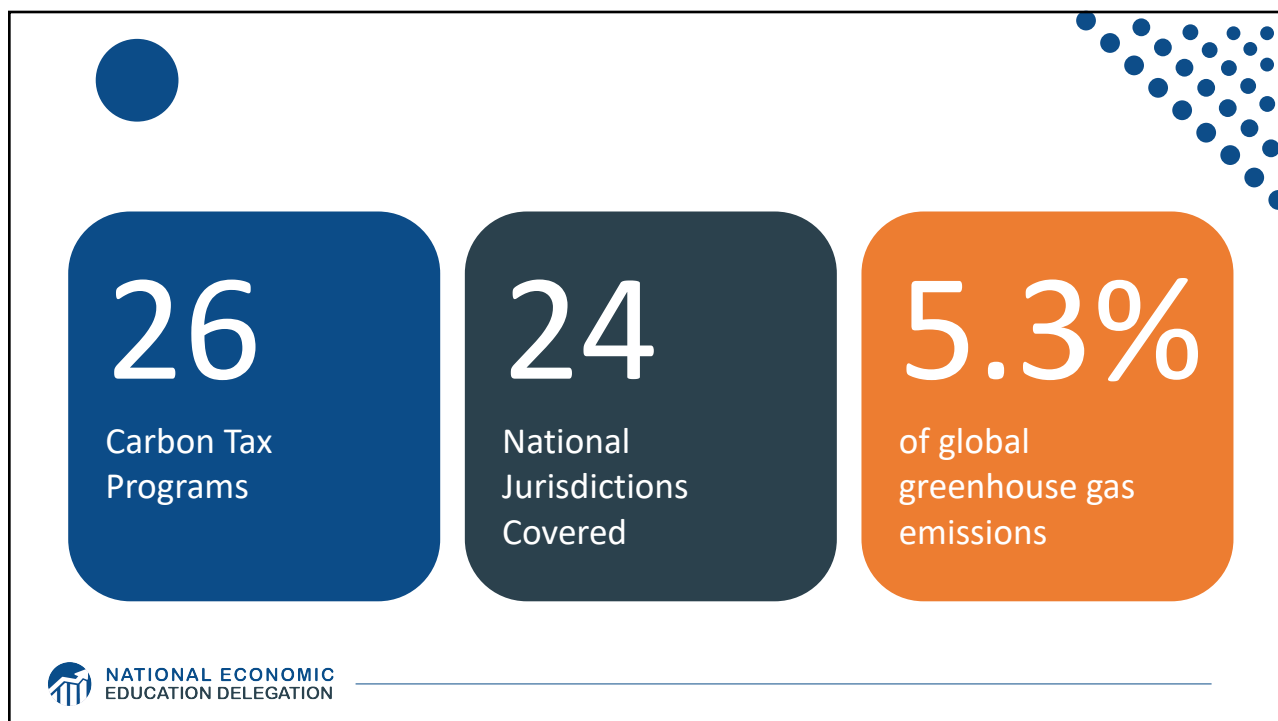
Climate Change Policy in Action

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British Columbia's Carbon Tax Policy



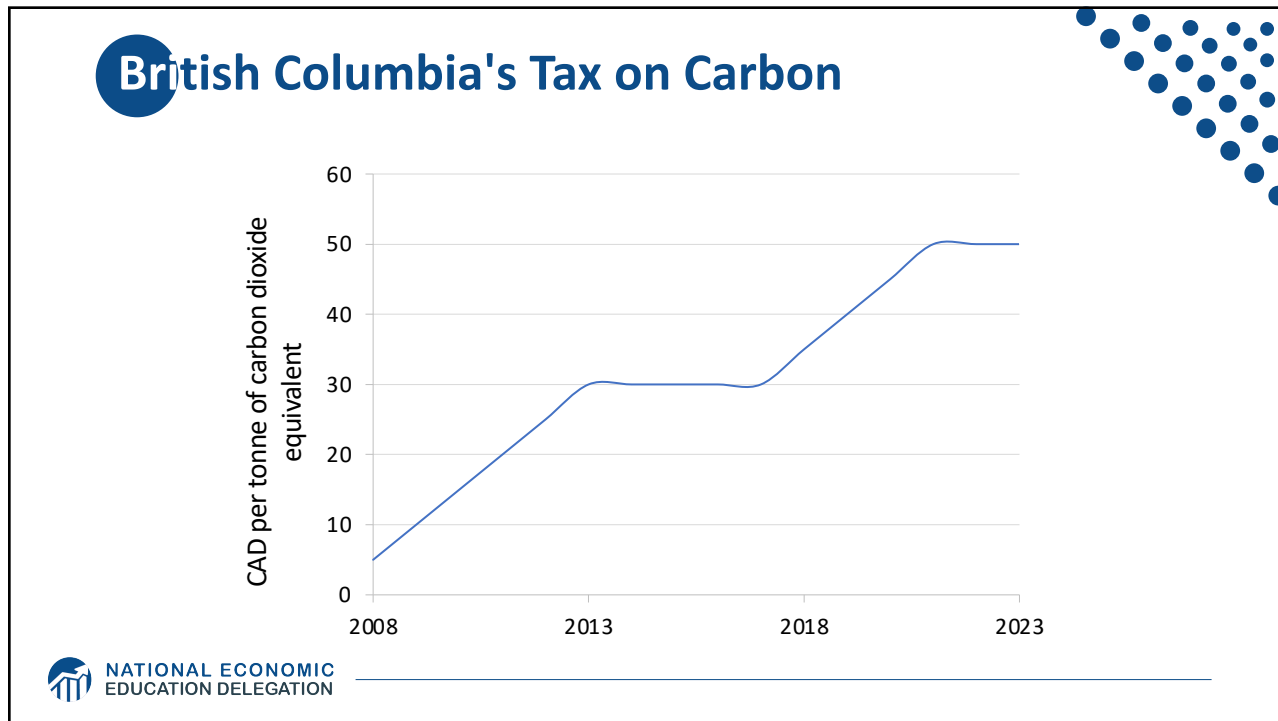
0.1%
of global
greenhouse gas
emissions

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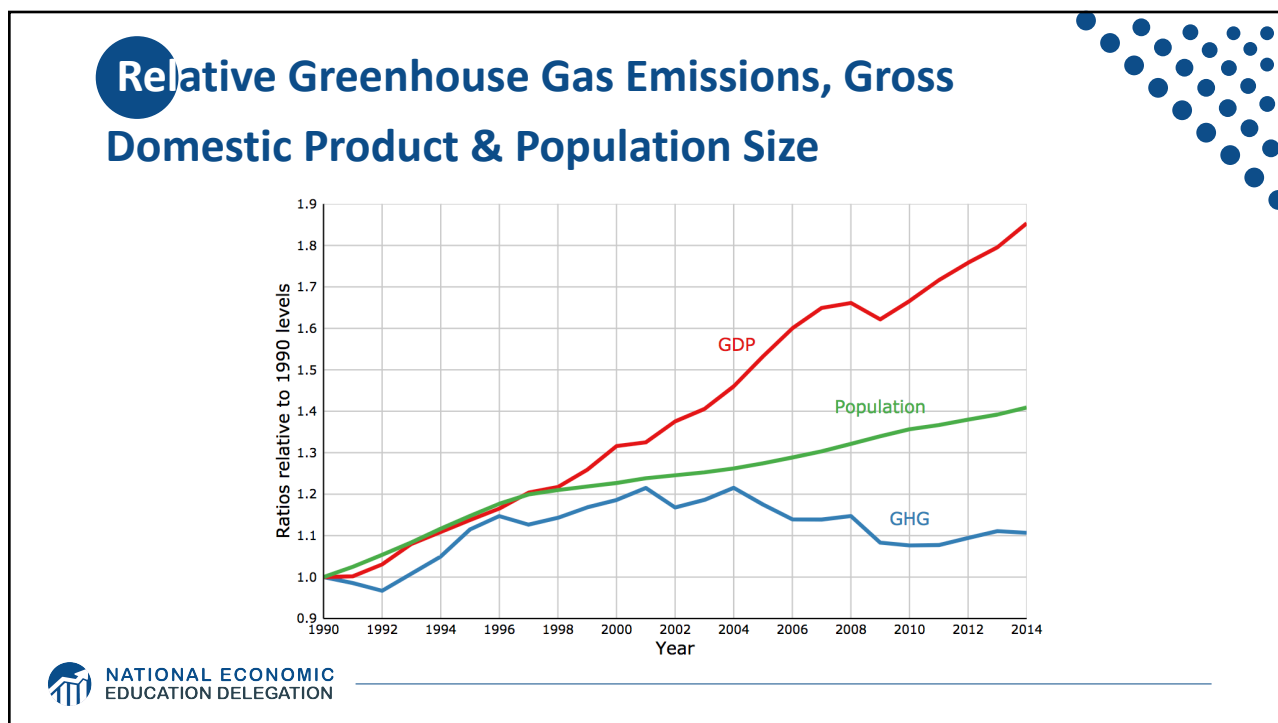
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“ Tax the pollution we do not want, and return the money for what we do want — money in people’s pockets, jobs and investment. ”
- B.C. Government - Carbon Tax Brochure

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Oldest
Carbon
Tax



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Sweden's Carbon Tax Policy



Started
in 1991

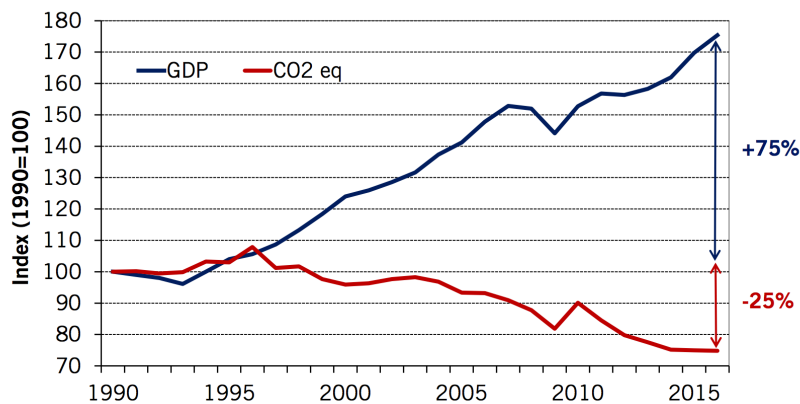
Currently at \$140/ton



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Real GDP and Domestic CO₂eq Emissions¹ In Sweden, 1990-2016



¹ In accordance with Sweden's National Inventory Report, submitted under the UNFCCC and the Kyoto Protocol. CO₂ = approx. 80 % of total CO₂eq emissions. Preliminary data for 2016.

Sources: Swedish Environmental Protection Agency, Statistics Sweden



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U.S. Carbon Tax Plans

- Climate Leadership Council
- Citizens Climate Lobby
- States and municipalities:
Washington state, Oregon,
Washington DC



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Summary

- Climate change is real, is caused by human actions, and has impacts we're already feeling
- Scientists and the IPCC recommend that we work to keep warming below 2 degrees C
- There are many ways to reduce emissions
- Economics-inspired policies can help us do this at the lowest cost
- Taxes and cap-and-trade are proven effective tools to fight climate change!



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“ Economic policies will be central to accomplishing the goals we choose ,”

~ Harris and Roach (2007)

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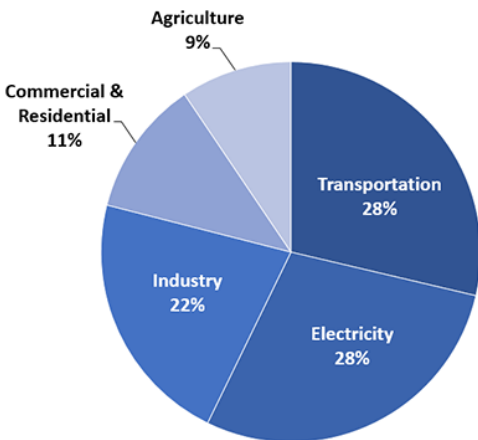
How These Impacts Affect Humans

- Agriculture
- Fisheries
- Coastal damages
- Direct health effects, including sickness and death (temperature & drought; also pollution)
- Indirect health effects (vector-borne disease)
- Reduced fresh water availability
- Wildfires
- Shifting zones for important ecosystems, and desertification
- Reduced worker productivity
- Increased violence
- Some of these may cause human migration and/or conflict

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Total U.S. Greenhouse Gas Emissions by Economic Sector in 2016



Economic Sector	Percentage
Transportation	28%
Electricity	28%
Industry	22%
Commercial & Residential	11%
Agriculture	9%

U.S. Environmental Protection Agency (2018). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016

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