


Climate Change Economics

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NEED Webinar

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National Economic Education Delegation




- **Vision**

 - One day, the public discussion of policy issues will be grounded in an accurate perception of the underlying economic principles and data.
- **Mission**

 - NEED unites the skills and knowledge of a vast network of professional economists to promote understanding of the economics of policy issues in the United States.
- **NEED Presentations**

 - Are **nonpartisan** and intended to reflect the consensus of the economics profession.



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Who Are We?

- **Honorary Board: 48 members**

- 2 Fed Chairs: Janet Yellen, Ben Bernanke
- 6 Chairs Council of Economic Advisers
 - o Furman (D), Rosen (R), Bernanke (R), Yellen (D), Tyson (D), Goolsbee (D)
- 3 Nobel Prize Winners
 - o Akerlof, Smith, Maskin

- **Delegates: 500+ members**

- At all levels of academia and some in government service
- All have a Ph.D. in economics
- Crowdsource slide decks
- Give presentations

- **Global Partners: 45 Ph.D. Economists**

- Aid in slide deck development



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Available NEED Topics Include:

- **US Economy**
- **Economic Inequality**
- **Climate Change**
- **US Social Policy**
- **Trade and Globalization**
- **Economic Mobility**
- **Trade Wars**
- **Housing Policy**
- **Federal Budgets**
- **Federal Debt**
- **2017 Tax Law**
- **Autonomous Vehicles**



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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

- **Economics of climate change**
- **Climate change and damages**
- **Reducing emissions**
- **Climate change policy**
- **Policy in action**



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Economics of Climate Change

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How Can Economists Help Fight Climate Change?

- **By assessing behavioral reactions to climate change.**
- **By measuring the damage and estimating the economic costs of fighting climate change.**
- **By designing smart policies that minimize costs.**
 - Balance economic growth with GHG emission mitigation.

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When Our decisions Affect Others, We Need Regulation

- Simple transactions: buyer and seller feel all costs and benefits of sales → efficient number of transactions!
- Pollution is an **EXTERNALITY**: a side effect (cost or benefit) that affects someone else → too much pollution is generated
 - Regulation limiting pollution has net benefits
 - *"Efficient" level of pollution balances costs & benefits of pollution*



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A Climate Change Ladder

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



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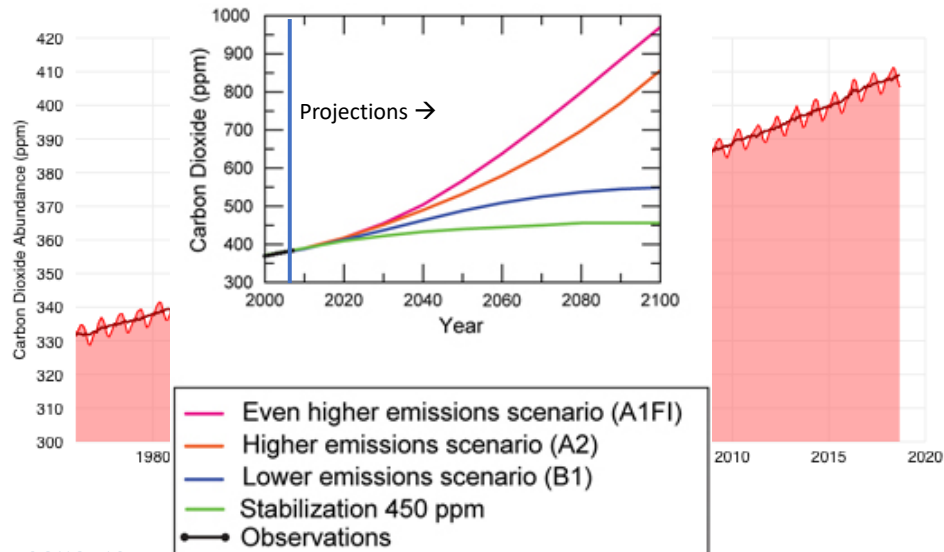
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Climate Change and Damages



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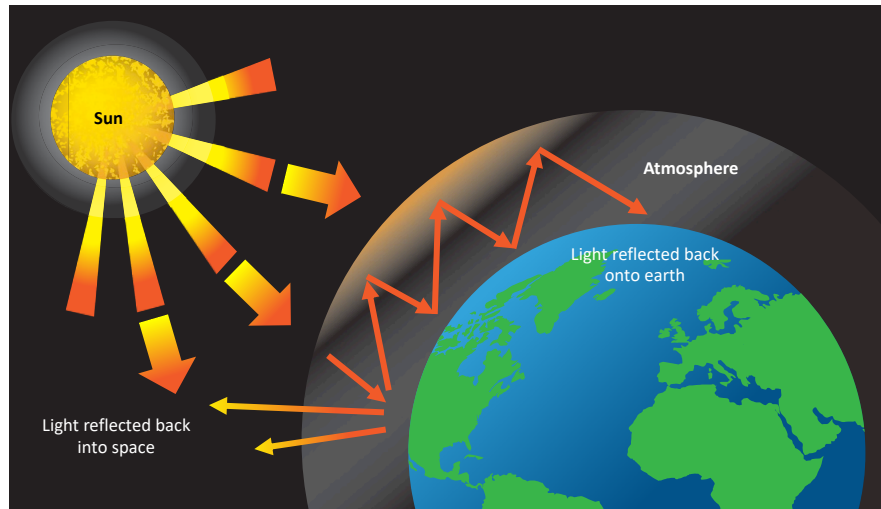
Atmospheric CO₂ Concentrations



Source: IPCC data distribution center and climate.gov

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The Atmospheric Greenhouse Effect



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What Does That Do?

- **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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How These Impacts Affect Humans

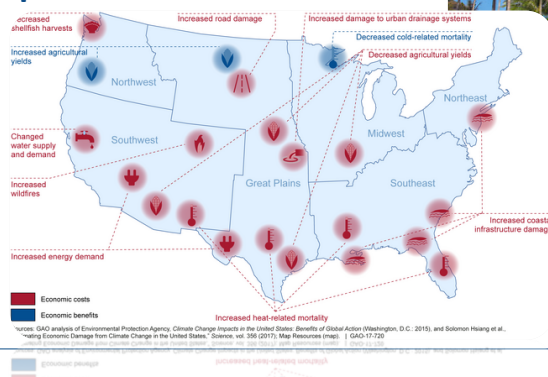
- Agriculture
- Fisheries
- Coastal damages
- Direct health effects, including sickness and death (temperature & drought; also pollution)
- Indirect health effects (vector-borne disease)
- Reduced fresh water availability
- Wildfires
- Shifting zones for important ecosystems, and desertification
- Reduced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



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Most Vulnerable People and Places

- Tropical areas
- Low-lying coastal areas
- Low-income people



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Social Cost of Carbon

- The expected cost of damages from each unit of greenhouse gas emissions.
- Current EPA estimate: ~\$40 per metric ton of CO₂.
 - About \$123/car per year.
- Social cost of carbon will increase over time.



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Adaptation Reduces Damages

- **Adaptations:** costly actions that reduce damages from climate change.
 - Examples: staying indoors, changing agricultural practices, building seawalls, moving people
- The **net cost to society** is the **cost of adaptation** plus the **cost of remaining damages**.
- People will take some actions on their own, up to the point where they find it worthwhile.
- Some responses require government involvement: large-scale actions or actions with shared benefits.



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International Climate Policy Goals

- **Intergovernmental Panel on Climate Change (IPCC)**
 - Global effort to fight climate change
 - Reports on consensus of climate science, including economics
- **IPCC report in 2007:**
 - Recommended goal: < 2 degrees C (3.6 degrees F)
 - Industrialized countries should reduce GHG emissions between 25% and 40% below 1990 levels by 2020.
- **2016 Paris Agreement:**
 - Basic goal of 2 degrees C: requires 40-70% GHG reduction 2010 → 2050
 - Reach goal of 1.5 degrees C: requires 70-95% GHG reduction 2010 → 2050
- **IPCC report in 2018:**
 - Temperature has already increased by 1.0 degrees C



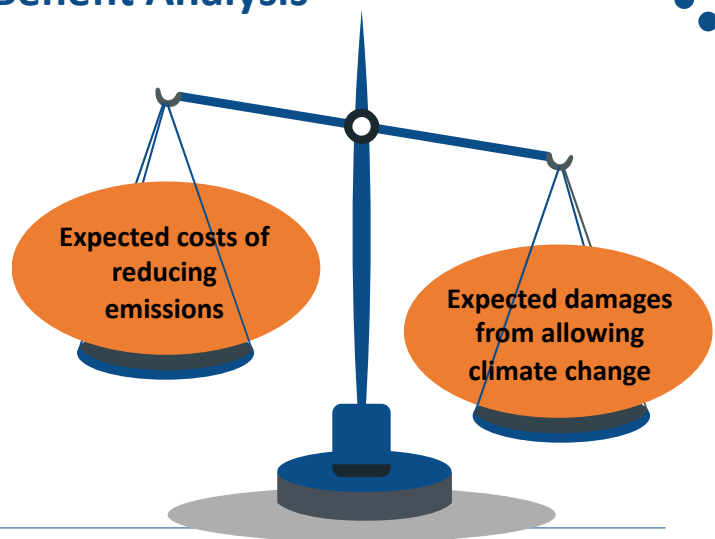
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How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

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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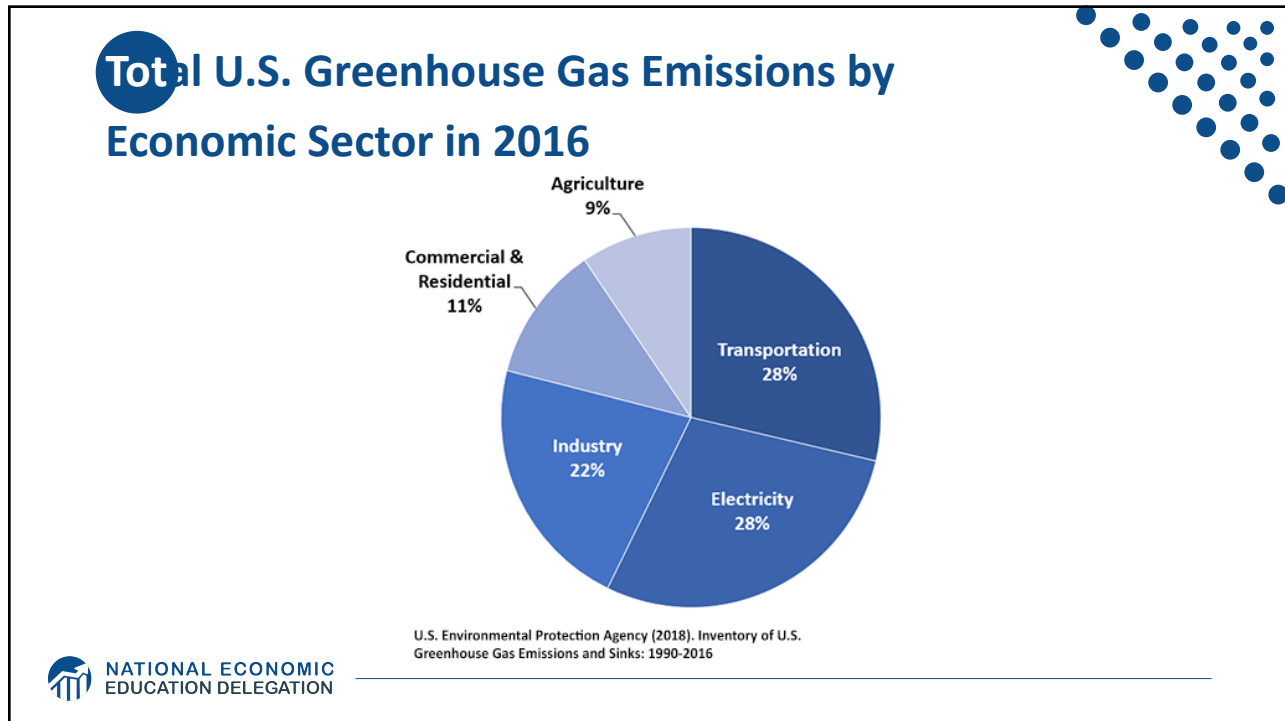
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Reducing Emissions

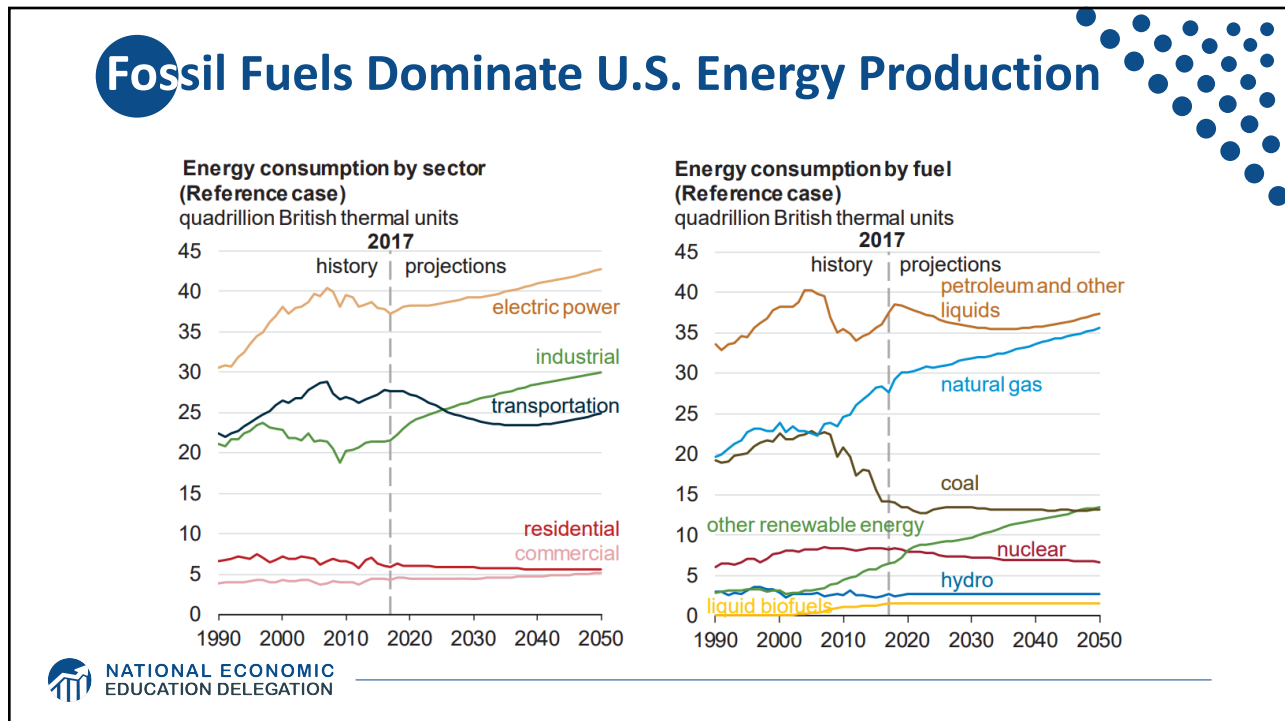


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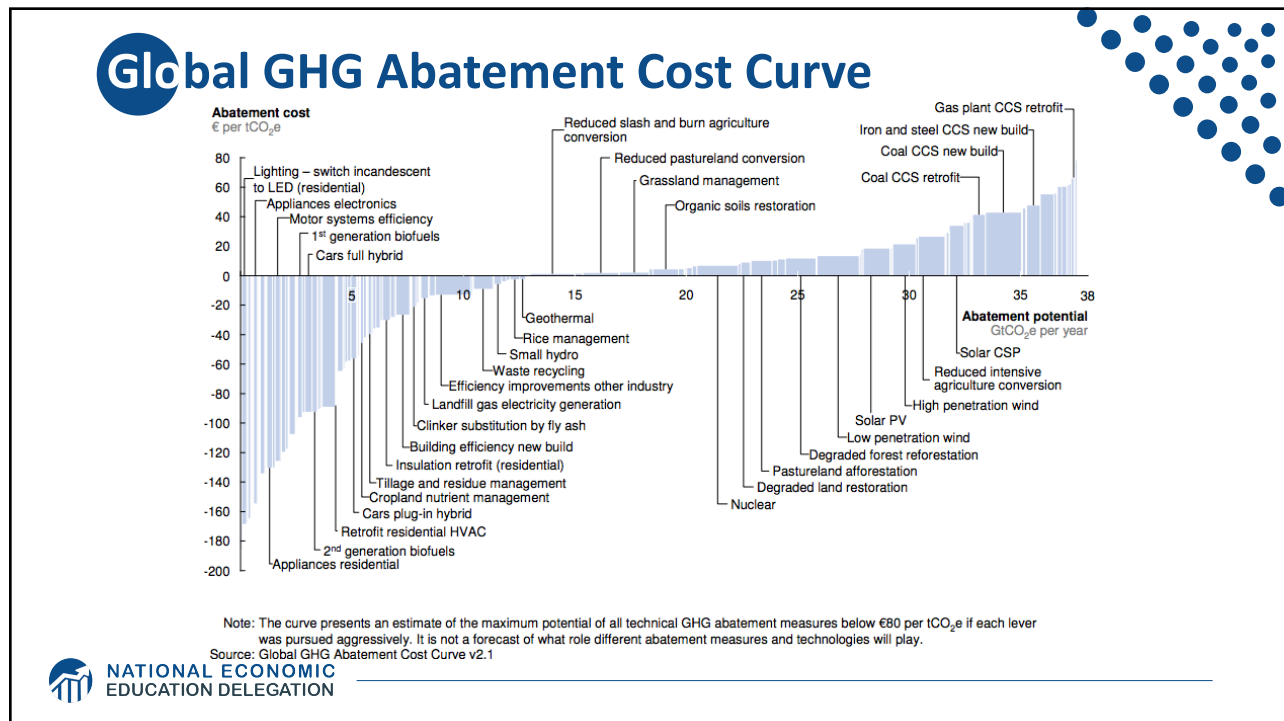
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Global Net Emissions Are What We Care About

- **Gross emissions (greenhouse gas sources):** how much greenhouse gas we put out
- **For climate impacts, we don't care where they are emitted, only how much**
 - There may be other local impacts
- **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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Climate Change Policy



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Policies That Reduce Emissions Directly

- **Command and control regulation**

- Emissions standards or limits
 - E.g., CAFE standards (fuel economy), tech standards (require scrubbers), emissions standards (Clean Water Act)

- **Market-oriented policies**

- Putting a price on emissions – leveling the playing field!
 - Subsidizing green energy (*e.g.*, feed-in tariffs)
 - Tax or cap & trade



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Command and Control vs Market-Based Regulation

- **Efficiency**

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

- **Equity**

- Both types of policies are regressive.
 - Cap and Trade and a Carbon Tax can generate revenues that can be used to offset the regressivity.
 - Command and Control Regulations do not.

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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.**

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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.**
 - Ensures that those with the lowest abatement costs abate more so they can make money selling permits / save money not buying them!

Carbon Tax and Cap & Trade: the Differences

	Carbon Tax	Cap & Trade
Price to Pollute	Certain	Uncertain
Emissions	Uncertain	Certain
Revenue	Generates revenue	Can generate revenue if government sells permits
Additional concerns	<ol style="list-style-type: none"> 1) May require legislation to change tax level. 2) Governments already have tax systems they can build off. 	<ol style="list-style-type: none"> 1) Permit distribution susceptible to lobbying. 2) Cap can be changed by regulator. 3) Some other regulations may not be effective if Cap & Trade is in place.

Other Example Policies that Reduce Emissions

- R&D 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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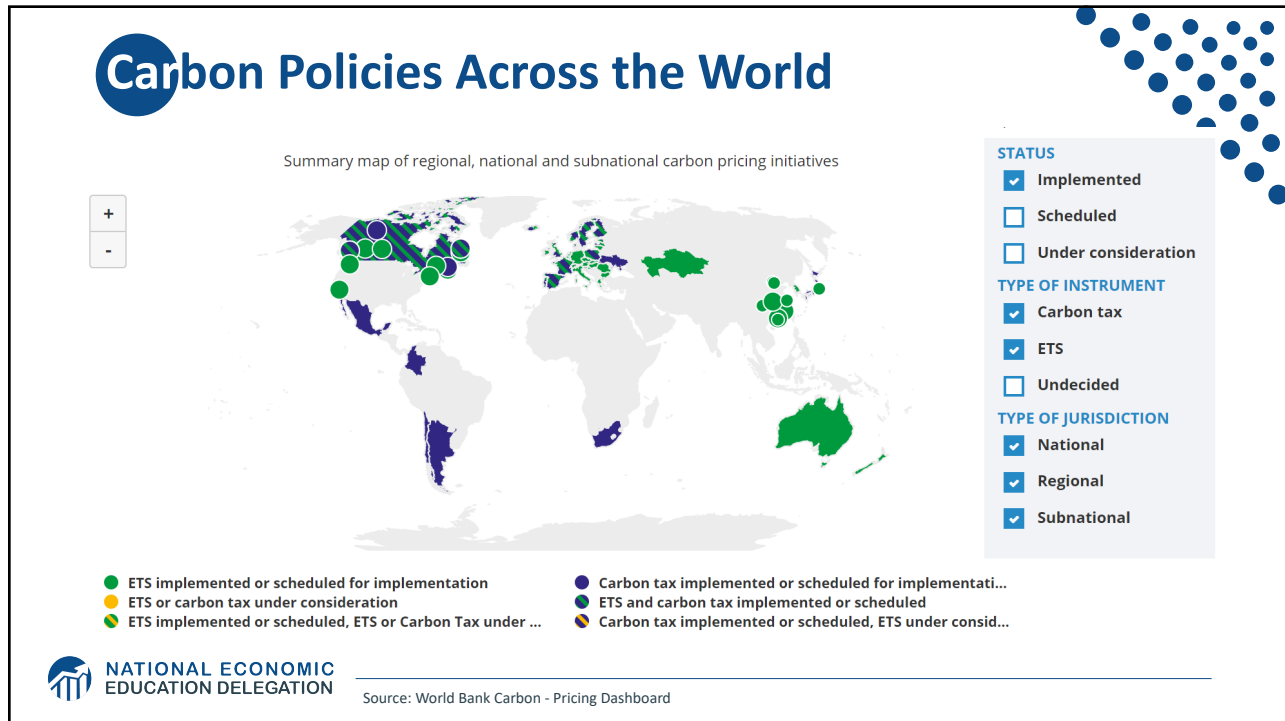
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Climate Change Policy in Action

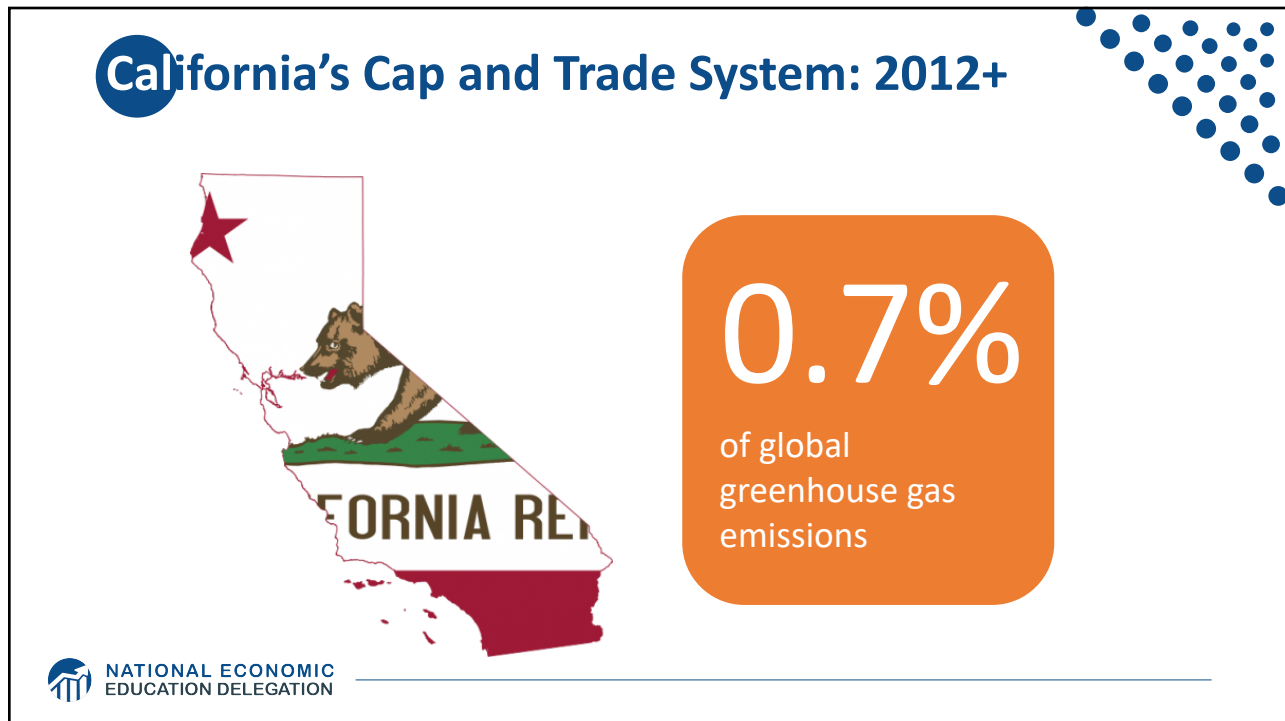


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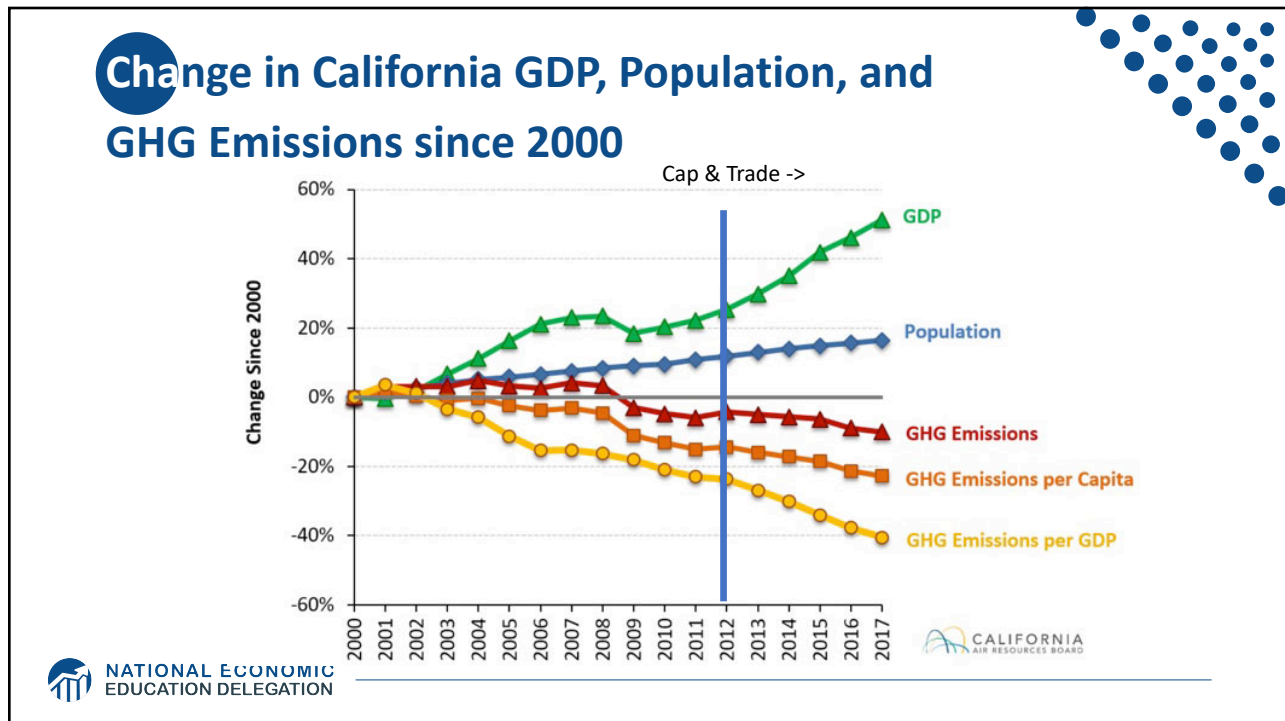
California's System Is Flexible



- 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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British Columbia's Carbon Tax Policy



0.1%
of global
greenhouse gas
emissions

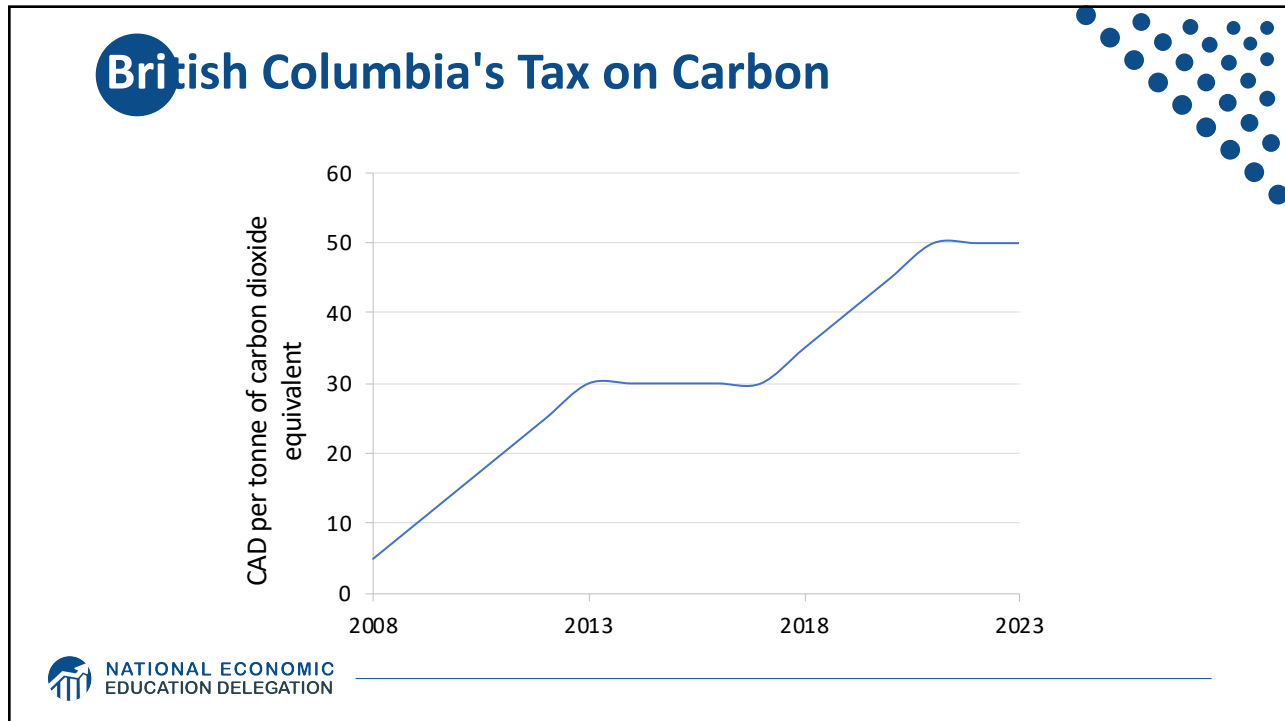
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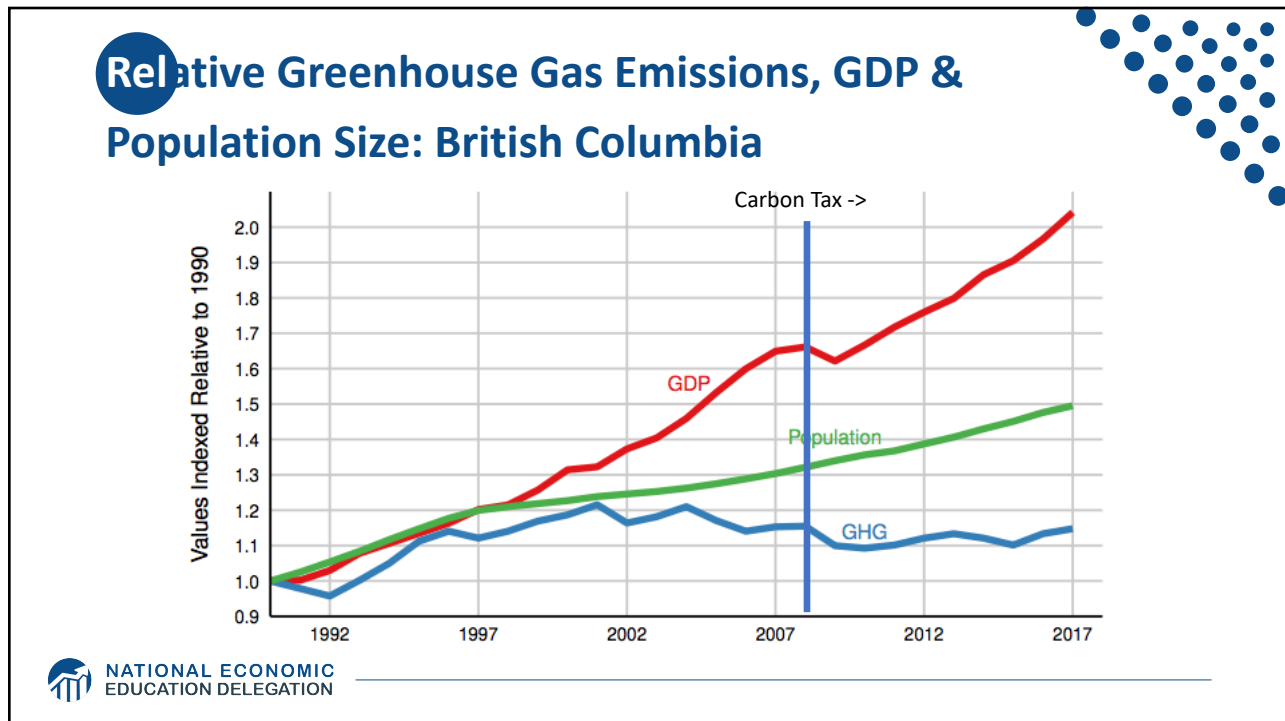
“ Tax the pollution we do not want, and return the money for what we do want — money in people’s pockets, jobs and investment. ”

- B.C. Government - Carbon Tax Brochure

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Summary

- **Climate change is real, is caused by human actions, and has impacts we're already feeling.**
- **We need smart policy to 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.**



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Thank you!

Any Questions?

www.NEEDelegation.org

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