


# Climate Change Economics

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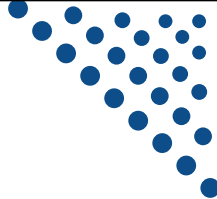


## Money Talks Club

May 18, 2020

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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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- **This slide deck was reviewed by:**
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  - 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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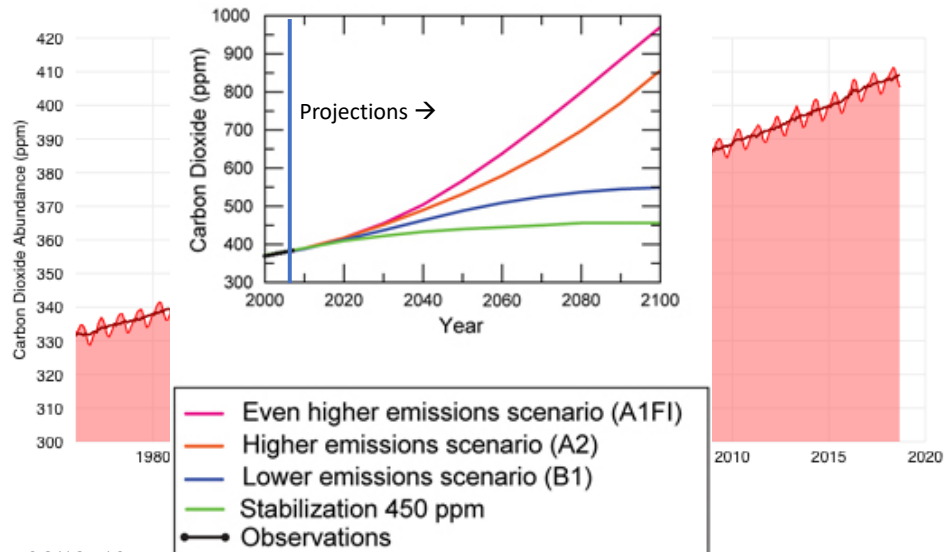
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# Climate Change and Damages



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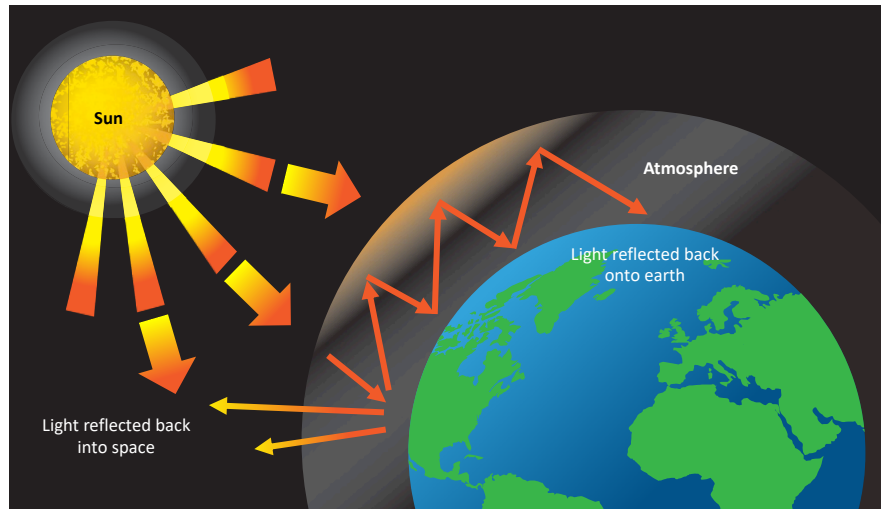
## Atmospheric CO<sub>2</sub> Concentrations



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

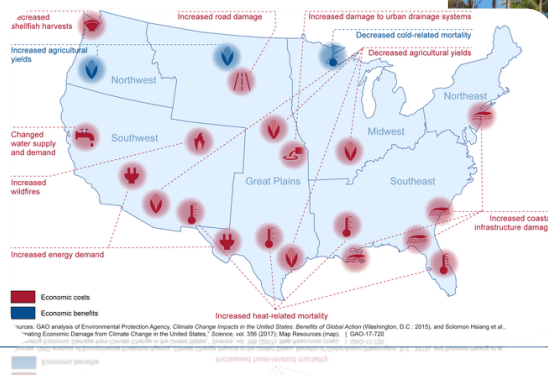
- Agriculture
- Fisheries
- Coastal damages
- Direct health effects, including sickness and death (temperature & drought; also pollution)
- Indirect health effects (vector-borne disease)
- Reduced fresh water availability
- Wildfires
- Shifting zones for important ecosystems, and desertification
- Reduced 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 CO<sub>2</sub>.
  - 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.



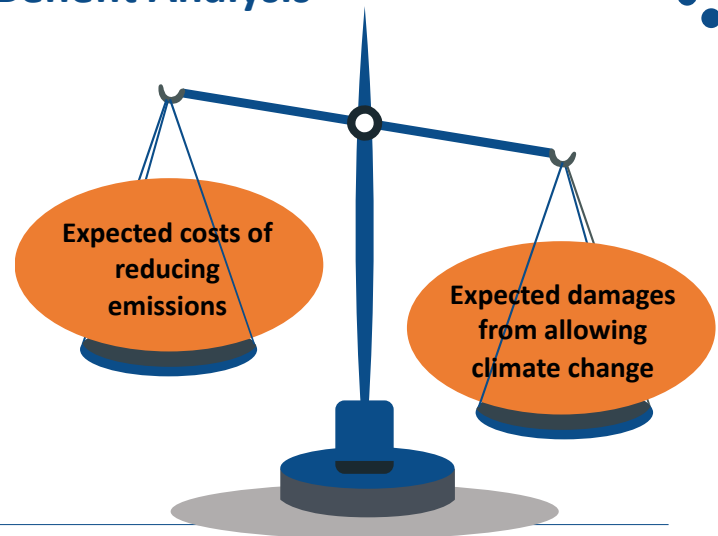
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## How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

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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## 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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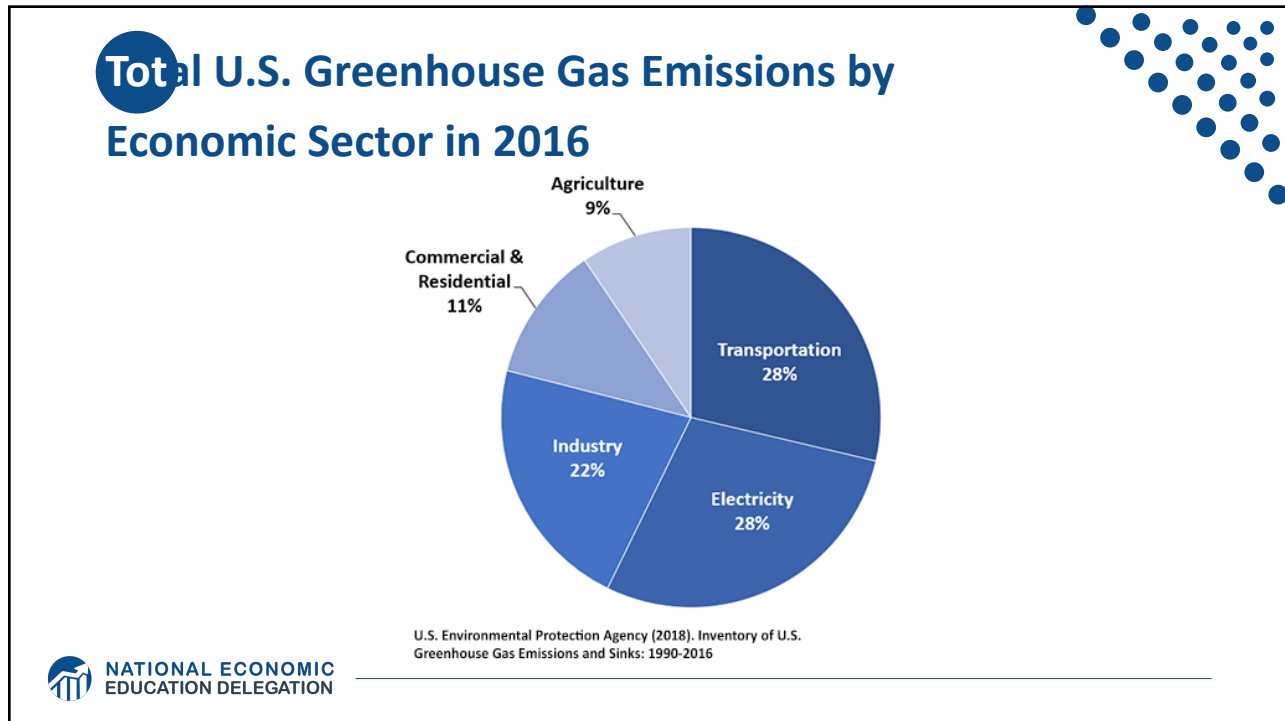
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## Reducing Emissions

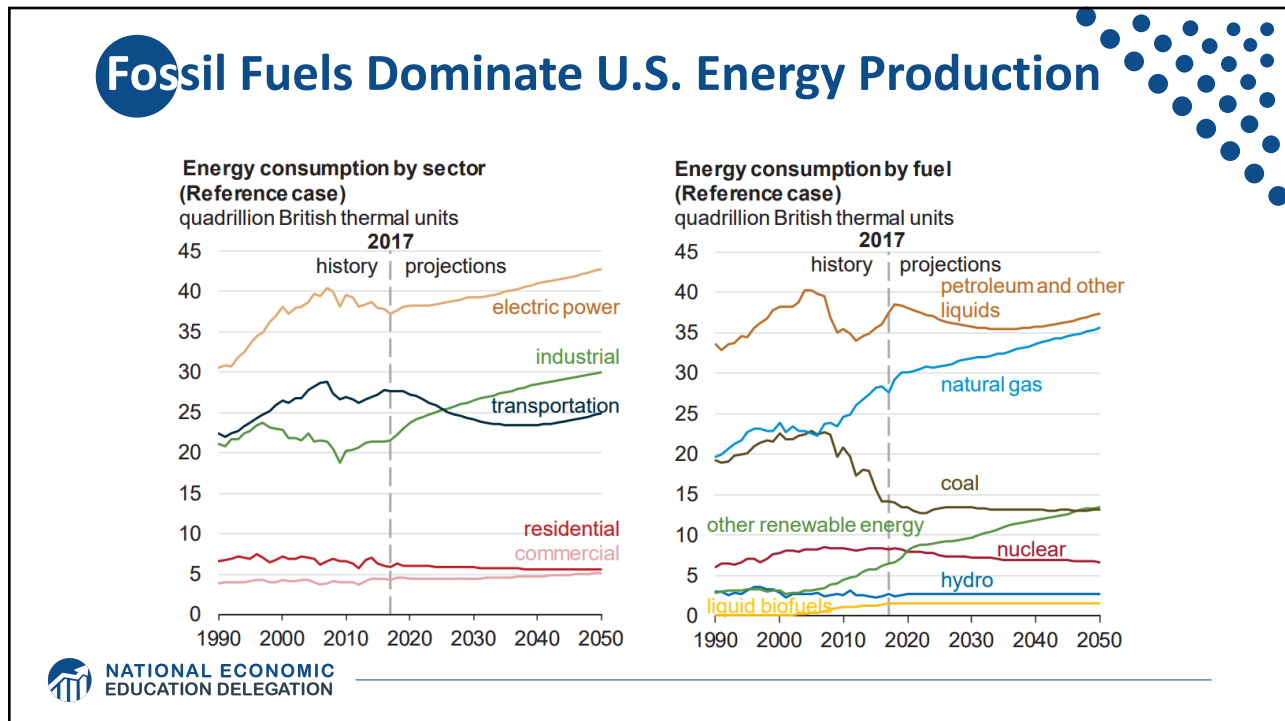


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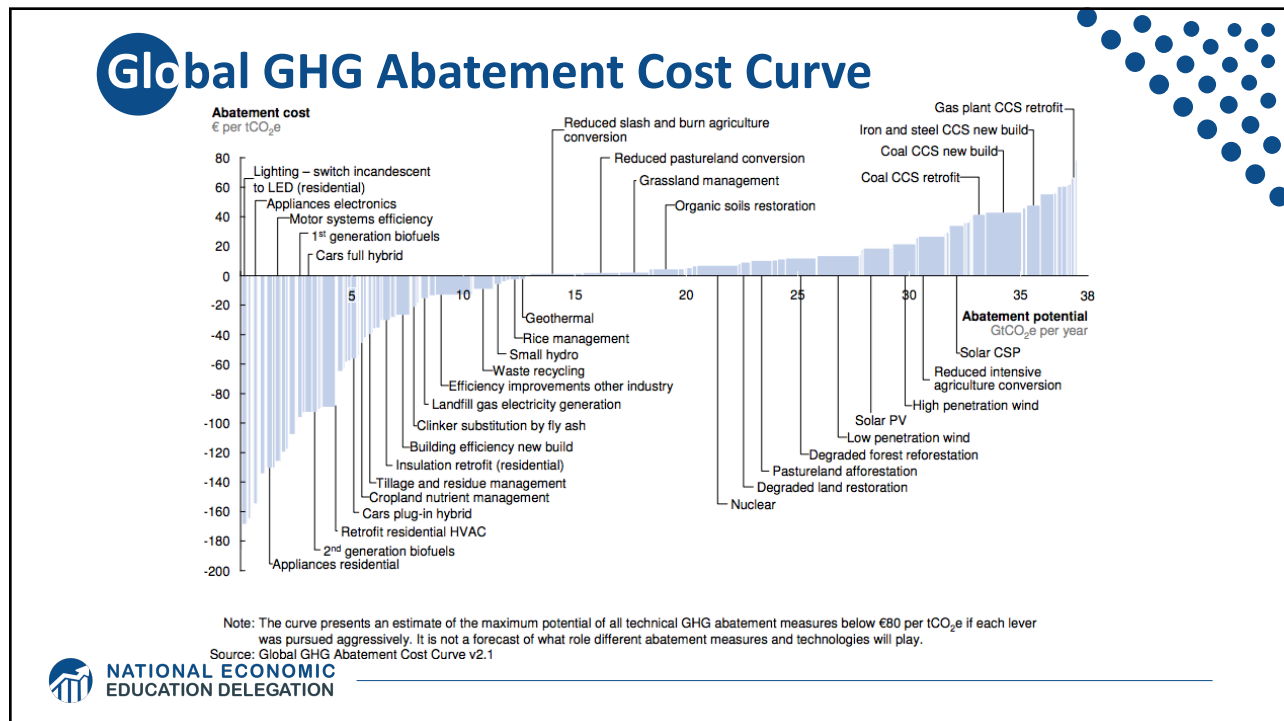
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## Global Net Emissions Are What We Care About

- **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 CO<sub>2</sub> 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.



## 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.**



## 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"> <li>1) May require legislation to change tax level.</li> <li>2) Governments already have tax systems they can build off.</li> </ol>	<ol style="list-style-type: none"> <li>1) Permit distribution susceptible to lobbying.</li> <li>2) Cap can be changed by regulator.</li> <li>3) Some other regulations may not be effective if Cap &amp; Trade is in place.</li> </ol>



## 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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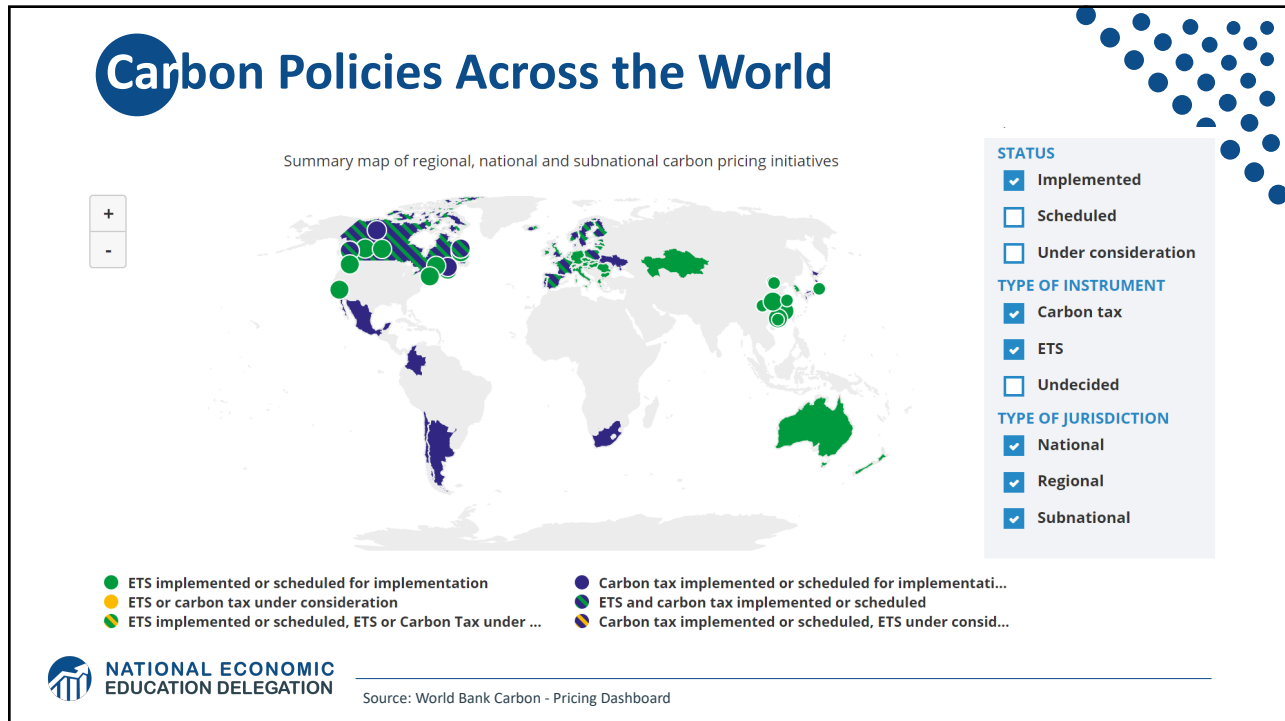
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## Climate Change Policy in Action

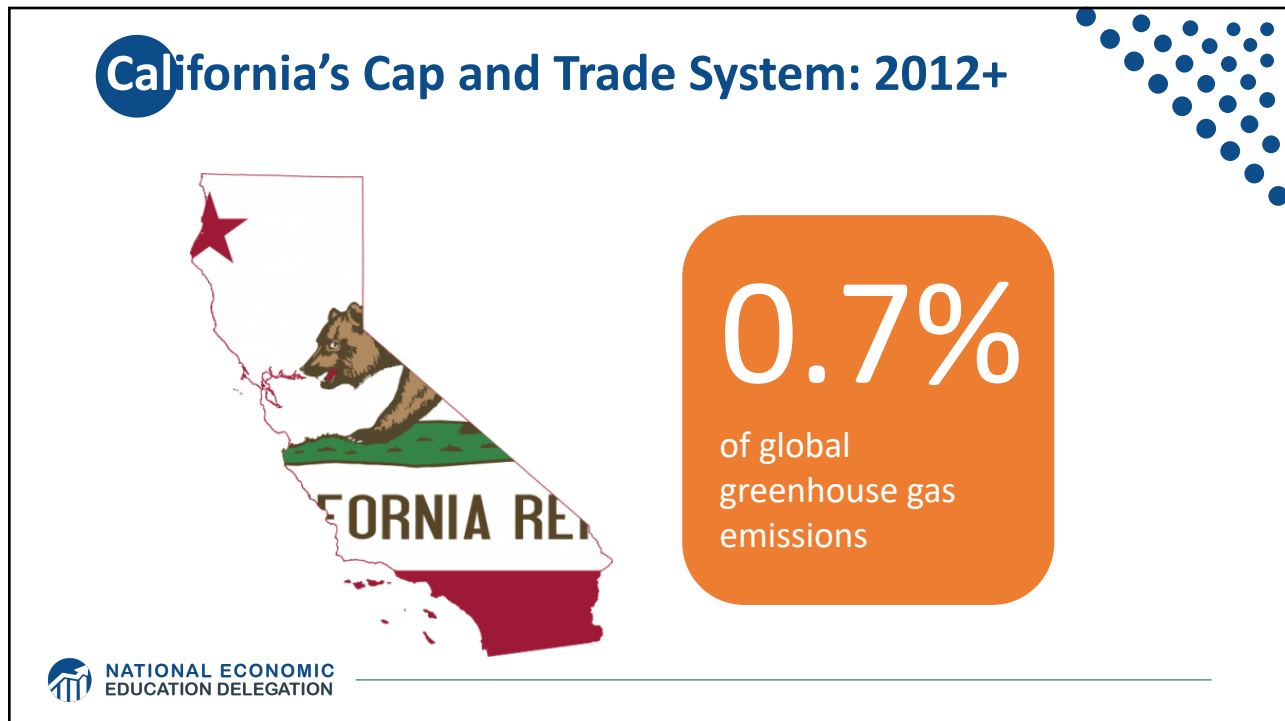


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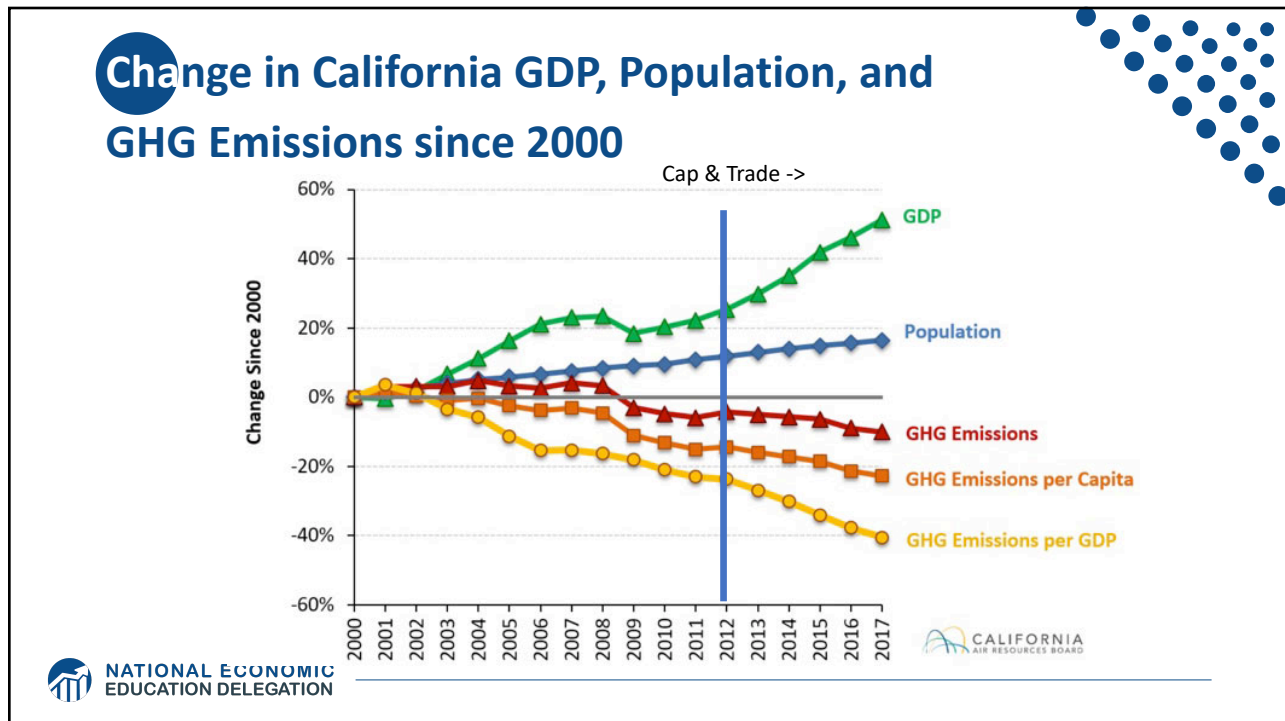
## California's System Is Flexible



- 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

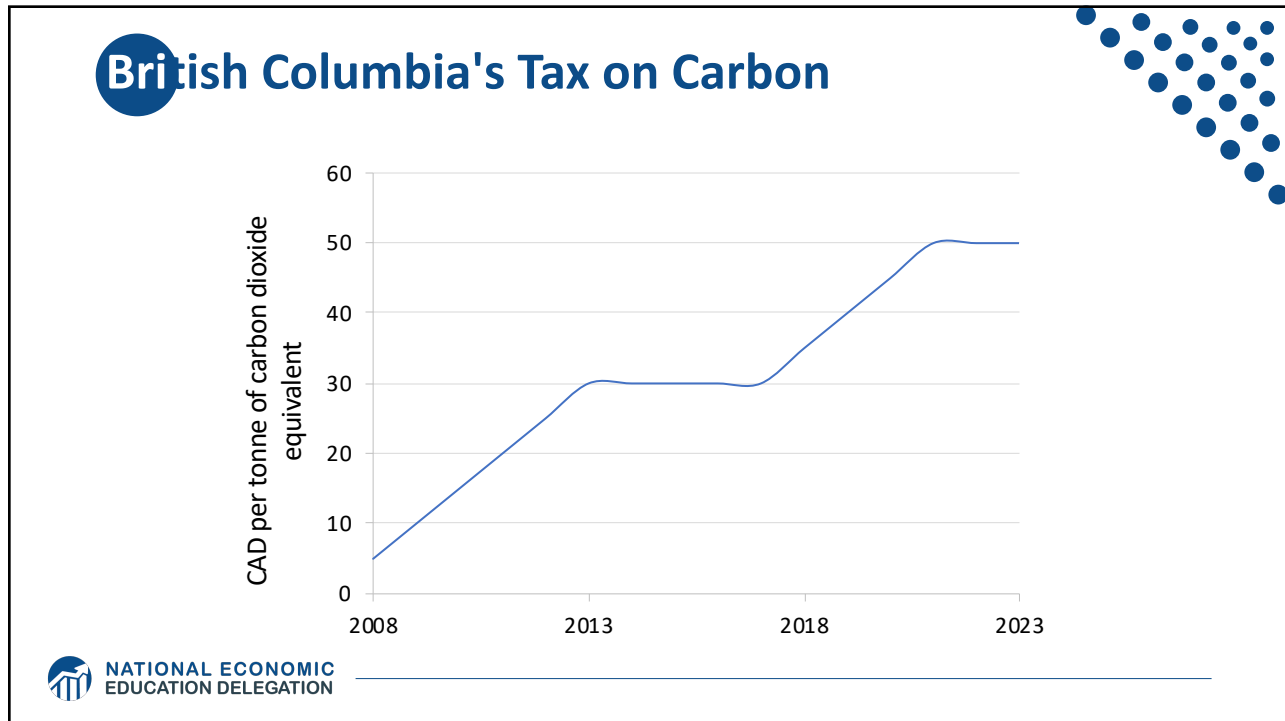
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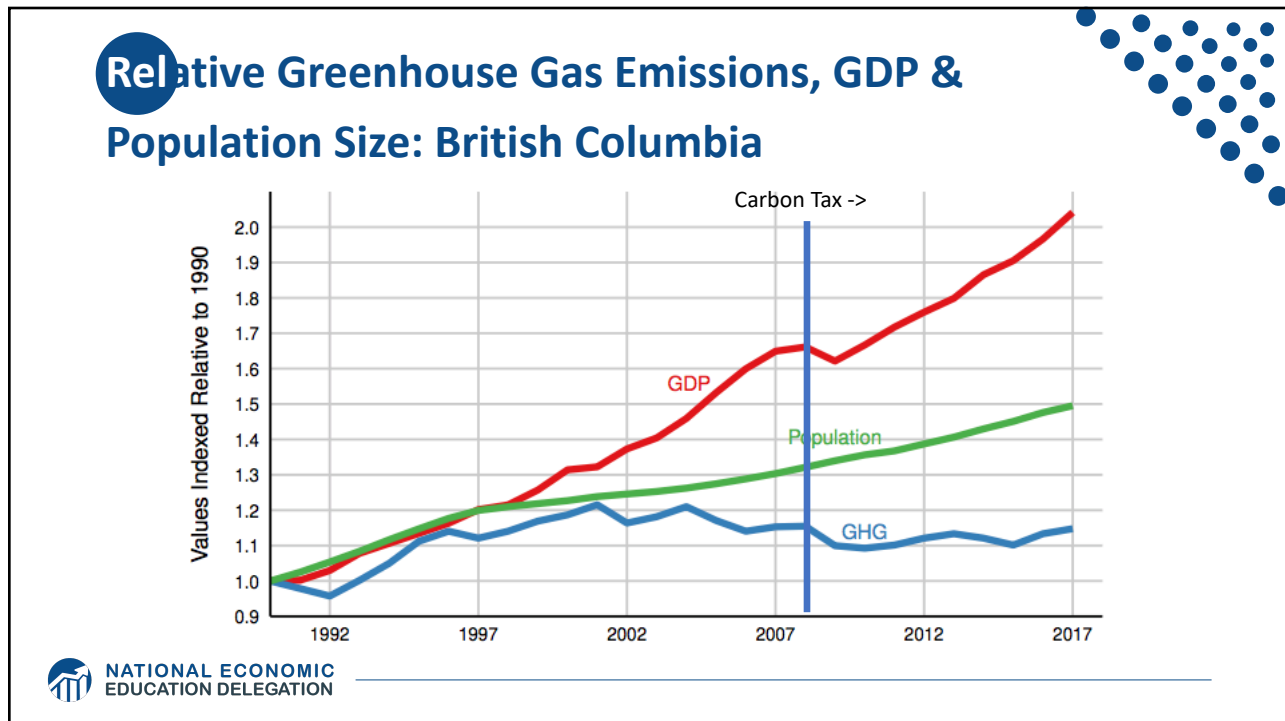
**“ Tax the pollution we do not want, and return the money for what we do want — money in people’s pockets, jobs and investment. ”**

- 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](http://www.NEEDelegation.org)

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