



Osher Lifelong Learning Institute, Spring 2022 **Contemporary Economic Policy**

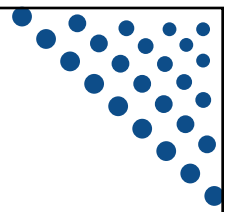
Bradley University
March-April, 2022

Host: Jon Haveman, Ph.D.
National Economic Education Delegation



Available NEED Topics Include:

- **Coronavirus Economics**
- **US Economy**
- **Climate Change**
- **Economic Inequality**
- **Economic Mobility**
- **Trade and Globalization**
- **Minimum Wages**
- **Immigration Economics**
- **Housing Policy**
- **Federal Budgets**
- **Federal Debt**
- **Black-White Wealth Gap**
- **Autonomous Vehicles**
- **US Social Policy**



Course Outline

- **Contemporary Economic Policy**


- Week 1 (3/7): US Economic Update & Prospects for Inflation
- **Week 2 (3/14): Climate Change Economics (Sarah Jacobson, Williams College)**
- Week 3 (3/21): Federal Debt (Geoffrey Woglom, Amherst College)
- Week 4 (3/28): Trade and Globalization (Alan Deardorff, University of Michigan)
- Week 5 (4/4): The Black-White Wealth Gap (Jon Haveman, NEED)
- Week 6 (4/11): Autonomous Vehicles (Jon Haveman, NEED)

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Submitting Questions


- **Please submit questions in the chat or speak up!**
 - I will try to handle them as they come up, but may take them in a bunch as time permits.
- **We will do a verbal Q&A once the material has been presented.**
 - And the questions in the chat have been addressed.

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Climate Change Economics

Sarah Jacobson, Ph.D.
Williams College

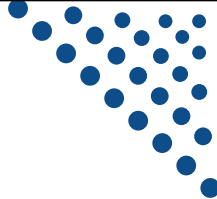



Bradley University
March 14, 2022

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Credits and Disclaimer

- **This slide deck was authored by:**
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- **Disclaimer**
 - NEED presentations are designed to be nonpartisan.
 - It is, however, inevitable that the presenter will be asked for and will provide their own views.
 - Such views are those of the presenter and not necessarily those of the National Economic Education Delegation (NEED).





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Outline

- Economic Building Blocks
- Climate Change
- Impacts of Climate Change
- Reducing Emissions
- Climate Change Policy
- Policy in Action



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Economic Building Blocks



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How Can Economists Help Fight Climate Change?

- By assessing behavioral reactions to climate change.
- By measuring climate change damages and estimating the costs of fighting climate change.
- By designing smart policies that minimize costs to society.



Econ 101: When Everything Is Simple, No Regulation Is Needed for Efficiency

- Simple transactions: buyer and seller feel all costs and benefits of sales
- They choose based on the costs & benefits they feel
- → Efficient number of transactions! (Maximizes social benefits)



When Our Decisions Affect Others, We Need Regulation

- Pollution causes an **EXTERNALITY**: a side effect (here, a cost) that affects someone else
 - Polluting things have an “unfair cost advantage” because part of cost is offloaded on others
 - → Too much pollution is generated
 - Regulation limiting pollution has net benefits
- The *“efficient” amount of pollution balances costs & benefits of pollution*



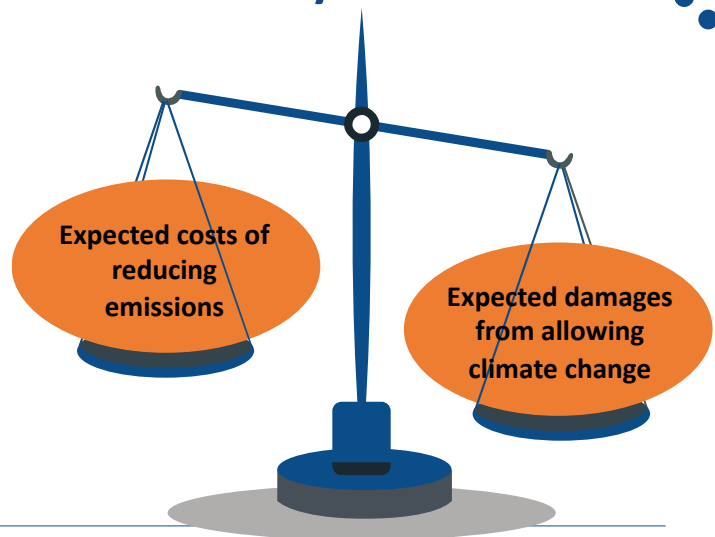
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How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

Abating greenhouse gas emissions is costly...
... but without action, climate change damages are even more costly.

Goal is not zero emissions, but efficient level that achieves a balance.



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Cost-Benefit Analysis of Fighting Climate Change

- Most economic models suggest the costs of keeping warming below 2°C are relatively small, amounting to **1-4% of GDP by 2030.**
- Costs of acting to keep warming below 2°C are almost certainly less than future economic damages they would avoid.
 - Damages estimated to be between: **7-20% of worldwide GDP.**



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Climate Change



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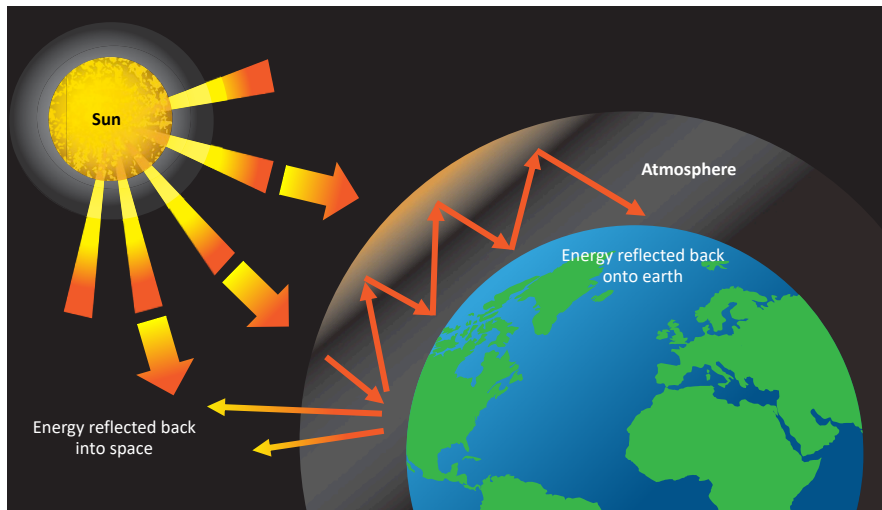
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A Climate Change Ladder

- Emissions
- Mitigation (a.k.a. Abatement)
- Adaptation
- Damages

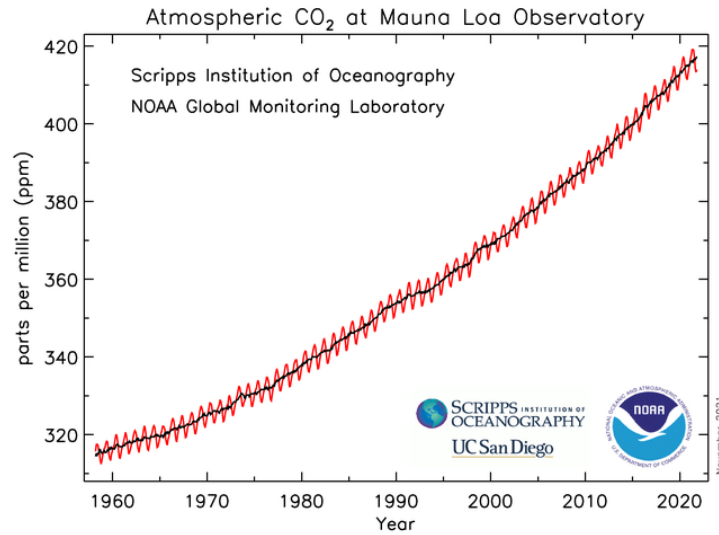
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The Atmospheric Greenhouse Effect



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Atmospheric CO₂ Concentrations Up To Now

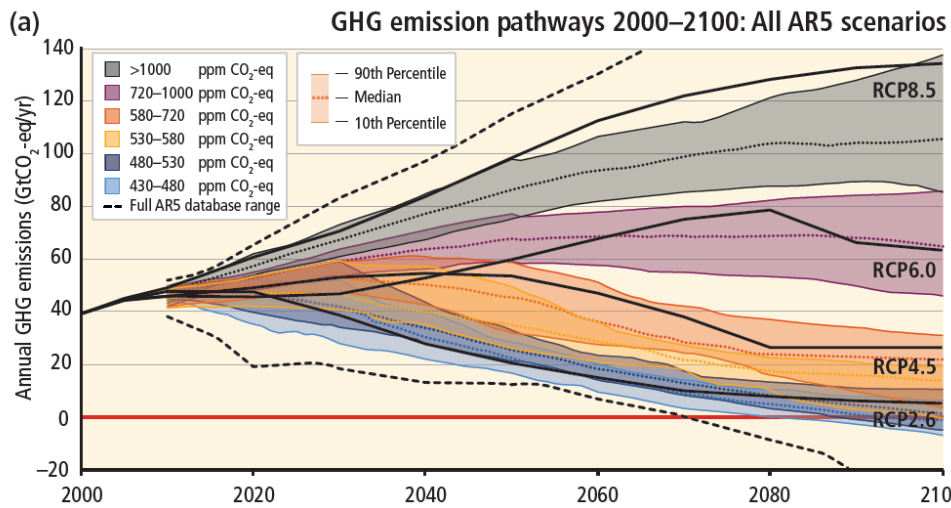


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Source: NOAA

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Emissions Trajectories into the Future



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Source: IPCC Assessment Report 5

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What Do Greenhouse Gas Emissions Do to the Planet?

- **Increased temperatures**
 - Sea level rise
 - Storm surges
- **Altered precipitation patterns**
- **More variable weather**
- **More / more powerful storms**
- **Carbon dissolves in ocean**



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Impacts of Climate Change



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How Climate Change Affects 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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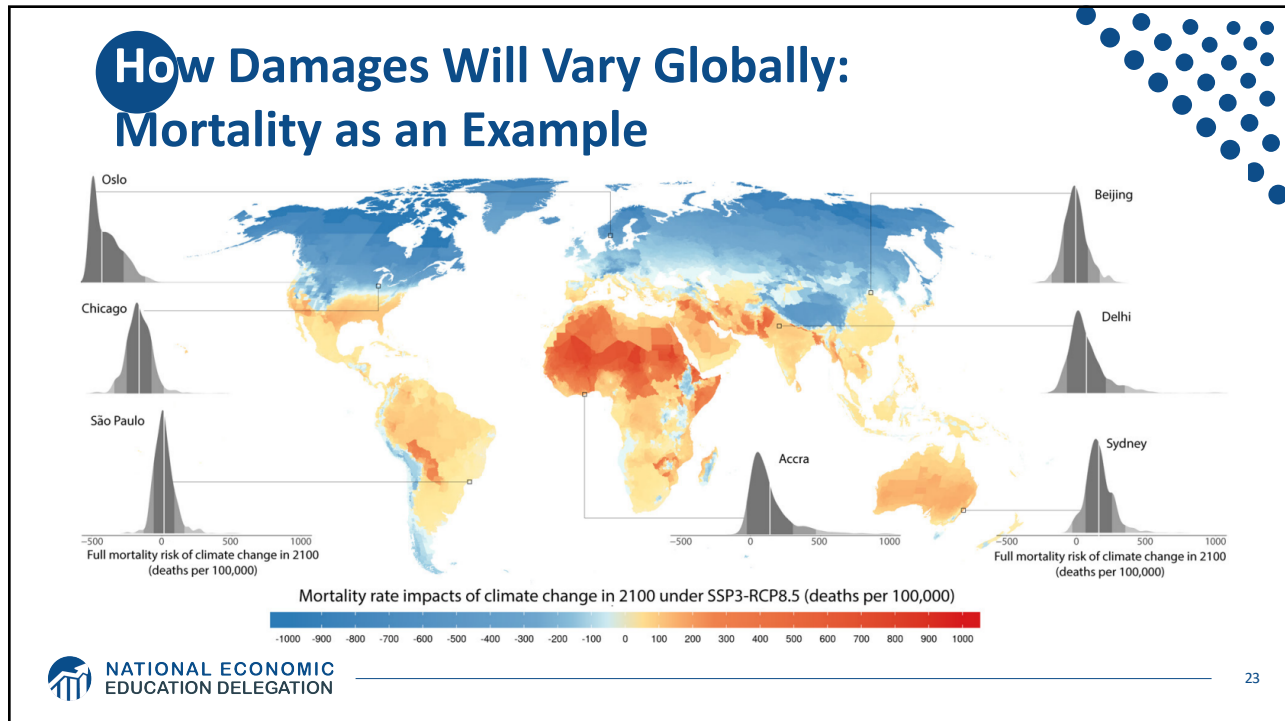
Social Cost of Carbon

- The expected cost of damages from each unit of greenhouse gas emissions.
- Current EPA estimate: ~\$51 per metric ton of CO₂ (but estimates vary a lot!)
 - About \$157/car per year.
 - \$32 Billion for all vehicles in the US.
- Social cost of carbon will increase over time.

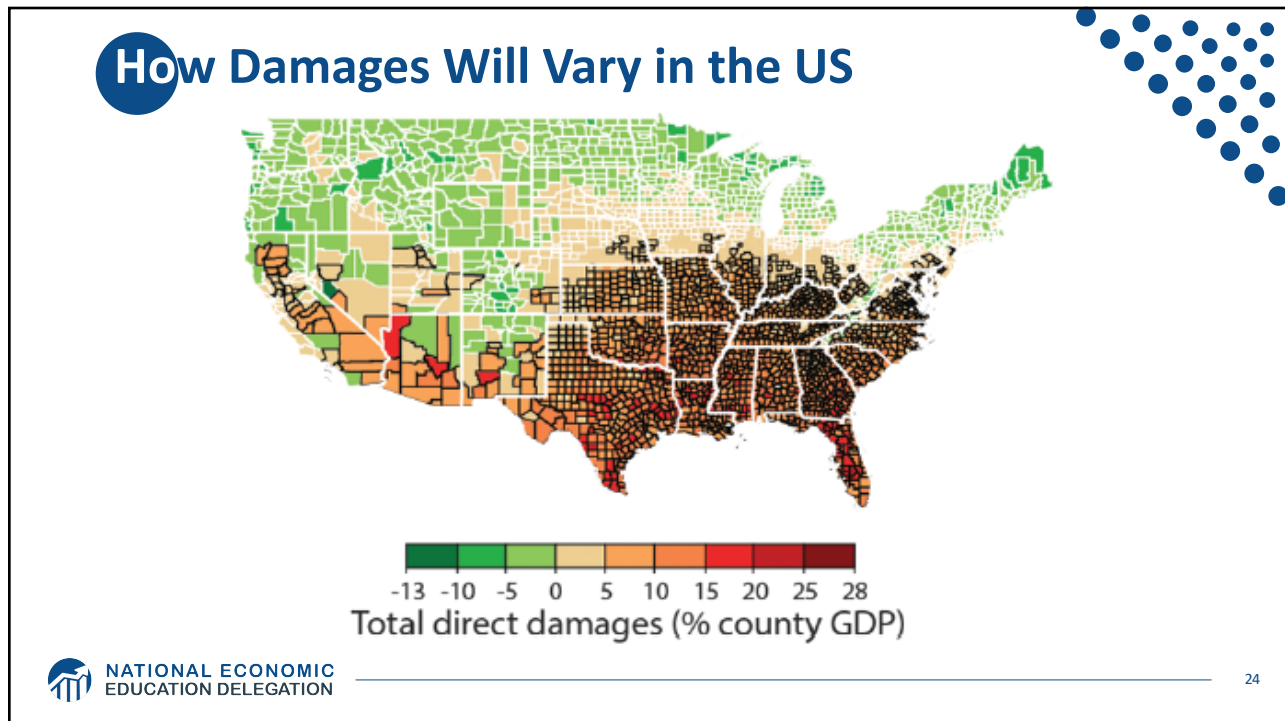


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Adaptation Reduces Damages

- **Adaptation:** costly action that reduce damages from climate change.
- The **net damage cost to society** is the **cost of adaptation** plus the **cost of remaining damages**.
- People and firms will take some actions on their own, up to the point where they find it worthwhile.
- Some adaptation requires government involvement.

Individual-Level Adaptation

- **Perhaps you...**
 - Stay inside more.
 - Turn on the air conditioning.
- **Farmers may:**
 - Plant at different times.
 - Plant new crops.
- **Businesses may:**
 - Give outdoor workers water / shade breaks.
- **Everyone might:**
 - Think about moving to a safer place.



Public Adaptation

- **Governments can help:**
 - When collective action is less costly than everyone acting alone.
 - When individual action is not possible or likely.
 - When some people can't protect themselves.
- **Sea walls**
- **Ecosystems that provide protection**
- **Policies that protect workers or low-income and vulnerable populations**
- **Planned retreat (moving a community)**



Reducing Emissions

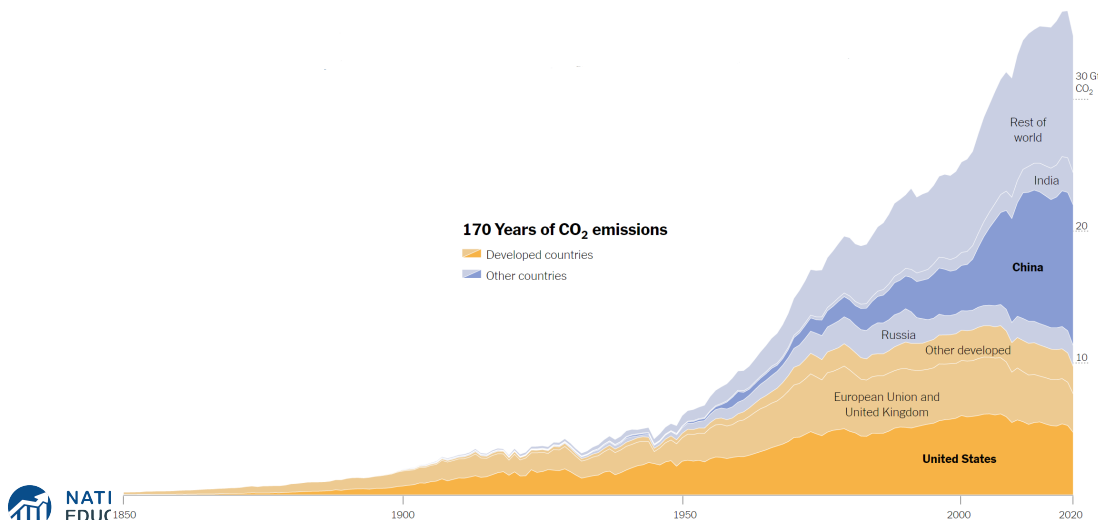
Global Net Emissions Are What We Care About

- **For climate impacts, we don't care where they are emitted, only how much**
 - There may be other local impacts
- **Gross emissions (greenhouse gas sources): how much greenhouse gases (including CO2) we put out**
- **Greenhouse gas sinks: ways to pull CO2 out of the air**
 - Existing: oceans, forests
 - Increase sinkage by planting trees, or other measures



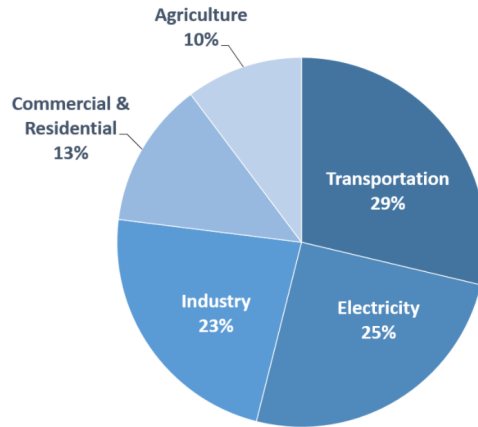
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Sources of the Global Flow of Emissions



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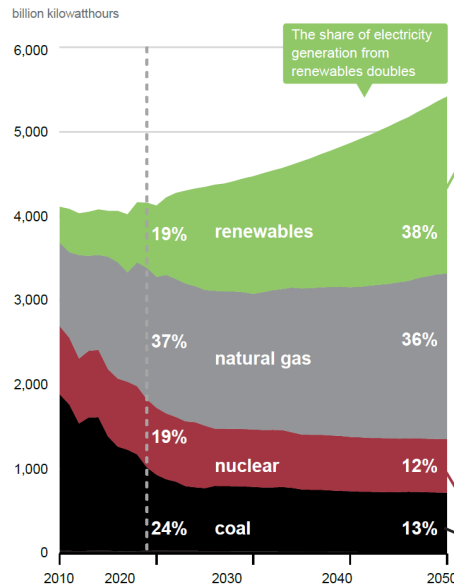
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020



Total Emissions in 2019 = 6,558 [Million Metric Tons of CO2 equivalent](#). Percentages may not add up to 100% due to independent rounding.

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US Electricity Sources



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Which Emissions Should We Cut?

- List all possible ways to reduce emissions
- Figure out how much each can reduce in total
- Figure out how much each costs per unit of emissions reduced
- Line them up in order: cheapest to costliest (“marginal abatement cost curve”)
 - → Tackle first the cheapest ones!

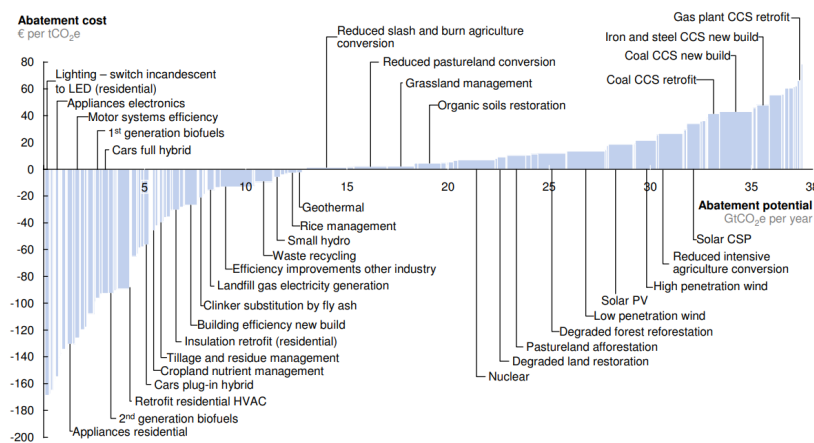


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Example Abatement Cost Curve

(Don't trust these numbers, this is just to show the idea)

V2.1 Global GHG abatement cost curve beyond BAU – 2030



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €80 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 v2.1

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But Are Costs So Easy to Assess?

- **Difficult to project future costs for new technology**
 - Costs of renewables have been dropping fast
- **Investments in research and development and infrastructure (e.g., EV charging) can lower future costs**
- **Barrier to expanding renewable energy: intermittency**
 - Battery technology under development

Geoengineering and Carbon Capture

- **Technical pathways to reduce climate change without reducing emissions**
- **Carbon capture: captures CO₂ emissions and stores them or “utilizes” them (for energy, pressure, etc.)**
 - Not yet proven at scale
- **Solar geoengineering: make the atmosphere reflect more light to regain earlier thermal balance**
 - Totally theoretical
 - Potentially risky

Climate Change Policy



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Policies That Reduce Emissions Directly

- **Command and control regulation**
 - Emissions standards or limits (e.g., Clean Water Act discharge limits)
 - Tech standards (e.g., require scrubbers on power plants)
- **Incentive-based policies**
 - Putting a price on emissions – leveling the playing field!
 - Tax or cap & trade
 - Subsidizing green energy (e.g., feed-in tariffs)



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Command and Control vs. Incentive-Based Regulation

- **Efficiency**

- Both can achieve the same amount of emissions reduction.
- Incentive-based policies can achieve emissions reduction at much lower cost.

- **Equity**

- Both have may regressive impacts (low-income families bear costs that are a larger percent of their incomes vs hi-income families)
 - However, new evidence increasingly questions this.
- Cap and trade and carbon tax can generate revenues that can be used to offset the regressivity.
 - E.g.: “carbon dividend”
- Command and control regulations do not.



How Does a Carbon Tax Work?

- **Choose activities to be covered (e.g., electricity sector, all emitters, etc.).**

- **Set tax level.**

- Optimally, it represents the social cost of polluting.

- **Polluters must pay a tax for every unit emitted.**

- Polluters with **low** abatement costs will **abate** to avoid the tax
- Polluters with **high** abatement costs will pollute and **pay the tax**



How Does Cap and Trade Work?

- Choose activities to be covered (e.g., electricity sector, all emitters, etc.).
- Set maximum emissions level (“cap”).
- That many pollution permits are issued.
 - Can be auctioned off or given to polluters
- Every polluter in a covered sector must have a permit for every unit of pollution.
- Polluters buy and sell (“trade”) permits on a market as they wish.
 - Polluters with **low** abatement costs will make / save money by **abating** and selling / not buying permits
 - Polluters with **high** abatement costs will buy permits and **pollute**

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Examples of Other Policies that Reduce Emissions

- Research and development subsidies
- Renewable energy mandates (e.g., renewable portfolio standards)
- Energy efficiency mandates and subsidies (e.g. CAFE fuel economy standards)
- Grid / infrastructure improvements
- Public transportation
- Land use / zoning policies

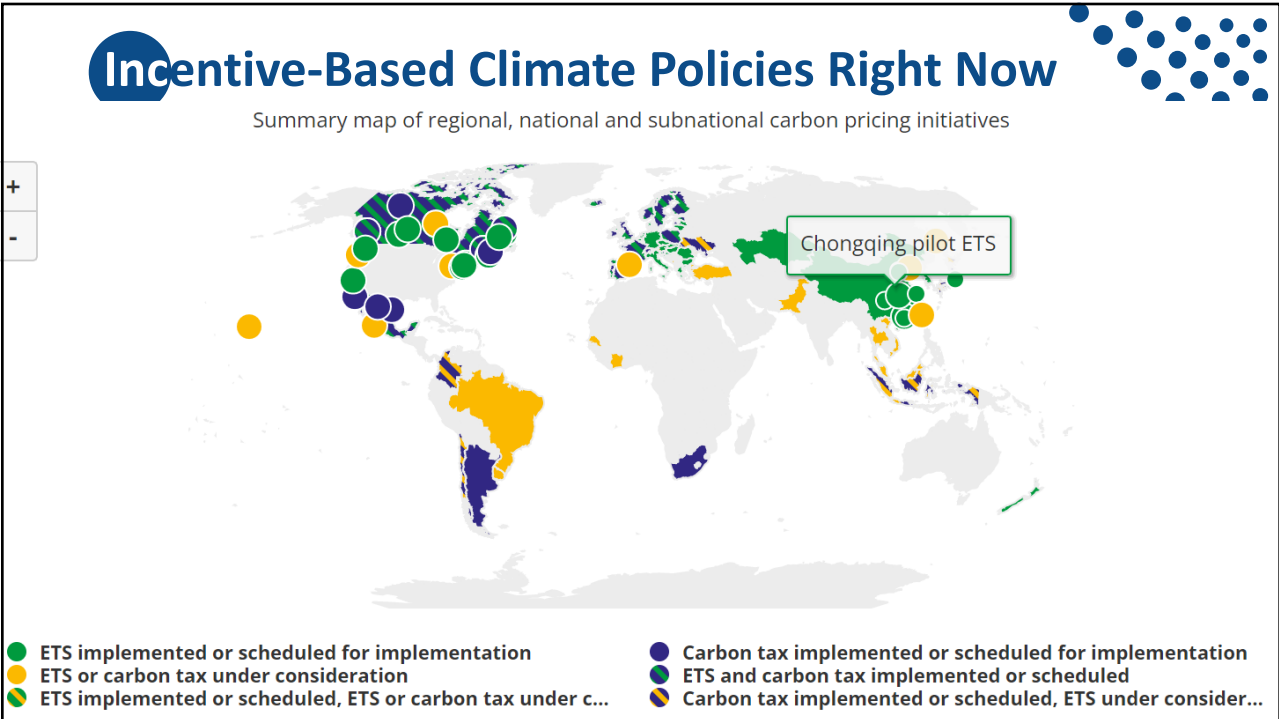
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Climate Change Policy in Action



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California's Cap and Trade System Since 2012



0.7%

of global
greenhouse gas
emissions

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California's AB32: Global Warming Solutions



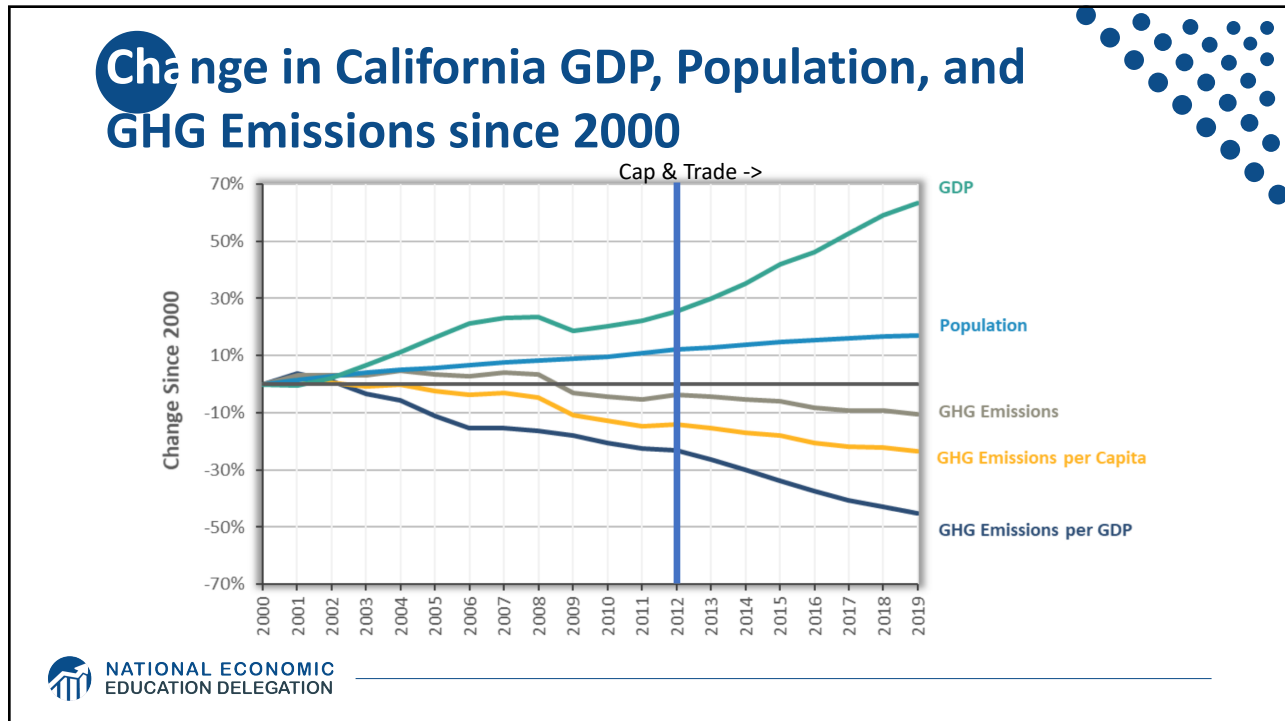
- **California's goals:**

- Reduce emissions to 1990 levels by 2020
- An 80% reduction in emissions from 1990 levels by 2030

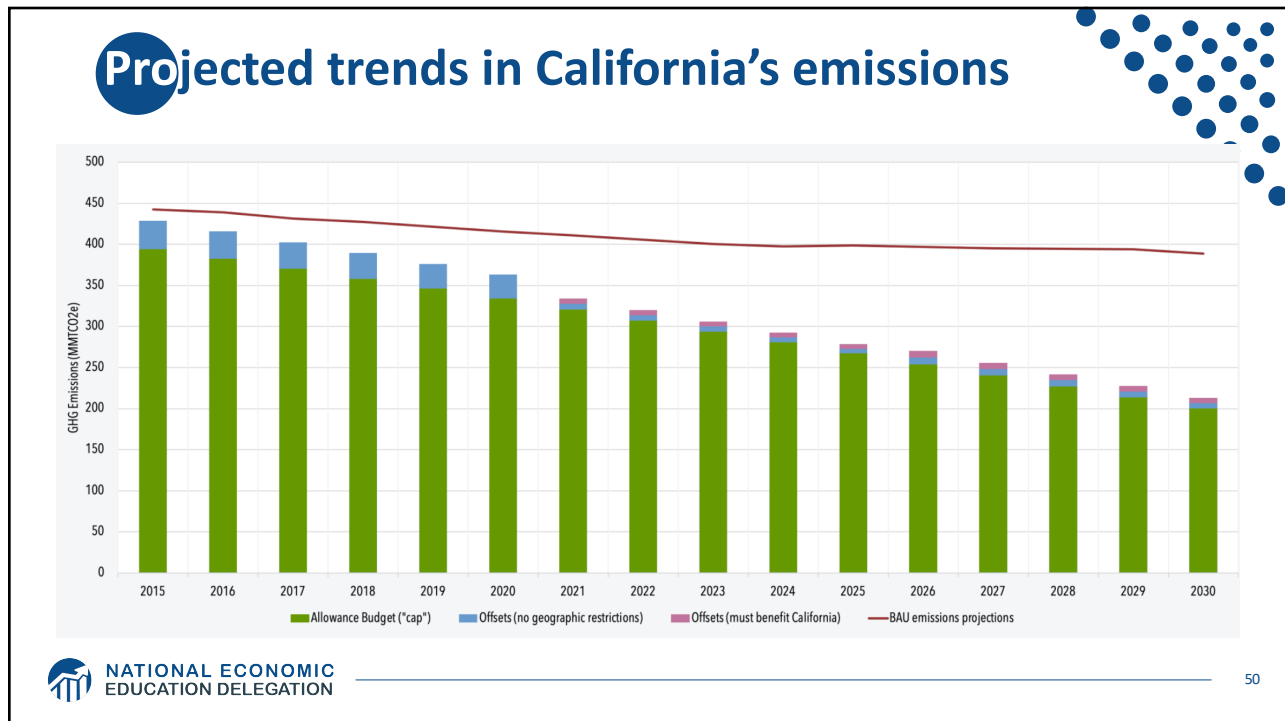
- **California's Tools:**

- Cap and Trade
- Renewable Portfolio Standard
- Clean Cars Program
- Low Carbon Fuel Standard

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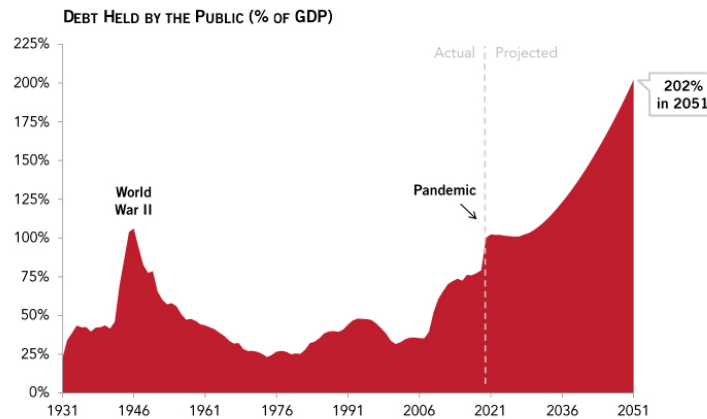
Summary

- Climate change is real, is caused by human actions, and has impacts we're already feeling.
- This problem won't solve itself; we need policy intervention, and fast.
- Smart policy can reduce greenhouse gas emissions by the right amount and at the lowest possible cost.
 - For example, cap and trade and emissions taxes!
- We also need policies to help with adaptation and support those bearing the greatest damages.

The Federal Debt: Geoffrey Woglom



The national debt is on an unsustainable path



SOURCE: Congressional Budget Office, The 2021 Long-Term Budget Outlook March 2021.
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PGPF.ORG

Thank you!

Any Questions?

www.NEEDelegation.org

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