NATIONAL ECONOMIC EDUCATION DELEGATION

Climate Change Economics

Jon Haveman, Ph.D.

Drake High School, San Anselmo CA

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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:**
  - Shana McDermott, Trinity University
  - Sarah Jacobson, Williams College
  - Sharon Shewmake, Western Washington University
- **This slide deck was reviewed by:**
  - Jason Shogren, University of Wyoming
  - Walter Thurmon, North Carolina State University
- **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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Economics Informs Almost Everything

- Prices
- Incentives
- Externalities
- Cost-Benefit Analysis
- Growth
- Inflation
- Interest Rates
- Climate Change
- International Trade
- Immigration
- Housing
- Education
- Health Care
- Gun Control

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Outline

- Economics of responding to climate change
- Addressing the sources of our emissions
- Climate change policy
- Policy in action

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How Can Economists Contribute to Thinking about Climate Change?

- They can assess behavioral reactions to climate change.
- They can measure:
  - The costs of acting.
  - The costs of NOT acting.
- They can help design smart policies that minimize costs.
  - Balance economic growth with GHG emission mitigation.

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Pollution Is Different From Oranges

- **Human activity creates pollution.**
- **Pollution is an EXTERNALITY:**
  - a side effect (cost or benefit) that affects someone else when something is bought or sold.
  - This is a ***market failure.***
- **The price of electricity does not reflect all of the costs.**
  - There is too much pollution.
  - Electricity is too cheap. The balance is wrong.

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Social Cost of Carbon

- **Cost above price paid.**
- **The expected cost of damages from each unit of greenhouse gas emissions.**
- **Current EPA estimate: ~$40 per metric ton of CO_2.**
  - About $123/car per year.
  - $26 Billion for all vehicles in the US.

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Externalities

- **An externality occurs when market activity affects people outside of a market.**
  - Market activity SPILLS OVER onto others.
  - A **negative externality** occurs when a ***cost*** spills over.
  - A **positive externality** occurs when a ***benefit*** spills over.

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What Kind of an Externality Results From:

- **Heating your house**
- **Getting an education**
- **Getting a dog**
- **Pig farming**
- **Smoking**
- **Growing apples**
- **Getting a vaccination**
- **Scientific research**

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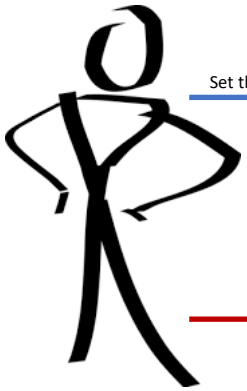
Addressing a Negative Externality

$.14/Kwh

Social cost = $.02/Kwh

$.16/Kwh



Set thermostat to: → 68 degrees

→ 65 degrees

The social cost of $.02/Kwh has been INTERNALIZED.

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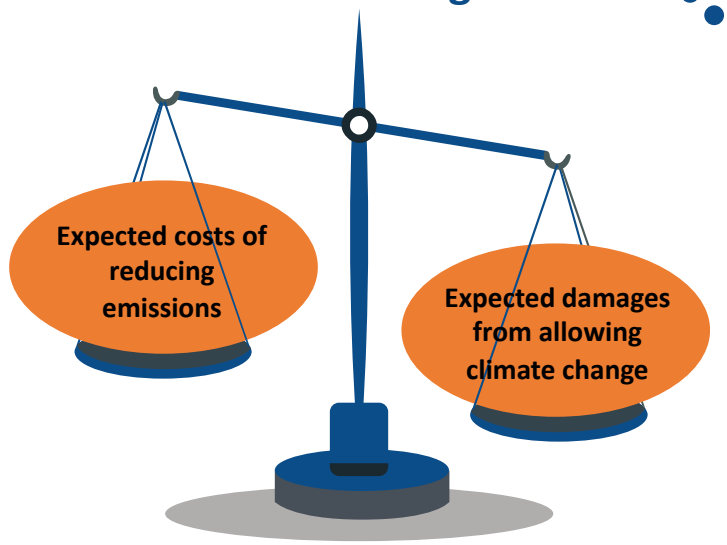
How Economists Decide How Much to Fight Climate Change

- Cost Benefit Analysis
- Weigh:



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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.**
  - Costs amount 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**.
- **Caveats:**
  - Putting a monetary value on priceless things
  - Uncertainty and risk

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This is What Precisely Wrong Looks Like

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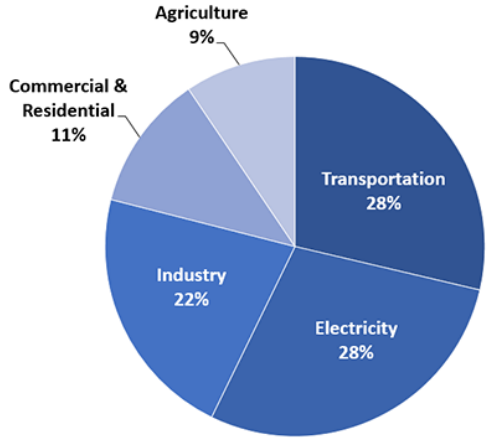
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2016



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

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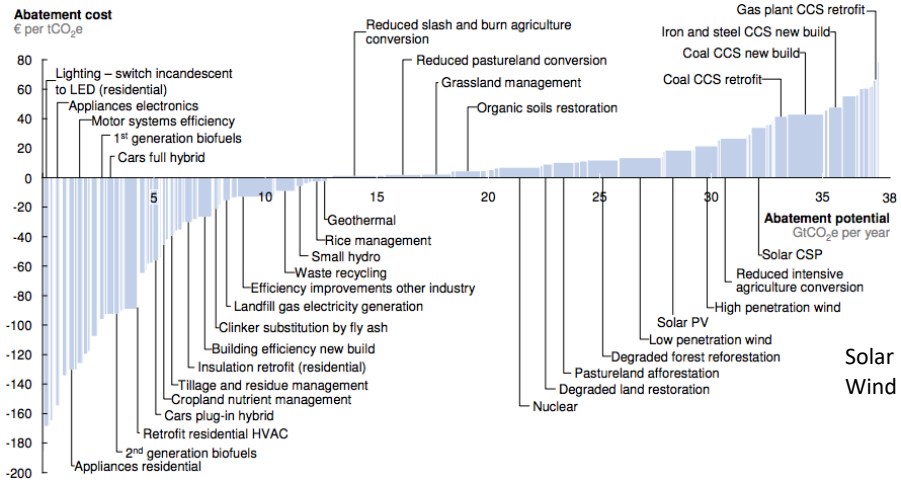
Global GHG Abatement Cost Curve

Lighting
Appliances
Hybrid cars



Solar
Wind

Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €80 per tCO_2e 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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Climate Change Policy

Direct and Indirect

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Policies That Reduce Emissions: INDirectly

- Subsidizing R&D
- Grid / infrastructure
- Mandating renewable energy (*e.g.*, renewable portfolio standards)
- Land use policies

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Land Use: Restoration Is Possible

South Korea restored its forest cover from 35% to 64% of the country's total area

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Policies That Reduce Emissions: Directly

- **Regulation**
  - Emissions standards or limits
- **Market oriented policies**
  - Putting a price on emissions
    - Subsidizing green energy
    - Tax or cap & trade

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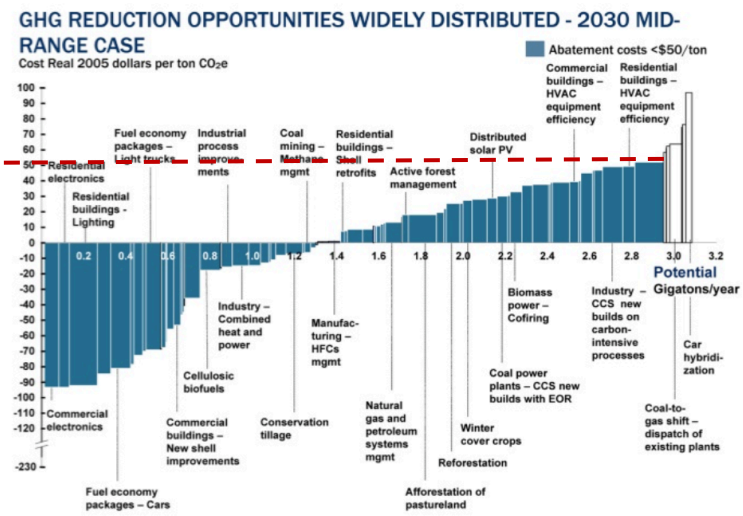
Putting a Price on Carbon

Suppose a Social Cost Of Carbon of $50



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Carbon Tax and Cap & Trade: the Differences

	Carbon Tax	Cap & Trade
Carbon Price	Certain	Uncertain
Emissions	Uncertain	Certain
Ease of Implementation	May be easier to implement	
Additional concerns	1) Always generates revenue 2) May require legislation to change 3) Predictability	1) Susceptible to lobbying. 2) Only generates revenue if government sells permits. 3) Cap can be changed by regulator. 4) Less certainty over future. 5) Regulations reduce efficacy of Cap & Trade

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One Other Thing: Cap and Trade vs. Carbon Tax

- **Emissions regulations and Cap and Trade can work at cross purposes.**
  - Regulations that lower emissions from big polluters…
    - Lower the demand for permits
    - Lowers the price of permits
    - Reduces incentives for other industries to cut emissions
- **Regulations can undermine the effectiveness of Cap and Trade.**
- **The same is not true of a carbon tax.**
  - Though regulations might cut tax revenue, revenue is not the goal of the carbon tax.

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Thoughts on Regulation vs Market-Oriented

- **Equity.**
  - Both types of policies can be regressive.
    - Cap and Trade and a Carbon Tax can offset the regressivity.
    - Regulations do not.
- **Efficiency.**
  - Market-oriented policies tend to achieve emissions reduction at much lower cost.
    - Example: CAFÉ Standards vs Carbon Tax
      - Tax is significantly more efficient.
      - Why?

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Efficiency: CAFÉ vs Carbon Tax

- **CAFÉ = Corporate Average Fuel Efficiency**
  - A fuel economy standard mandating that an auto-maker's vehicle fleet must meet minimum fuel economy standards.
- **Horse Race**
  - Tax on fuel applies to ALL vehicles, not just new.
  - Rebound Effect:
    - Driving a more efficient vehicle lowers the cost per mile driven
      - leading to more miles driven.
  - Slower turnover of inefficient vehicles: higher cost of new.
- **Summary**
  - A given level of emission reductions **costs 3-14 times more with CAFÉ** standards than under a comparable carbon tax.

Climate Change Policy in Action

California's Cap and Trade System (2013)

0.7%

of global greenhouse gas emissions

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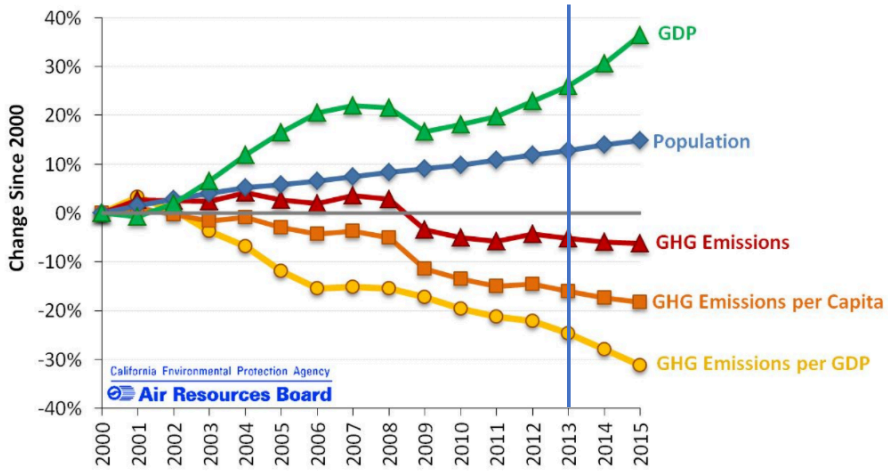
Change in California GDP, Population, and GHG Emissions since 2000



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Sweden's Carbon Tax Policy

Started in 1991

Currently at $140/ton

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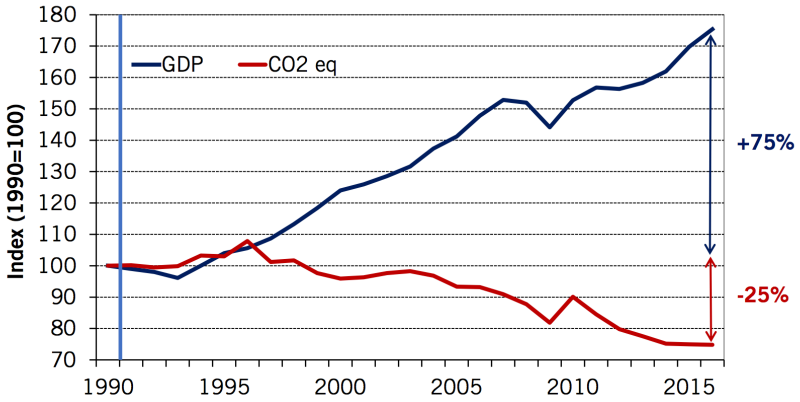
Real GDP and Domestic CO_2eq Emissions[1] In Sweden, 1990-2016



[1] In accordance with Sweden's National Inventory Report, submitted under the UNFCC and the Kyoto Protocol. CO_2 = approx. 80 % of total CO_2eq emissions. Preliminary data for 2016.

Sources: Swedish Environmental Protection Agency, Statistics Sweden

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Summary

- There are many ways to reduce emissions.
- Taxes and cap and trade are proven effective tools to fight climate change!
- Economics-inspired policies can help us do this at the lowest cost.
- Other tools may also be necessary.
  - Regulations may well be necessary in some circumstances, but they are generally inefficient.
- Scientists and the IPCC recommend that we work to keep warming below 1.5 degrees celcius.
  - ***Economists believe that this goal is well worth the costs!***

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Thank you!

Any Questions?

www.NEEDelegation.org
Jon D. Haveman, Ph.D.
Jon@NEEDelegation.org

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