


NATIONAL ECONOMIC
EDUCATION DELEGATION

Climate Change Economics

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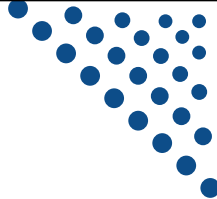

Austin Rotary Club
January 11, 2021



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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:**
 - Jason Shogren, University of Wyoming
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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**
- **Reducing emissions**
- **Climate change policy**
- **Policy in action**



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Economics of Climate Change

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When Everything Is Simple, No Regulation Is Needed

- **Simple transactions: buyer and seller feel all costs and benefits of sales**
- **→ Efficient number of transactions!**

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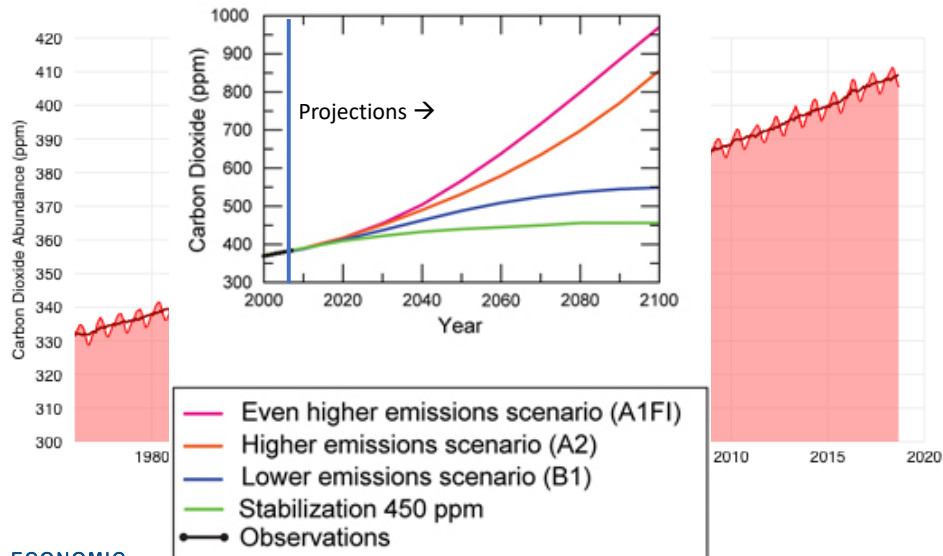
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When Our Decisions Affect Others, We Need Regulation

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



Atmospheric CO₂ Concentrations



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 Adaptation Reduces Damages

- **Adaptations: costly actions that reduce damages from climate change.**
 - Examples: staying indoors, changing agricultural practices, building seawalls, migration
- **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.**

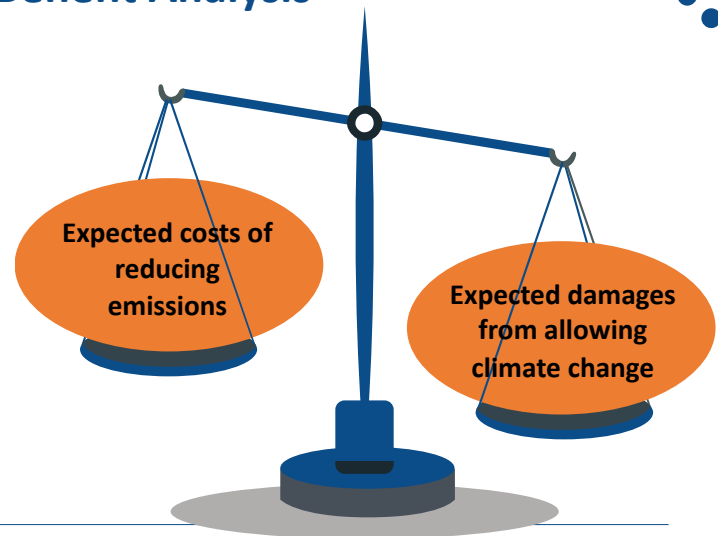
A Climate Change Ladder

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

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

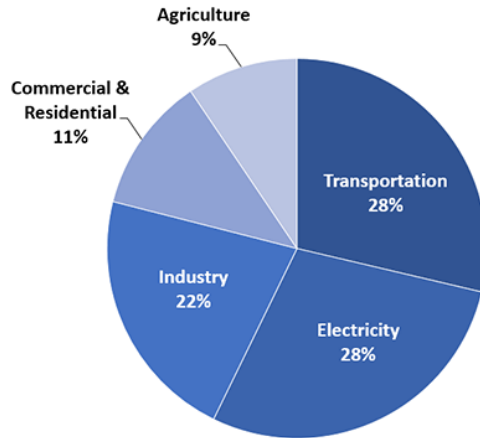
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Global Net Emissions Are What We Care About

- **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

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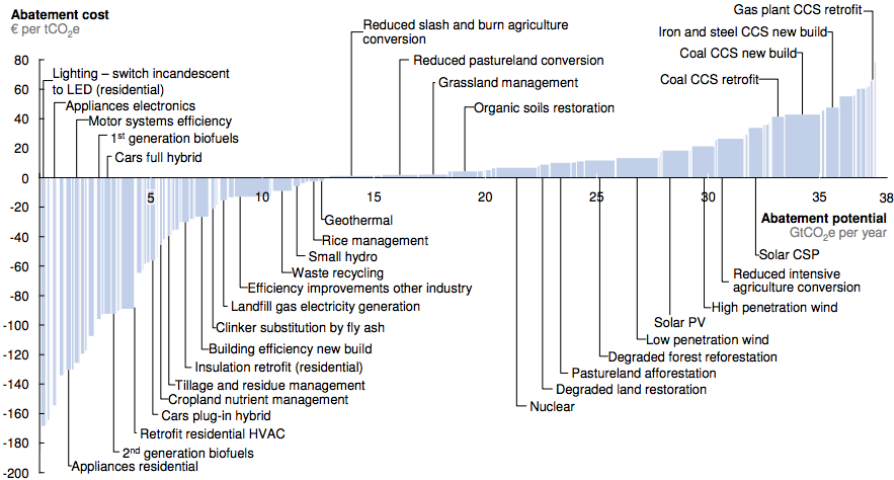
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2016



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



Global Emissions Abatement Cost Curve



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



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 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.



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



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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.
 - 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 and subsidies (e.g. CAFE fuel economy standards)
- Grid / infrastructure improvements
- Public transportation
- Land use / zoning policies



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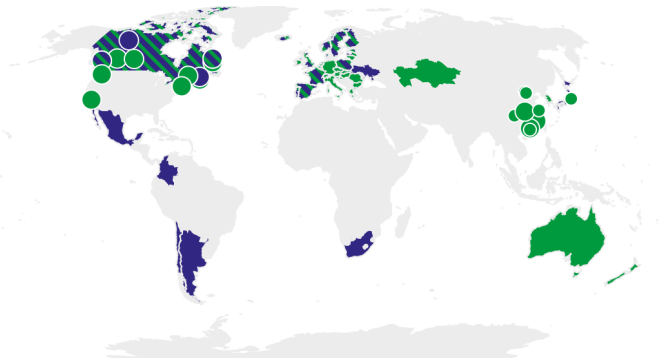
Climate Change Policy in Action



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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

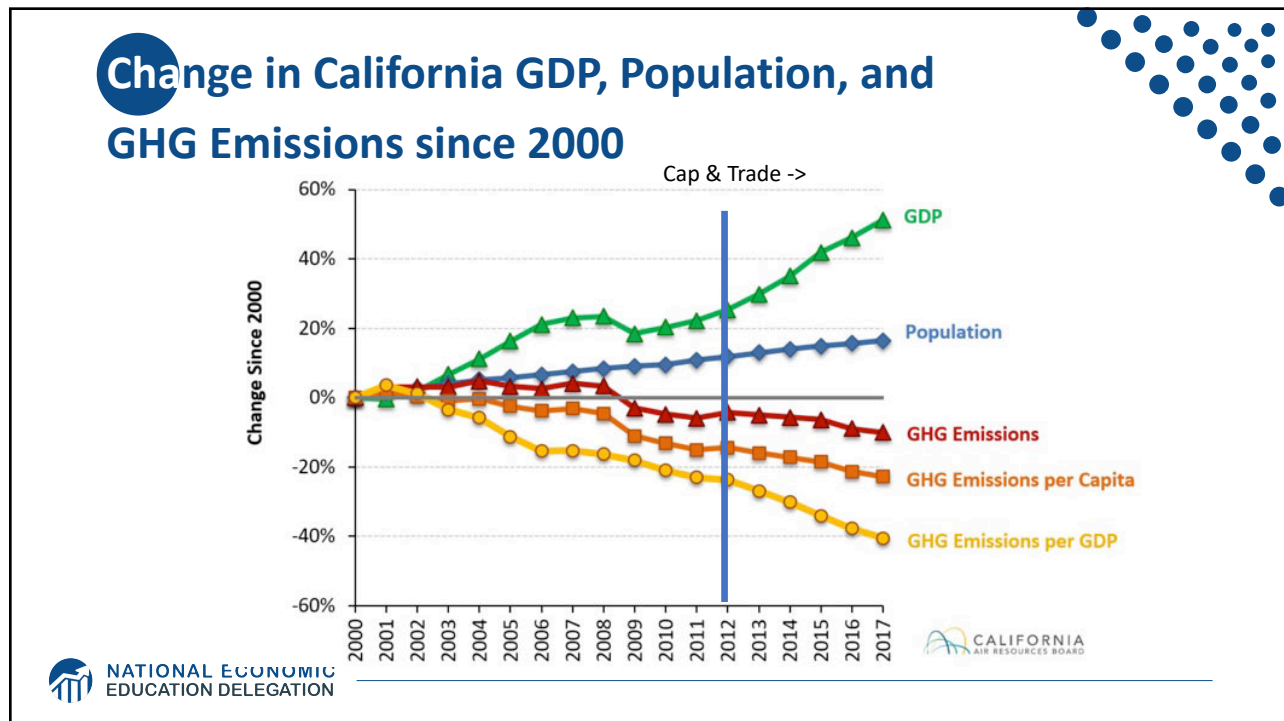


- **California's goals:**
 - Reduce emissions to 1990 levels by 2020
 - An 80% reduction in emissions from 1990 levels by 2030
- **California's Tools:**
 - Cap and Trade
 - Renewable Portfolio Standard
 - Clean Cars Program
 - Low Carbon Fuel Standard



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Summary

- Climate change is real, is caused by human actions, and has impacts we're already feeling.
- 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.

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Thank you!

Any Questions?

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