Osher Lifelong Learning Institute, Winter 2022

Contemporary Economic Policy

Oklahoma State University
February-March, 2022

Jon Haveman, Ph.D.
National Economic Education Delegation

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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: 54 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: 649+ 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: 48 Ph.D. Economists**
  - Aid in slide deck development

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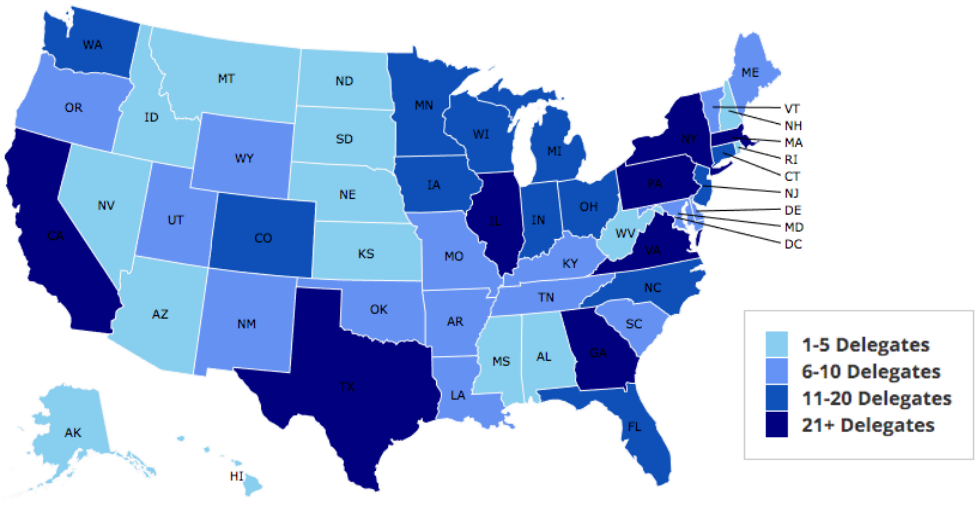
Where Are We?



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Available NEED Topics Include:

- Coronavirus Economics
- US Economy
- Climate Change
- Economic Inequality
- Economic Mobility
- Trade and Globalization
- Minimum Wages
- Immigration Economics
- Housing Policy
- Federal Budgets
- Federal Debt
- Black-White Wealth Gap
- Autonomous Vehicles
- US Social Policy

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Course Outline

- **Contemporary Economic Policy**
  - Week 2 (2/15): US Economy & Coronavirus Economics
  - **Week 3 (2/22): Climate Change Economics (Simone Wegge, CUNY)**
  - Week 4 (3/1): Immigration Economics (Roger White, Whittier College)
  - Week 5 (3/8): Infrastructure Economics (Mallika Pung, Univ. of New Mexico)
  - Week 5 (3/15): Trade and Globalization (Alan Deardorff, Univ. of Michigan)
  - Week 6 (3/22): The Black-White Wealth Gap (Me)

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Submitting Questions

- **Please submit questions in the chat.**
  - I will try to handle them as they come up, but may take them in a bunch as time permits.
- **We will do a verbal Q&A once the material has been presented.**
  - And the questions in the chat have been addressed.
- **OLLI allowing, we can stay beyond the end of class to have further discussion.**

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Climate Change Economics

Simone Wegge, Ph.D.
CUNY, College of Staten Island & Graduate Center

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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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- **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

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

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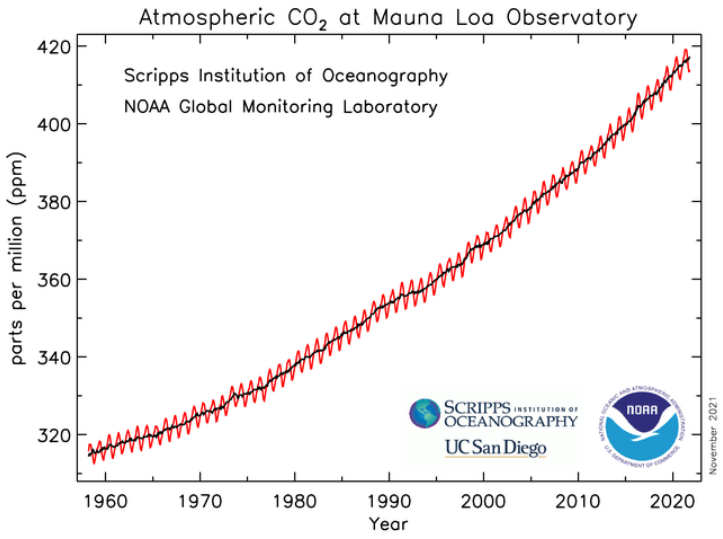
How Can Economists Contribute to Thinking about Climate Change?

- **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.

Climate Change Science

Atmospheric CO_2 Concentrations



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Source: NOAA

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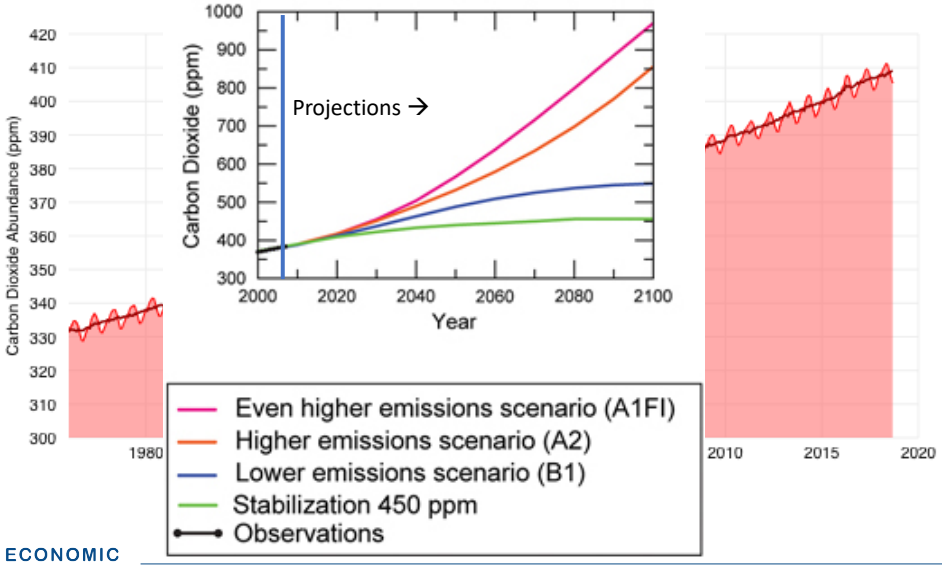
Atmospheric CO_2 Concentrations



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Source: IPCC data distribution center and climate.gov

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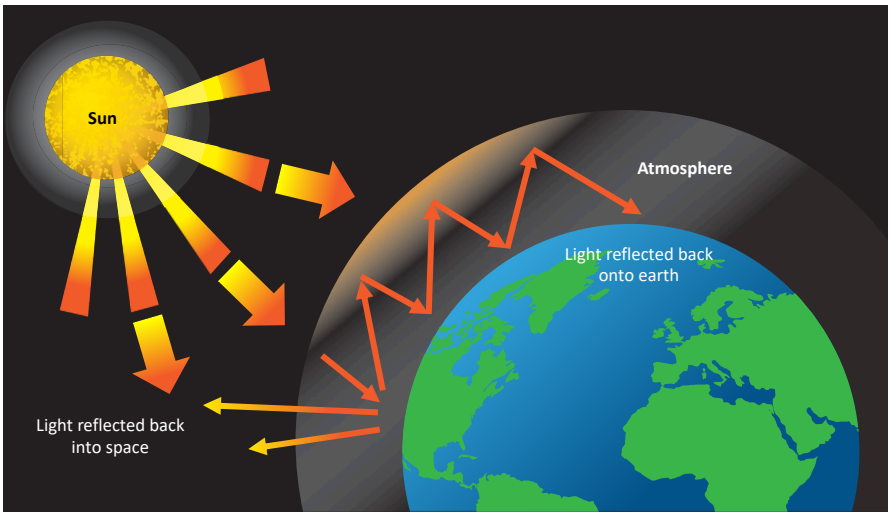
The Atmospheric Greenhouse Effect



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What Do Greenhouse Gas Emissions Do to the Planet?

- **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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Uncertainty

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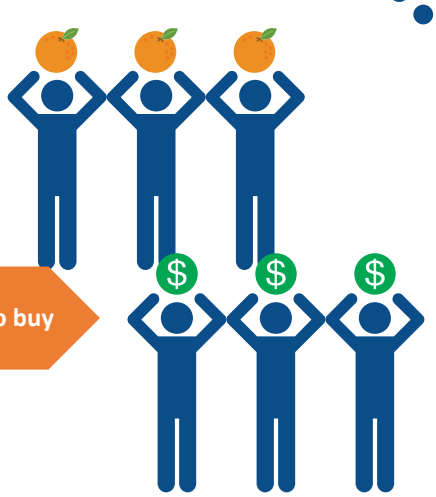
How Much Pollution Does Society Want?
Analogy: How Many Oranges Does Society Want?

- People grow and sell oranges for a price that at least covers costs (***supply***).
- People will not pay more for them than what they consider to be their value (***demand***).
- Prices let ***supply*** and ***demand*** balance out. The price settles where:

# of oranges people want to sell = # of oranges people want to buy



- This is the "right" number of oranges for society.
- Prices reflect scarcity and the social value of the resource.

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Markets that Function Poorly

Market Failures: True cost of a good is not reflected in its price

Example: Use of plastic bottles (negative externality)
Example: Your neighbor's enjoyment of your flowers (Positive externality)

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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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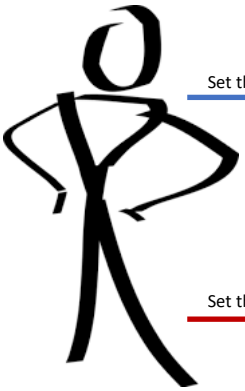
Addressing a Negative Externality

$.14/Kwh

Social cost = $.02/Kwh

$.16/Kwh



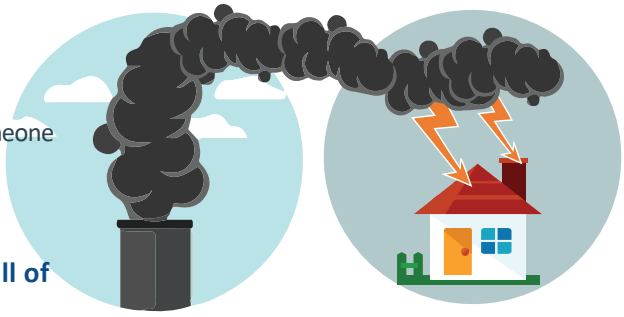
Set thermostat to: 68 degrees

Set thermostat to: 65 degrees

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

Electricity Is Different From Oranges

- **Many sources of electricity generate 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.**
  - Electricity is too cheap.
  - There is too much pollution.



Reflection:

- **Take a moment to write into the chat box a situation in which some market activity creates either benefits or costs to someone outside of the market**
  - Example 1: in the market for electricity, the cost of carbon emissions is borne by everyone, even people who do not use electricity
  - Example 2: in the market for vaccinations for the measles, the benefit of you being vaccinated against the measles is that you cannot pass the disease on to others, so there is a public health benefit, a benefit to others

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Impacts of Climate Change

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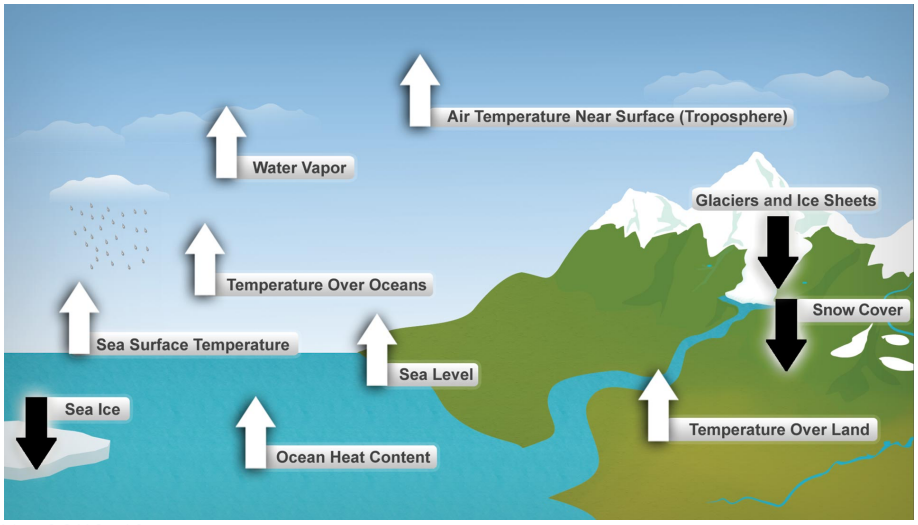
Global Warming Indicators



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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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Adaptation Reduces Damages

- Human *adaptations* are costly actions that can reduce damages from climate change.
- The net cost to society is the cost of adaptation plus the cost of the 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.
- Adaptation is already underway.

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Individual-Level Adaptation Examples

- **Do you behave differently on a hot day?**
  - Write what you do differently in the chat
  - Staying inside more.
  - Turn on the air conditioning.
  - Plant at different times.
  - Plant new crops.
  - Think about moving.

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Public Adaptation

- **Governments can help:**
  - When collective action is less costly than everyone acting alone.
  - When individual action is not possible or likely.
  - When some people can't protect themselves.
- **Sea walls**
- **Ecosystems that provide protection**
- **Supporting low-income and vulnerable populations**
- **Moving residents of a town**

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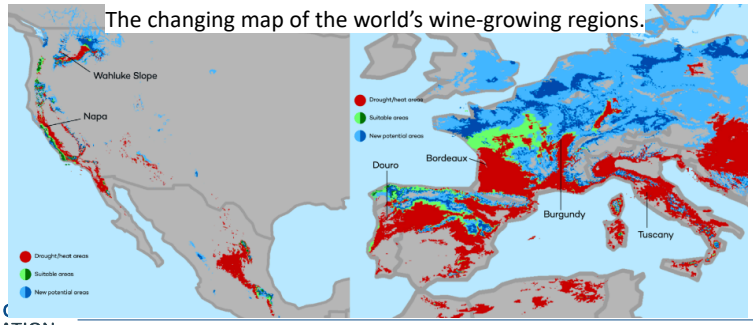
Market Based Adaptation

- **Prices and costs influence behavior.**
  - Where to live.
  - Where/when/what to plant.
- **Avoid barriers to market adjustment.**
  - Trade barriers, immigration restrictions, federal flood insurance, agricultural subsidies, and zoning regulations.

The changing map of the world's wine-growing regions.



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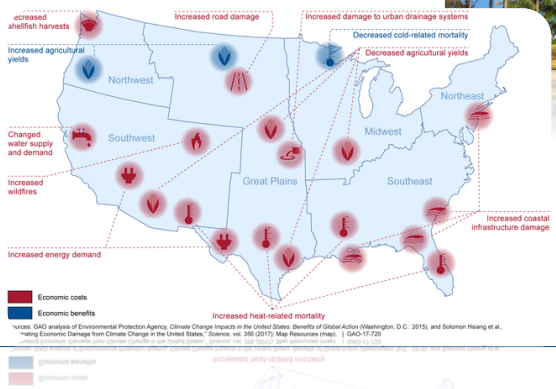
Most Vulnerable People and Places

- Tropical areas
- Low-lying coastal areas
- Low-income people



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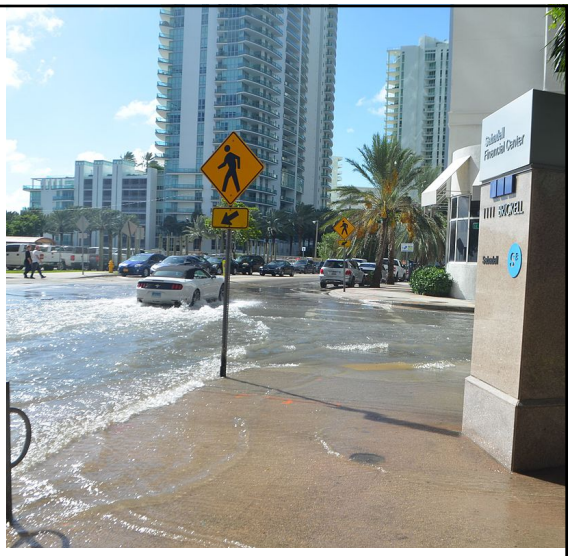
Real Estate Markets

- Sea level rise
- Wildfire risk
- Extreme weather events
  - Hurricanes
  - Extreme rainfall
  - Drought
- Water supplies, electricity reliability
- Residential markets affected
- Turnover leading indicator



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Projected Effects Vary Across the U.S. but Are Estimated at 1.2% of GDP per 1C Increase

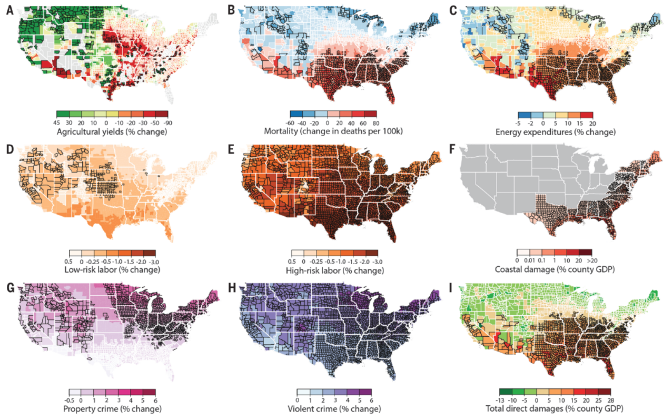

Fig. 2. Spatial distributions of projected damages. County-level median values for average 2080 to 2099 RCP8.5 impacts. Impacts are changes relative to counterfactual "no additional climate change" trajectories. Color indicates magnitude of impact in median projection; outline color indicates level of agreement across projections (thin white outline, inner 66% of projections disagree in sign; no outline, ≥83% of projections agree in sign; black outline, ≥95% agree in sign; thick white outline, state borders; maps without outlines shown in fig. S2). Negative damages indicate economic gains. (**A**) Percent change in yields, area-weighted average for maize, wheat, soybeans, and cotton. (**B**) Change in all-cause mortality rates, across all age groups. (**C**) Change in electricity demand. (**D**) Change in labor supply of full-time-equivalent workers for low-risk jobs where workers are minimally exposed to outdoor temperature. (**E**) Same as (D), except for high-risk jobs where workers are heavily exposed to outdoor temperatures. (**F**) Change in damages from coastal storms. (**G**) Change in property-crime rates. (**H**) Change in violent-crime rates. (**I**) Median total direct economic damage across all sectors [(A) to (H)].

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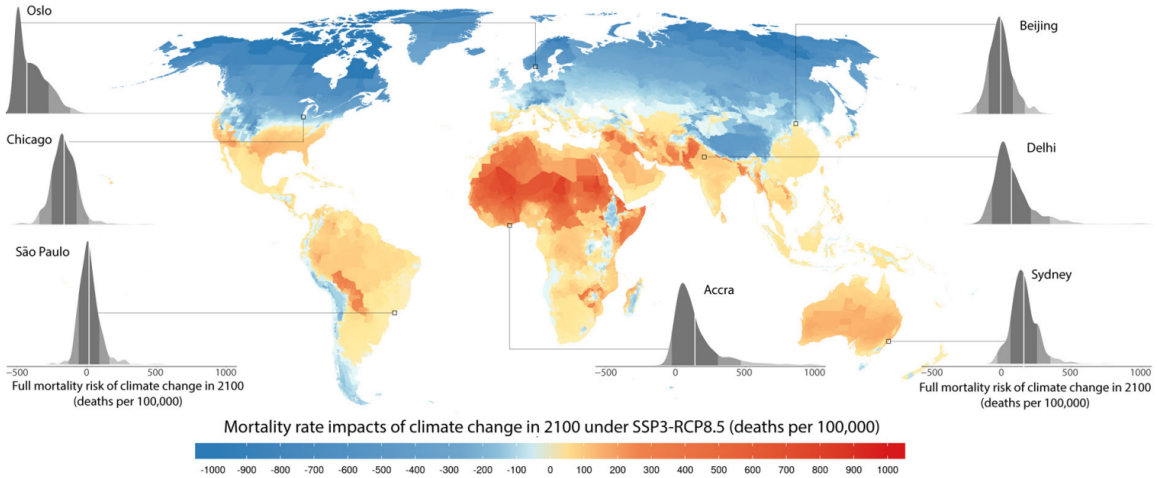
How Damages Will Vary Globally: Mortality as an Example



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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: ~$51 per metric ton of CO_2.**
  - About $32 Billion for all vehicles in the US.
- **Social cost of carbon will increase over time.**

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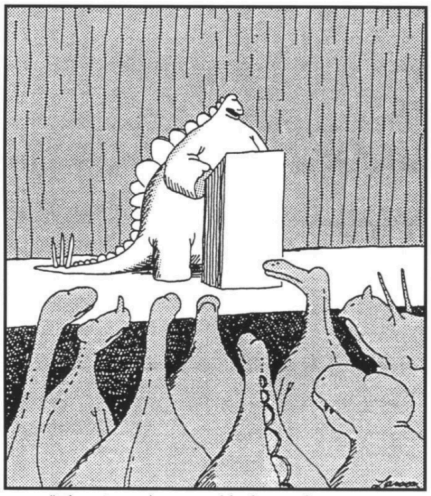

"The picture's pretty bleak, gentlemen. ... The world's climates are changing, the mammals are taking over, and we all have a brain about the size of a walnut."

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Economics of Responding to Climate Change

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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, 4th report:**
  - 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 2021, Part 1 of 6th Report:**
  - "Unless there are immediate, rapid, and large-scale reductions in greenhouse gas emissions, limiting warming to 1.5°C will be beyond reach." Ko Barrett, NOAA & IPCC Vice-Chair

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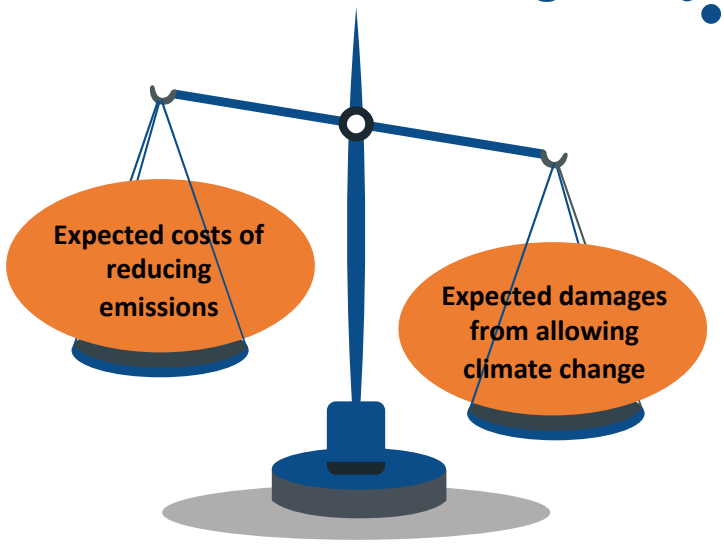
How Economists Decide How Much to Fight Climate Change

- Cost Benefit Analysis
- Weigh:



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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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Addressing the Sources of Our 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 (including 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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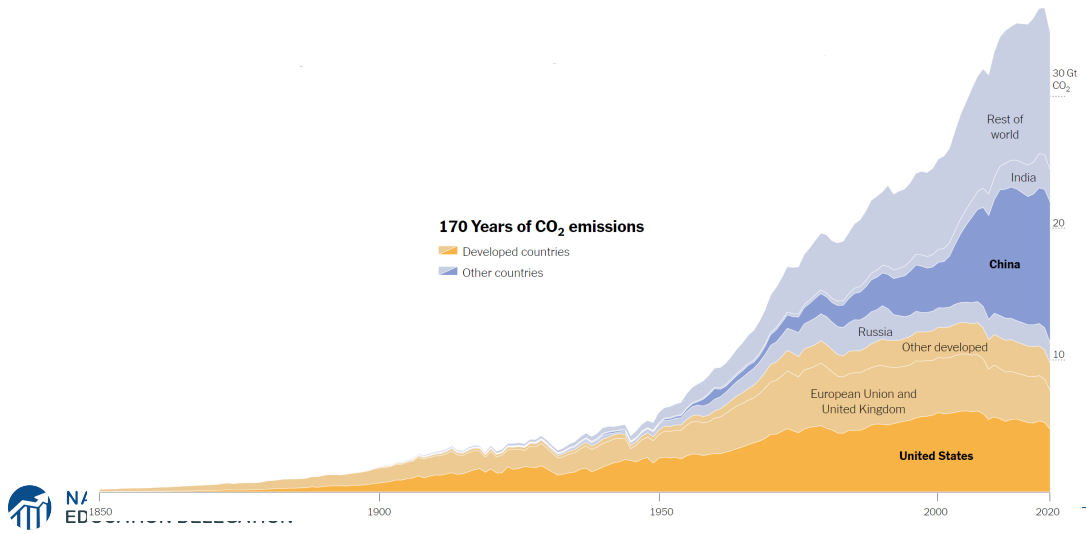
Sources of the Global Flow of Emissions



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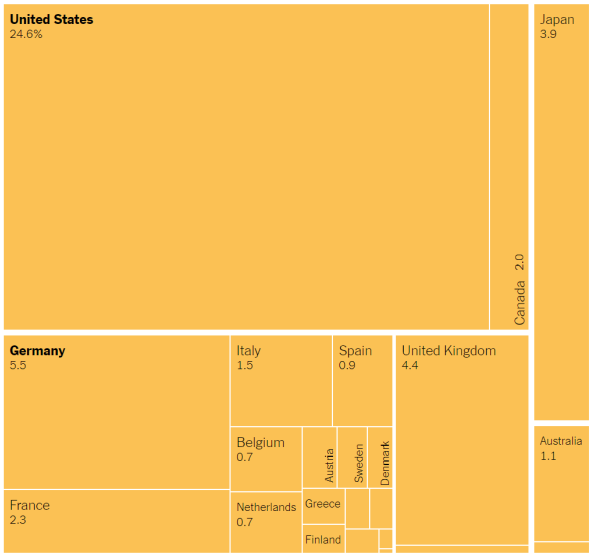
Sources of the Global Stock of Emissions

23 rich, developed countries are responsible for half of all historical CO_2 emissions.



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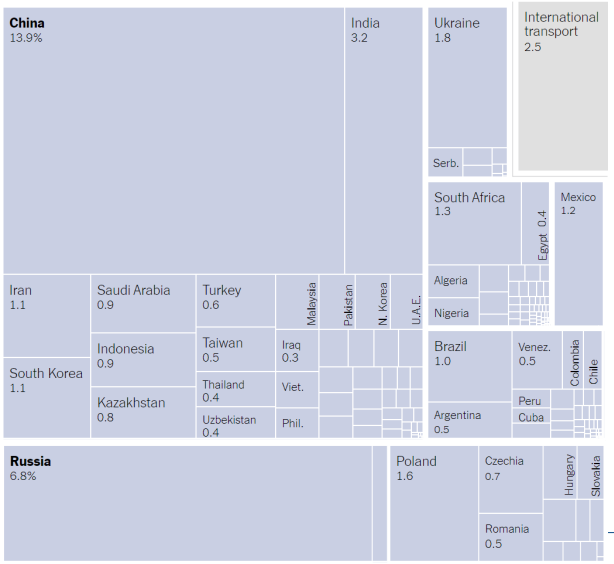
Sources of the Global Stock of Emissions

More than 150 countries are responsible for the other half.



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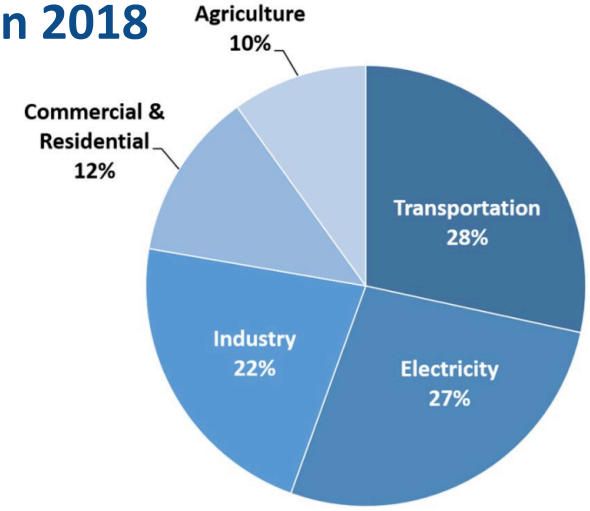
Total U.S. Greenhouse Gas Emissions by Economic Sector in 2018



U.S. Environmental Protection Agency (2020). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018

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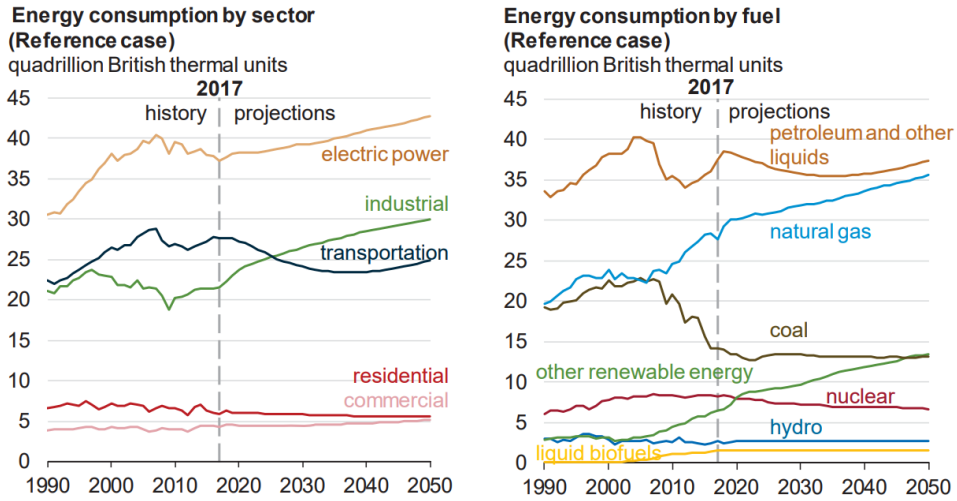
Fossil Fuels Dominate U.S. Energy Production



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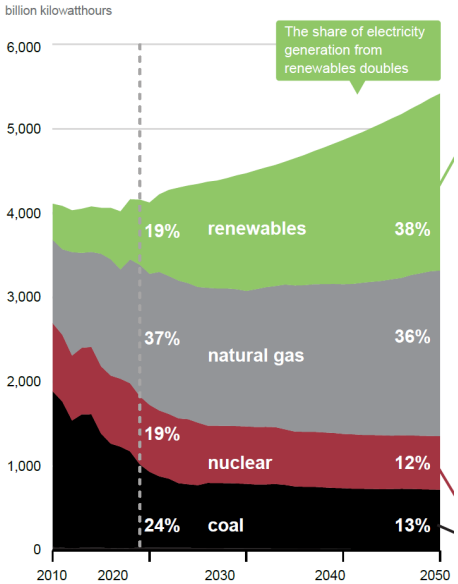
US Electricity Sources



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Which Emissions Should We Cut?

- List all possible ways to reduce emissions
- Figure out how much each can reduce in total
- Figure out how much each costs per unit of emissions reduced
- Line them up in order: cheapest to costliest ("marginal abatement cost curve")
  - → Tackle first the cheapest ones!

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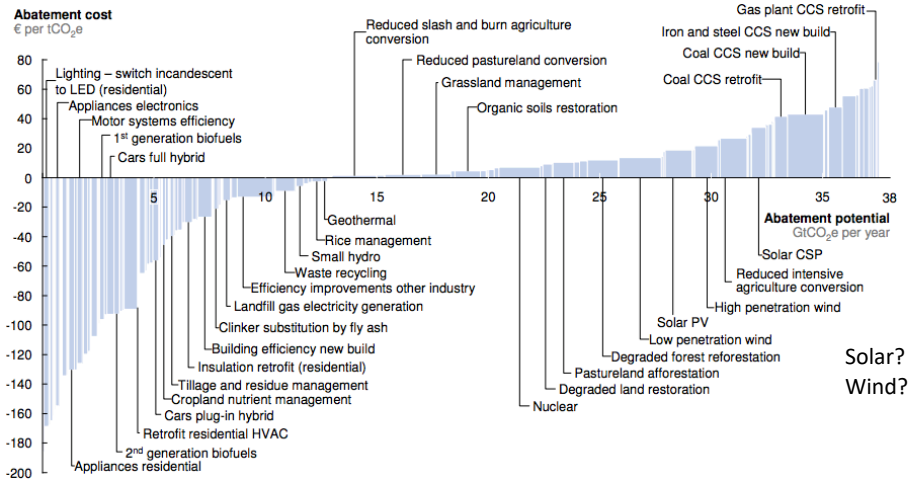
Global GHG Abatement Cost Curve

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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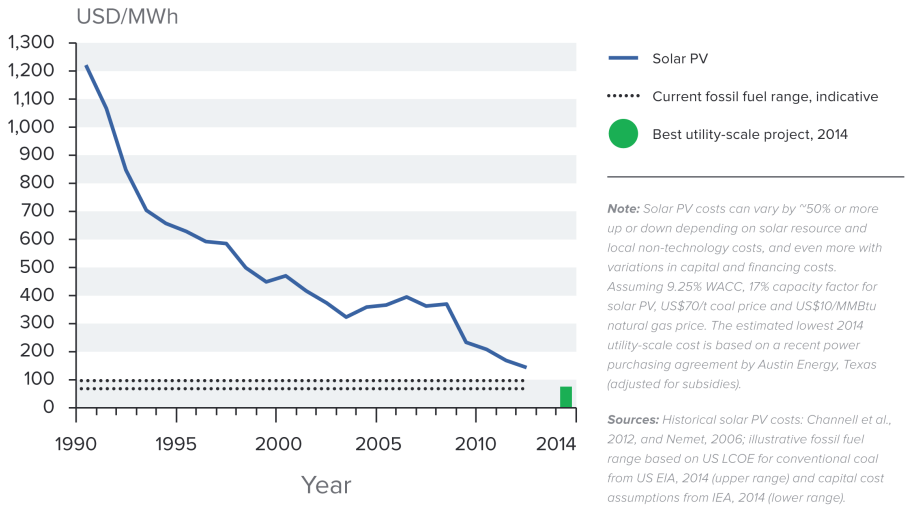
Indicative Solar Costs Over Time



Note: *Solar PV costs can vary by ~50% or more up or down depending on solar resource and local non-technology costs, and even more with variations in capital and financing costs. Assuming 9.25% WACC, 17% capacity factor for solar PV, US$70/t coal price and US$10/MMBtu natural gas price. The estimated lowest 2014 utility-scale cost is based on a recent power purchasing agreement by Austin Energy, Texas (adjusted for subsidies).*

Sources: *Historical solar PV costs: Channell et al., 2012, and Nemet, 2006; illustrative fossil fuel range based on US LCOE for conventional coal from US EIA, 2014 (upper range) and capital cost assumptions from IEA, 2014 (lower range).*

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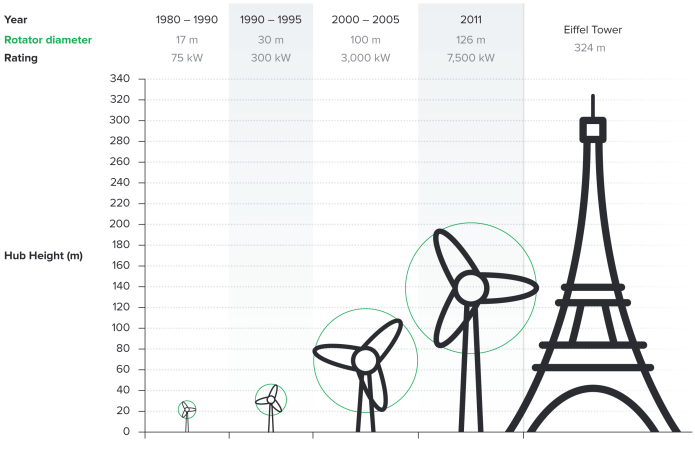
Wind Turbines Have 100 Times More Power Generation Capabilities Than 30 Years Ago



Source: Adapted from the European Wind Energy Association.

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Challenges with Renewable Energy

- **It's intermittent - only produced if there is sun or wind.**
- **Energy is needed all day and night, with peak times.**
- **Limited w/o storage.**
  - Creative storage options are under development.

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Climate Change Policy

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Policies That Reduce Emissions: Directly

- **Regulation (Command and Control)**
  - Emissions standards or limits
    - E.g., CAFE standards (CAFE: Corporate Average Fuel Economy)
  - Tech standards (e.g., require scrubbers on power plants)

- **Market-oriented policies (Incentive-based)**
  - Putting a price on emissions
    - Subsidizing green energy (*e.g.*, feed-in tariffs)
    - Tax OR Cap & Trade

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Command and Control Regulation 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.
    - Example: CAFÉ Standards vs Carbon Tax: Tax is significantly more efficient.

- **Equity**
  - Both have may regressive impacts (low-income families bear costs that are a larger percent of their incomes vs hi-income families)
    - However, new evidence increasingly questions this.
  - Cap and trade and carbon tax can generate revenues that can be used to offset the regressivity. Command and control regulations do not.
    - E.g.: “carbon dividend”

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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

- Research and development 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

Climate Change Policy in Action

California's Cap and Trade System: 2012+

0.7%

of global greenhouse gas emissions

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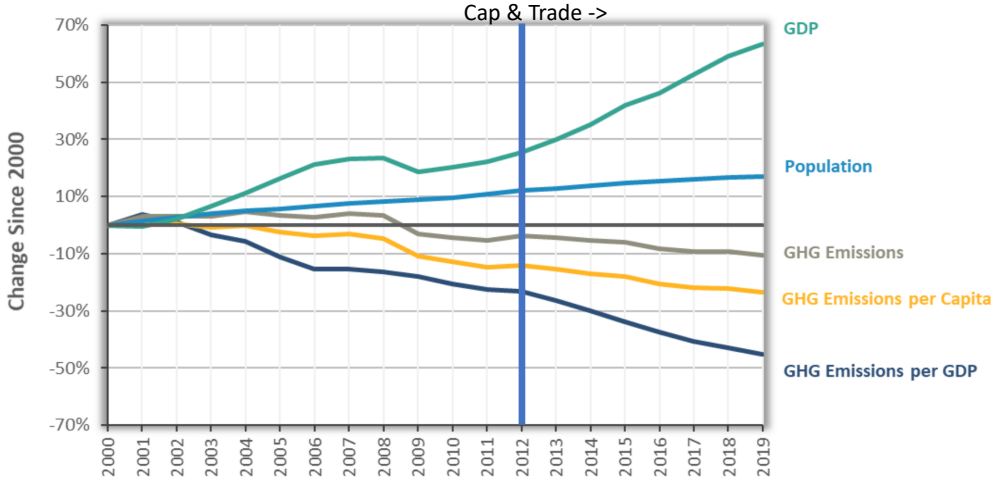
Change in California GDP, Population, and GHG Emissions since 2000



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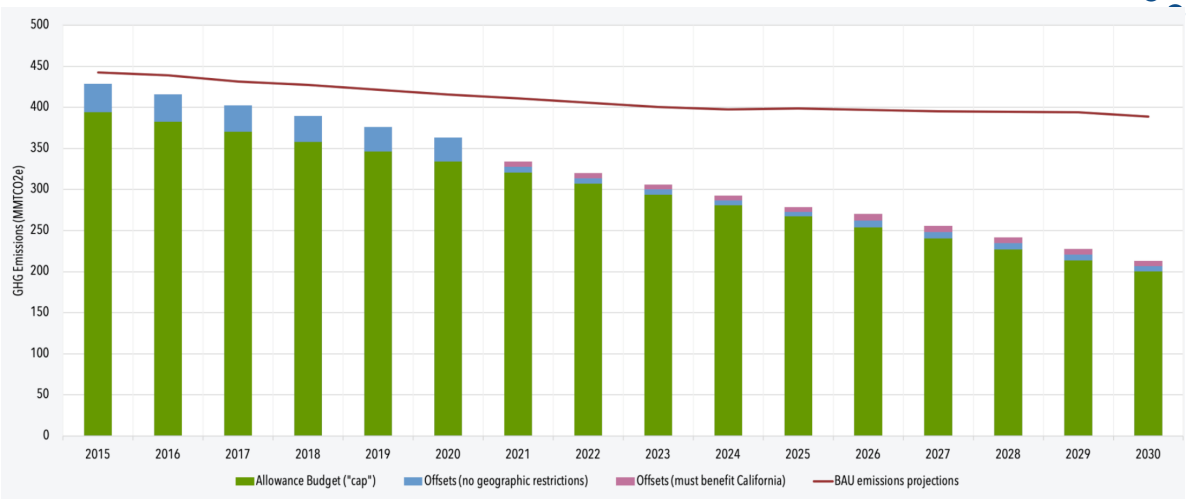
Projected trends in California's emissions



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Summary

- Climate change is real, is caused by human actions, and has impacts we're already feeling.
- We need to reduce emissions to balance the costs of action against the costs of inaction.
- Scientists and the IPCC recommend that we work to keep warming below 1.5 degrees celsius.
  - *Economists believe that this goal is well worth the costs!*

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Summary – *continued*

- There are many ways to reduce emissions.
- Economics-inspired policies can help us do this at the lowest cost.
- Taxes and cap and trade are proven effective tools to fight climate change!
- Other tools may also be necessary.

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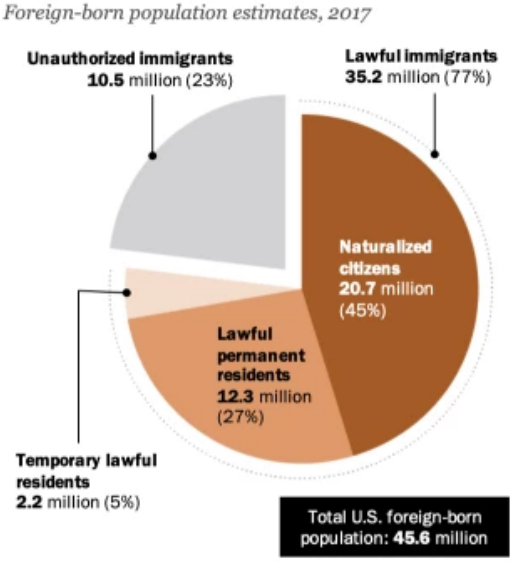
Immigration - w/ Roger White

Categories of the total number of immigrants in the United States.



https://www.pewresearch.org/fact-tank/2019/07/12/how-pew-research-center-counts-unauthorized-immigrants-in-us/

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Thank you!

Any Questions?

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