


Climate Change Economics

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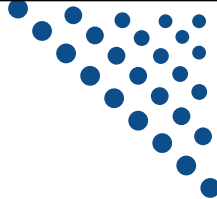
Ms. Kornfeld's HS Governance Class
September 21, 2020




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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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- **This slide deck was authored by:**
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Outline

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



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Economics of Climate Change

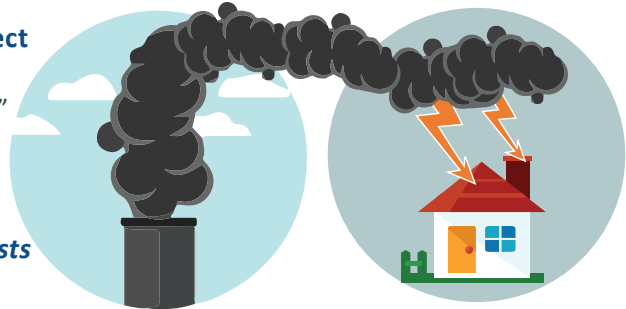


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When Our Decisions Affect Others, We Need Regulation

- **Pollution causes an EXTERNALITY: a side effect (cost or benefit) that affects someone else**
 - Polluting activities 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” level of pollution balances costs & benefits of pollution**



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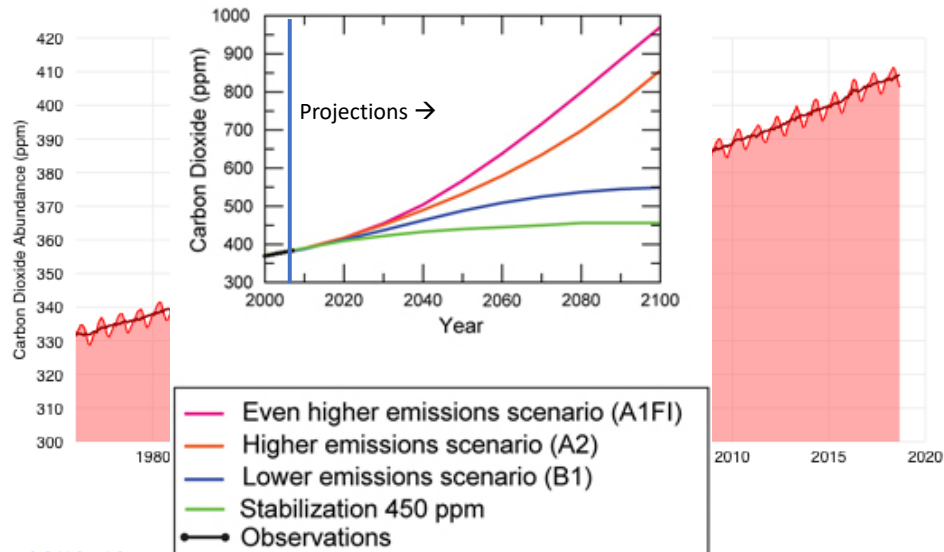
Climate Change Is Caused by Pollution: Greenhouse Gas Emissions

- **Greenhouse gases include:**

- Carbon dioxide (CO₂)
- Methane
- Particulates
- Nitrous oxides
- Sulfur dioxide
- Water vapor

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Atmospheric CO₂ Concentrations



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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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A Climate Change Ladder

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

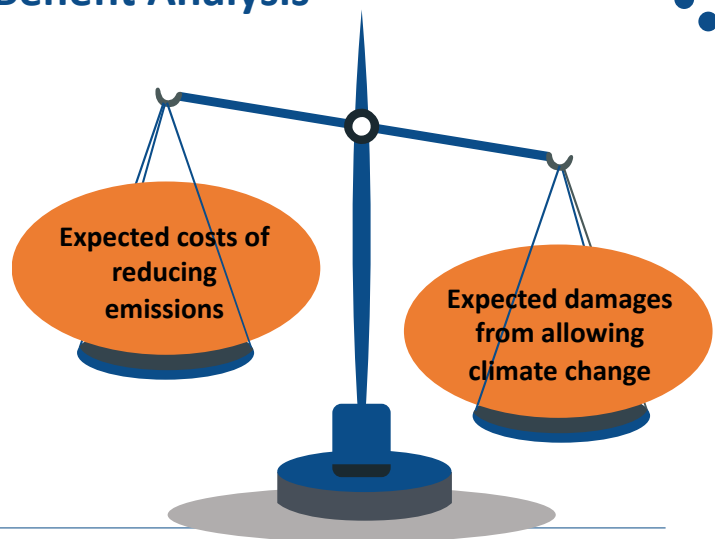


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How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

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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Reducing Emissions



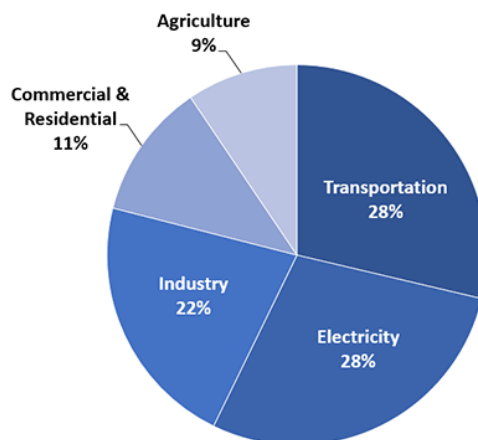
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Global Net Emissions Are What We Care About

- **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 (incl. 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

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



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

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 (total social benefit)**
 - Both can achieve the same amount of emissions reduction.
 - Incentive-based policies can achieve emissions reduction at much lower cost.
- **Equity (fairness)**
 - Both have regressive impacts (low-income families bear costs that are a larger percent of their incomes).
 - Cap and trade and 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 (the “social cost of carbon”).
- **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

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

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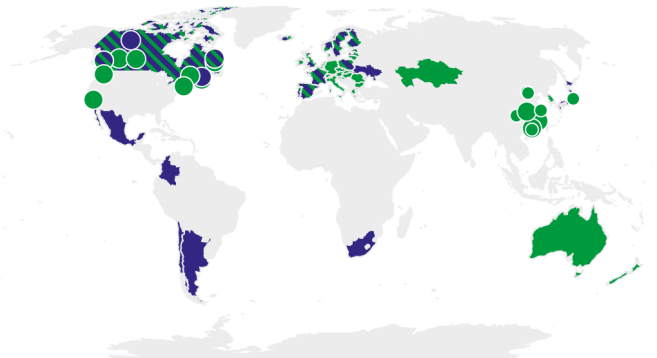
Climate Change Policy in Action



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Climate Policies Across the World

Summary map of regional, national and subnational carbon pricing initiatives



STATUS

- Implemented
- Scheduled
- Under consideration

TYPE OF INSTRUMENT

- Carbon tax
- ETS
- Undecided

TYPE OF JURISDICTION

- National
- Regional
- Subnational

- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- ETS implemented or scheduled, ETS or Carbon Tax under consideration
- Carbon tax implemented or scheduled, ETS under consideration



Source: World Bank Carbon - Pricing Dashboard

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California's Cap and Trade System: 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

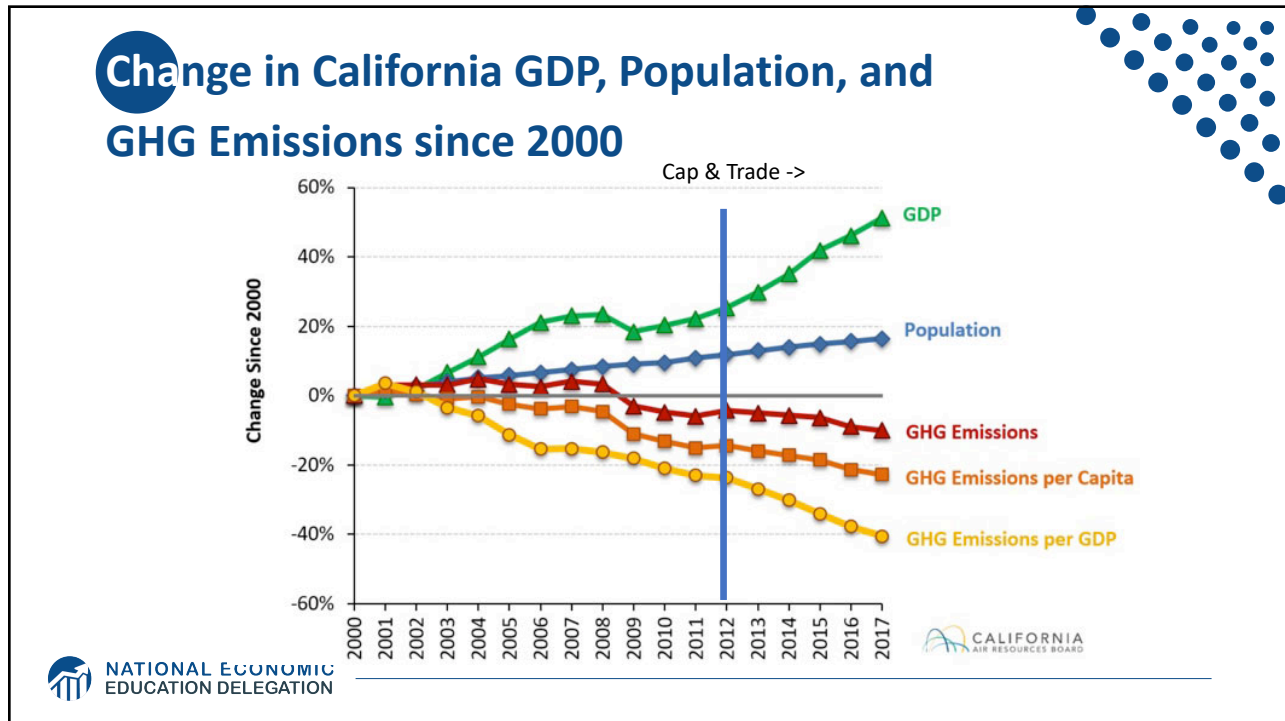
- **California's Tools:**

- 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.**
- **We need smart policy to reduce greenhouse gas emissions by the right amount and at the lowest possible cost.**
 - For example, cap and trade or 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?

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