NATIONAL ECONOMIC EDUCATION DELEGATION

Climate Change Economics

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San Rafael Harbor Rotary

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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.

Who Are We?

- **Honorary Board: 44 members**
  - 2 Fed Chairs: Janet Yellen, Ben Bernanke
  - 6 Chairs Council of Economic Advisers
    - Furman (D), Rosen (R), Bernanke (R), Yellen (D), Tyson (D), Goolsbee (D)
  - 3 Nobel Prize Winners
    - Akerlof, Smith, Maskin
- **Delegates: 365 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: 42 Ph.D. Economists**
  - Aid in slide deck development

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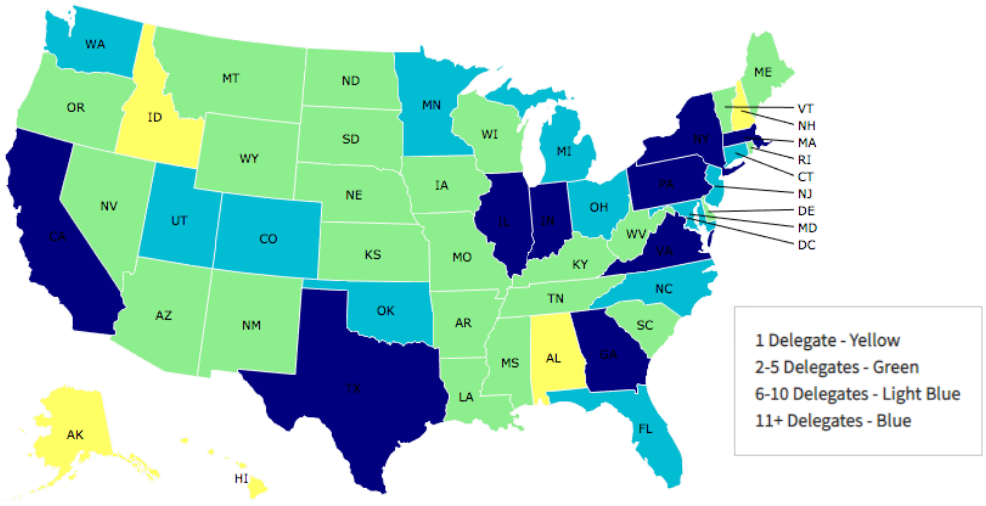
Where Are We?



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- **This slide deck was authored by:**
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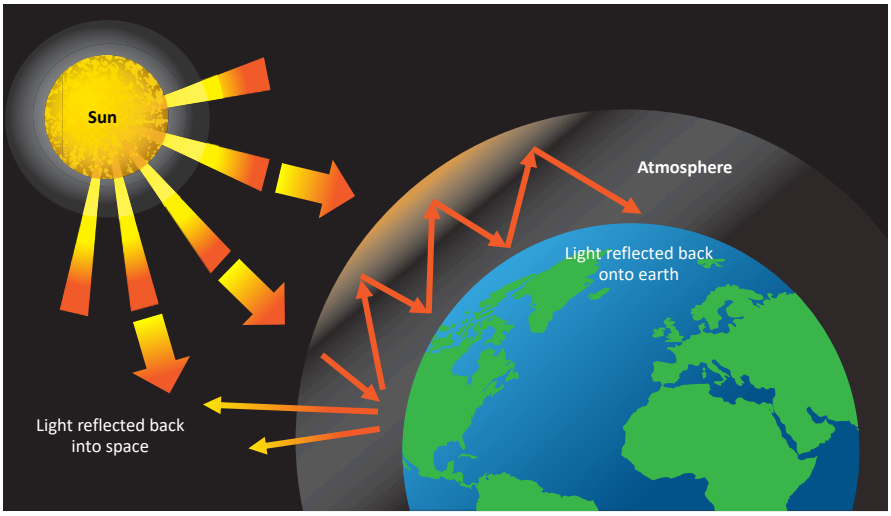
  - NEED presentations are designed to be nonpartisan.
  - It is, however, inevitable that the presenter will be asked for and will provide their own views.
  - Such views are those of the presenter and not necessarily those of the National Economic Education Delegation (NEED).

The Atmospheric Greenhouse Effect



Outline

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

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Pollution Economics

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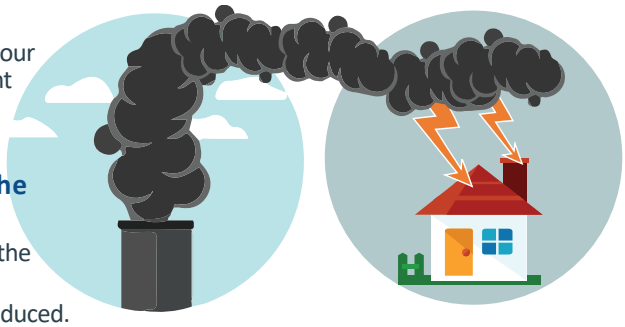
Pollution Imposes Costs Outside the Market

- **Pollution is an EXTERNALITY: a side effect (cost or benefit) that affects someone else when something is bought or sold.**
  - The power company sells you electricity for your house, but the pollution from the power plant affects everyone, not just you!
  - This is a ***market failure.***
- **All of the effects are not always felt by the buyers and sellers.**
  - The price of electricity does not reflect all of the costs—there is too much pollution.
  - Electricity is too cheap. Too much will be produced.
- **There is a cost of electricity above the price paid.**



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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.
- **Social cost of carbon will increase over time.**

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Economics of Responding to Climate Change

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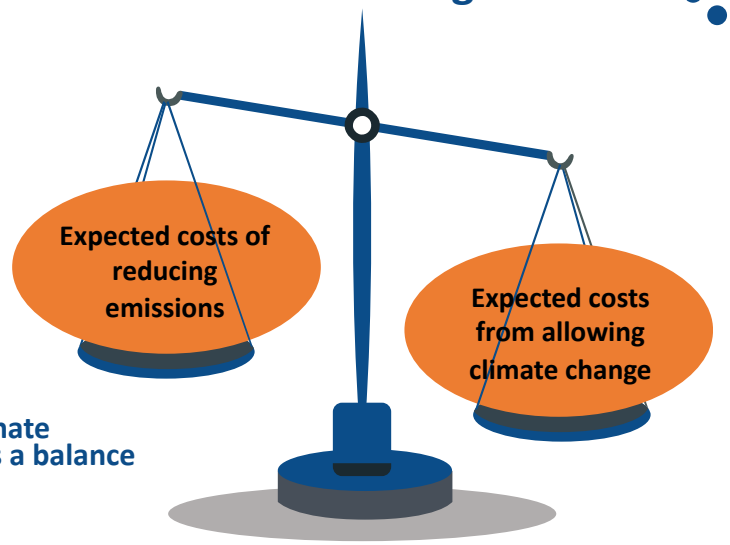
How Economists Decide How Much to Fight Climate Change

- Cost Benefit Analysis
- Weigh:
- This does not likely eliminate emissions, but recognizes a balance between economic costs.



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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.**
  - Stern Report estimate: damages could be as high as **20% of worldwide GDP**.
- **Caveats:**
  - Putting a monetary value on priceless things
  - Inequality
  - Uncertainty and risk

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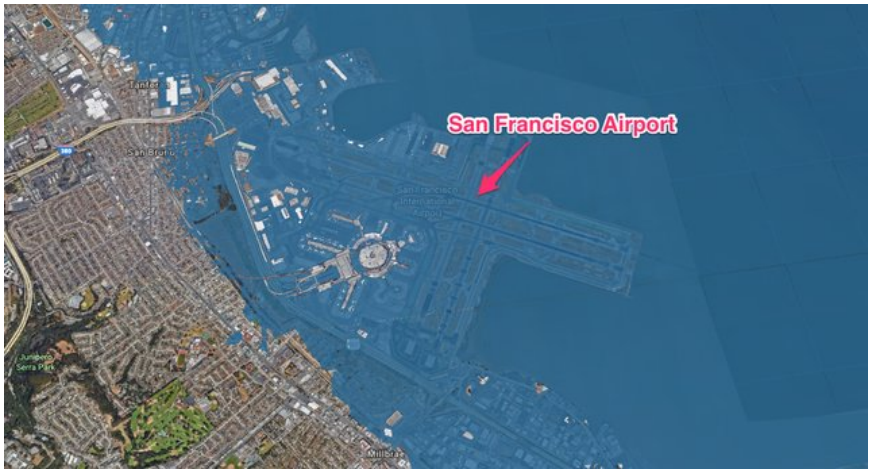
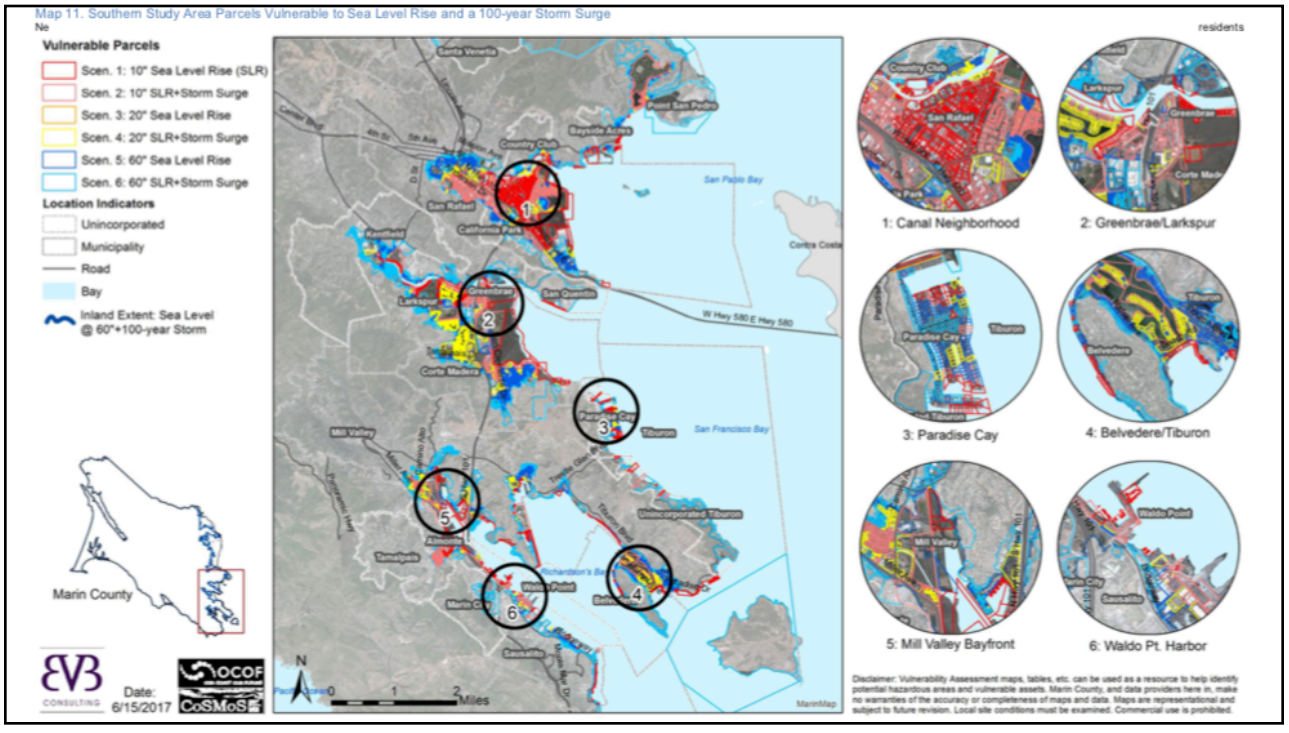
This is What Precisely Wrong Looks Like





Addressing the Sources of Our Emissions

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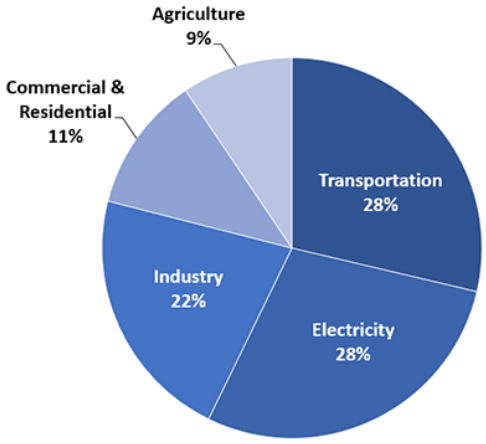
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2016



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

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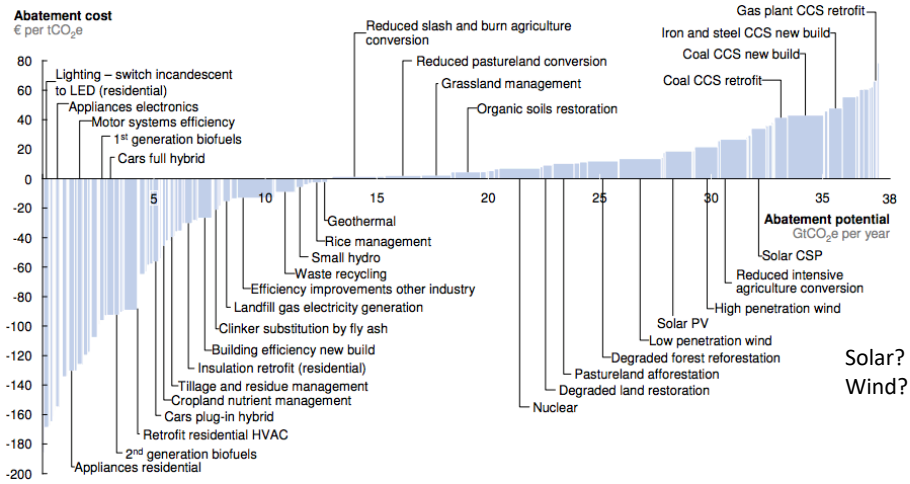
Global GHG Abatement Cost Curve

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

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Policies That Reduce Emissions: Directly

- **Regulation**
  - Emissions standards or limits
    - E.g., CAFE standards
- **Market oriented policies**
  - Putting a price on emissions
    - Subsidizing green energy (*e.g.*, feed-in tariffs)
    - Tax or cap & trade

How Does Cap and Trade Work?

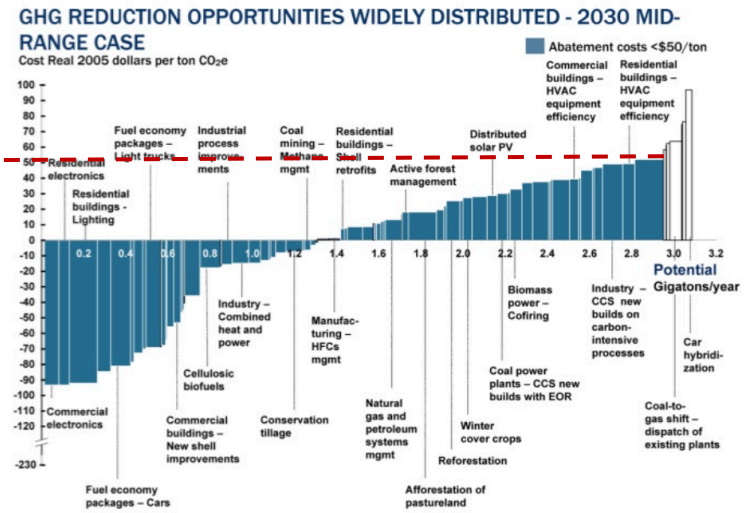
- **Activities to be covered are determined.**
- **Acceptable emissions levels are indicated.**
- **"Permits" that allow acceptable emissions levels are distributed.**
  - How?
    - According to historical emissions?
    - Evenly across emitters?
    - Sold at some price?
- **A "market" is developed.**
- **Those desiring to emit will have to buy sufficient permits to accommodate their emissions.**
- **Those wishing to abate will offer their permits on the "market".**
  - The price of a permit indicates:
    - The cost of emitting.
    - The cost of eliminating further emissions.
- **Agency determines equality of permits in possession and emissions.**

How Does a Carbon Tax Work?

- **Activities to be covered are determined.**
- **The price of emissions (tax) is determined.**
  - Presumably some relation to the social cost of polluting.
- **Emissions are measured.**
- **Taxes are determined and paid.**

Putting a Price on Carbon

Suppose a Social Cost Of Carbon of $50



Carbon Prices: the Good and Bad

- **Good:**
  - Provide price signal to lower emissions.
  - They yield low-cost reductions in emissions.
- **Bad:**
  - Regressive
    - Costs weigh more heavily on low-income people.
  - Firms might leave to flee regulation.
  - It is necessary to monitor emissions.

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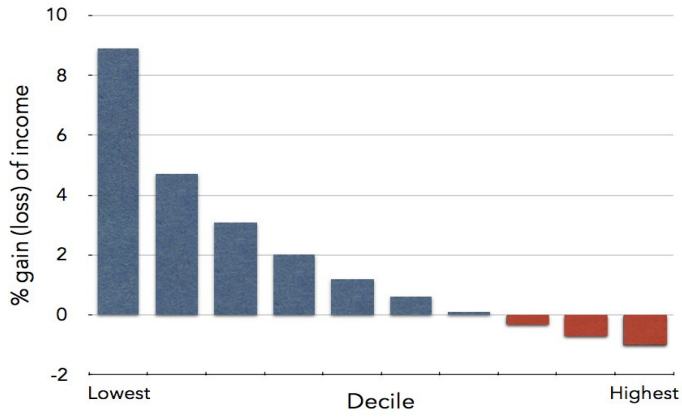
Revenue Dividend Eliminates Regressivity

IMPACT OF CARBON DIVIDENDS ON U.S. FAMILY INCOMES



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Source: U.S. Treasury, 2017

Carbon Tax and Cap & Trade: the Differences

	Carbon Tax	Cap & Trade

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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	Always generates revenue May require legislation to change Predictability	Susceptible to lobbying Only generates revenue if government sells permits Cap can be changed by regulator Less certainty over future

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Thoughts on Regulation vs Market Oriented

- **Equity**
  - Both types of policies are regressive.
    - Cap and Trade and a Carbon Tax both have the ability to offset the regressive nature of reducing carbon emissions.
    - Regulations do not.
- **Efficiency**
  - Market oriented policies tend to achieve emissions reduction at much lower cost.
    - Example: CAFÉ Standards vs Carbon Tax
      - Tax is 3-14 times more efficient than CAFE.
      - Only new cars, people hold on to old cars longer….

Climate Change Policy in Action

California's Cap and Trade System: 2012+

0.7%

of global greenhouse gas emissions

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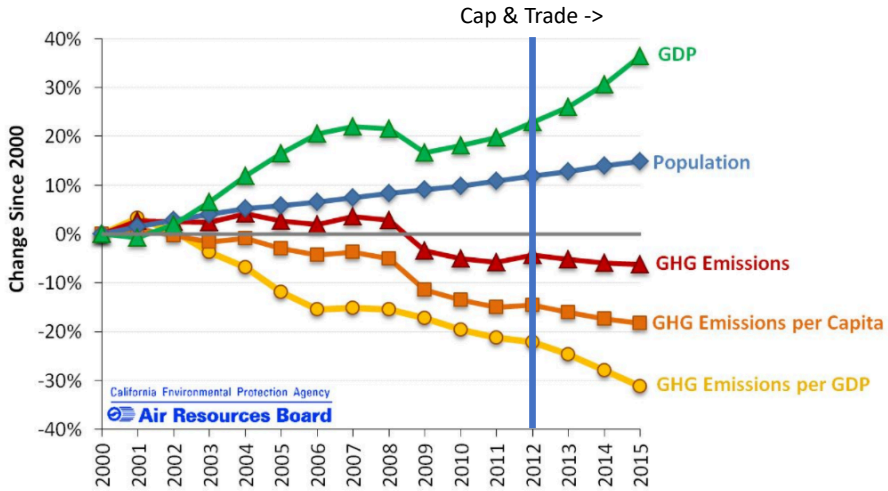
Change in California GDP, Population, and GHG Emissions since 2000



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Sweden's Carbon Tax Policy

Oldest Carbon Tax: 1991

$140/ton

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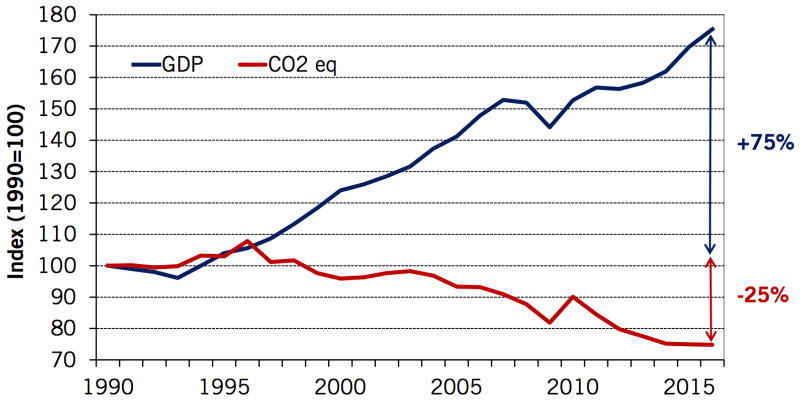
Real GDP and Domestic CO_2eq Emissions[1] In Sweden, 1990-2016



[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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Economic Growth and Climate Change Action Are Compatible

- Abating greenhouse gas emissions is costly…

  … but climate change damages are even more costly.

- Economic growth comes with consequences that we have to deal with, including climate consequences.
- Economies with environmental regulations can still be dynamic.
- Goal: design policies that reach climate goals at the least possible cost.

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Thank you!

Any Questions?

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