


Climate Change Economics

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NEED



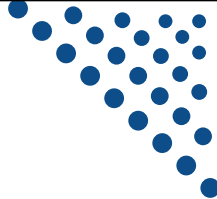
ExtraFood


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- **This slide deck was authored by:**
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Economic Building Blocks

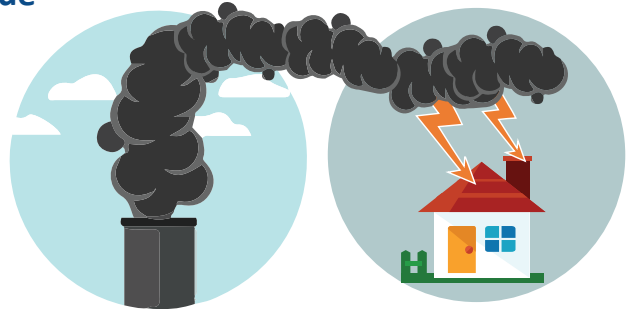


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When Our Decisions Affect Others, We Need Regulation

- **Pollution causes an EXTERNALITY: a side effect (here, a cost) 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” amount of pollution balances costs & benefits of pollution***



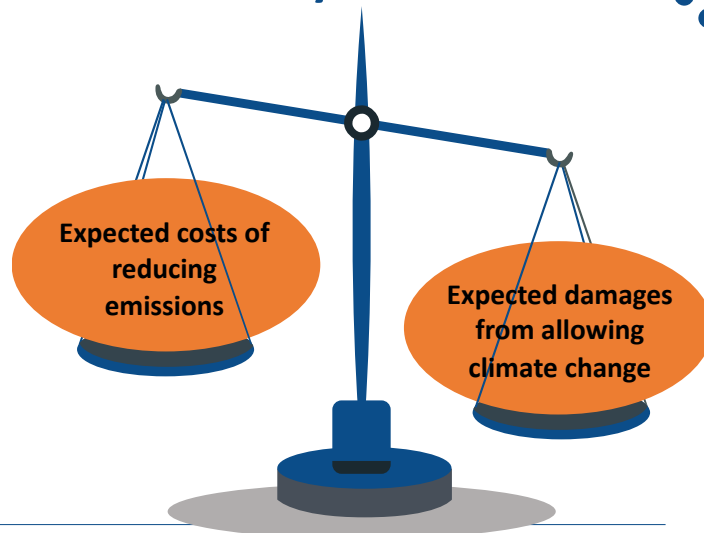
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How Economists Decide How Much to Fight Climate Change: Cost Benefit Analysis

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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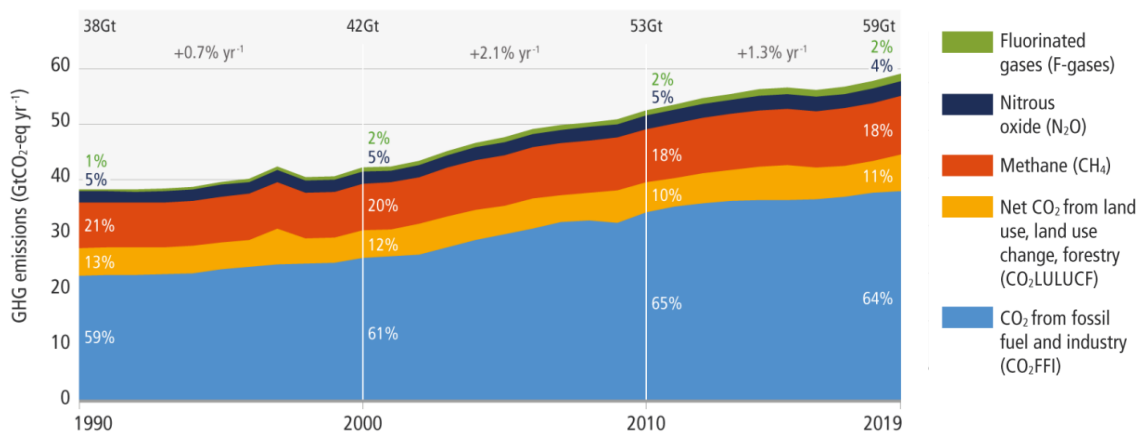
A Climate Change Ladder

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

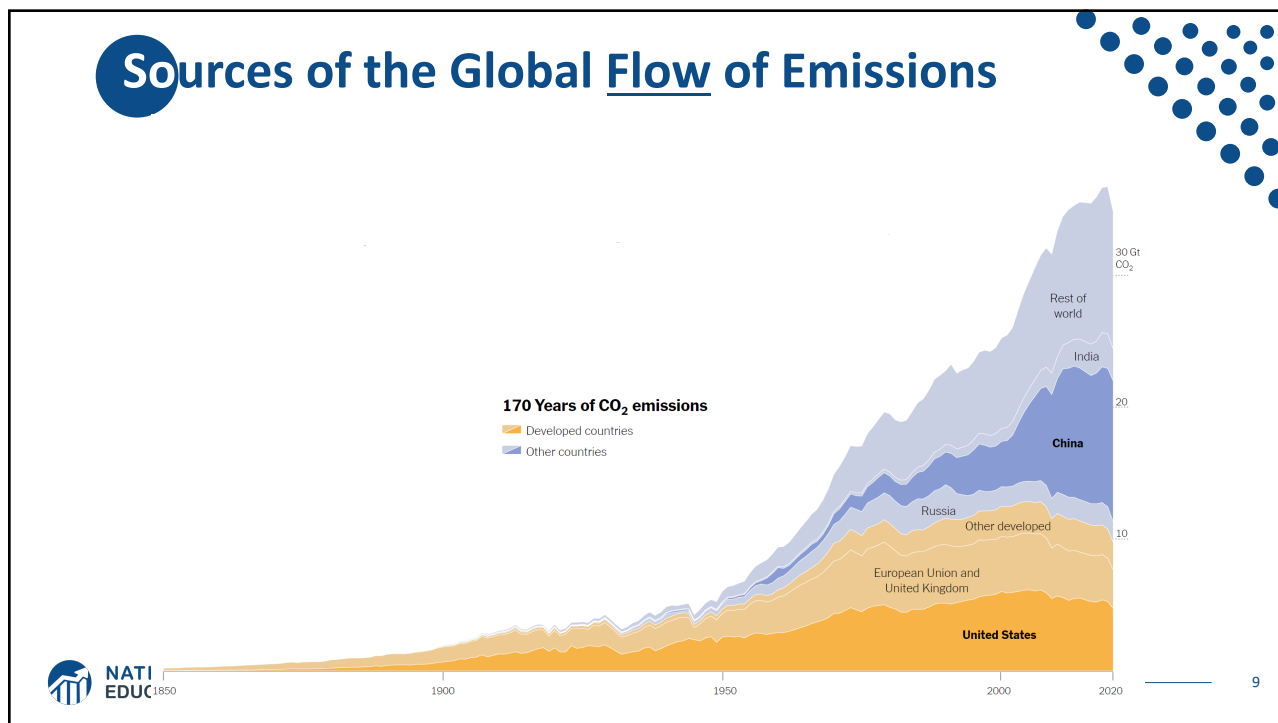
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Greenhouse Gas Emissions 1990-2019

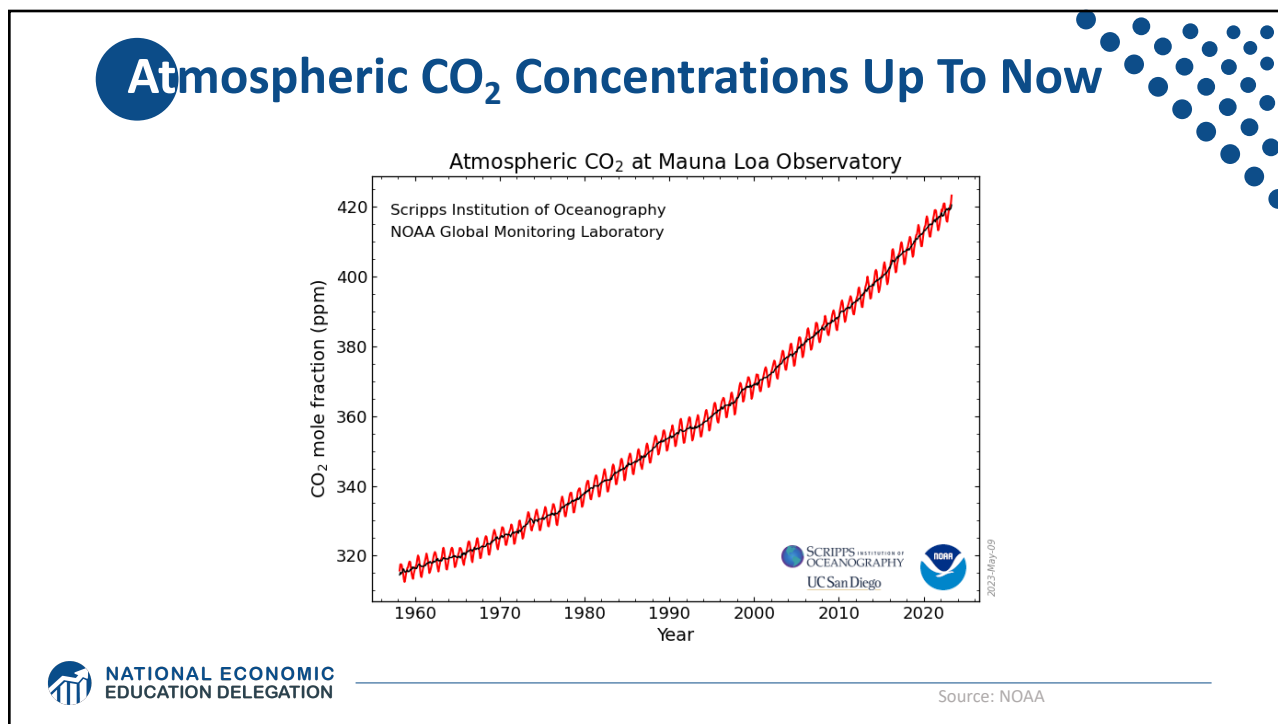
a. Global net anthropogenic GHG emissions 1990–2019 ⁽⁶⁾



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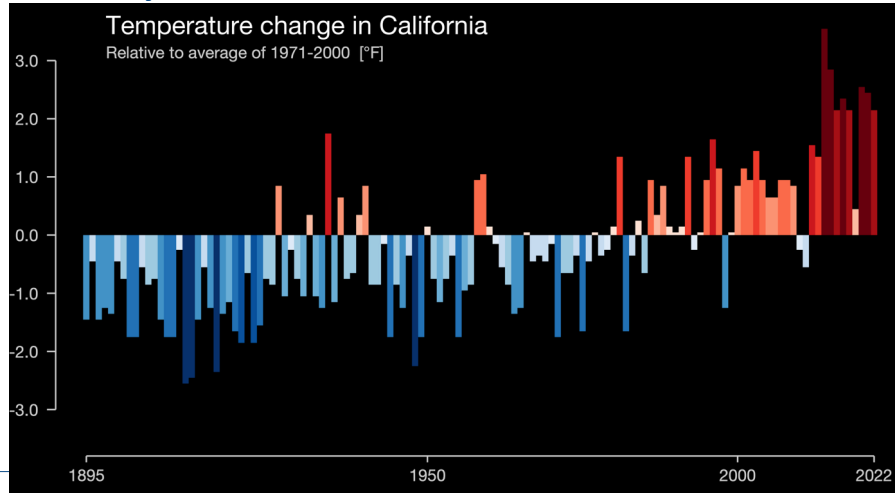


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These Changes Are Already Underway

Use <https://showyourstripes.info/> to see the temperature history of an area!

Here's WA!



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Impacts of Climate Change

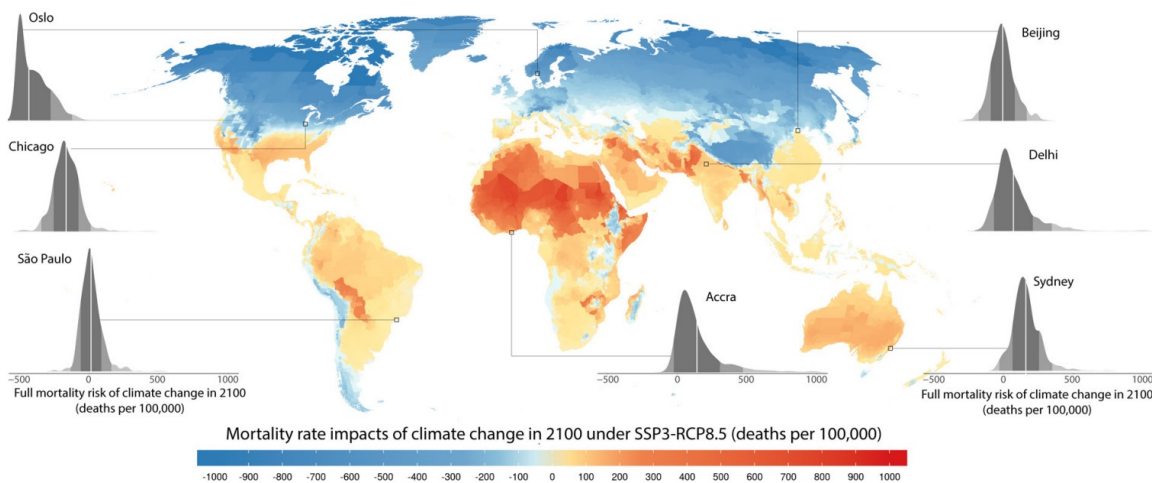


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How Climate Change Affects Humans

- 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

How Damages Will Vary Globally: Mortality as an Example



Adaptation Reduces Damages

- **Adaptation:** costly action that reduce damages from climate change.
- The **net damage cost to society** is the **cost of adaptation** plus the **cost of remaining damages**.
- People and firms will take some actions on their own, up to the point where they find it worthwhile.
- Some adaptation requires government involvement.

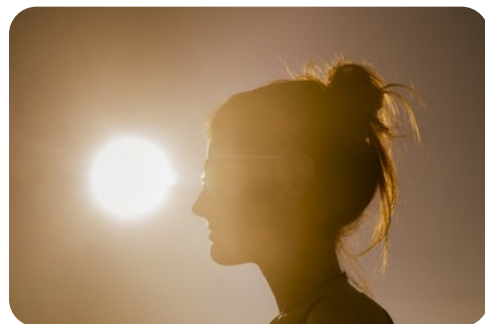


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Individual-Level Adaptation

- **Perhaps you...**
 - Stay inside more.
 - Turn on the air conditioning.
- **Farmers may:**
 - Plant at different times.
 - Plant new crops.
- **Businesses may:**
 - Give outdoor workers water / shade breaks.
- **Everyone might:**
 - Think about moving to a safer place.



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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**
- **Policies that protect workers or low-income and vulnerable populations**
- **Planned retreat (moving a community)**



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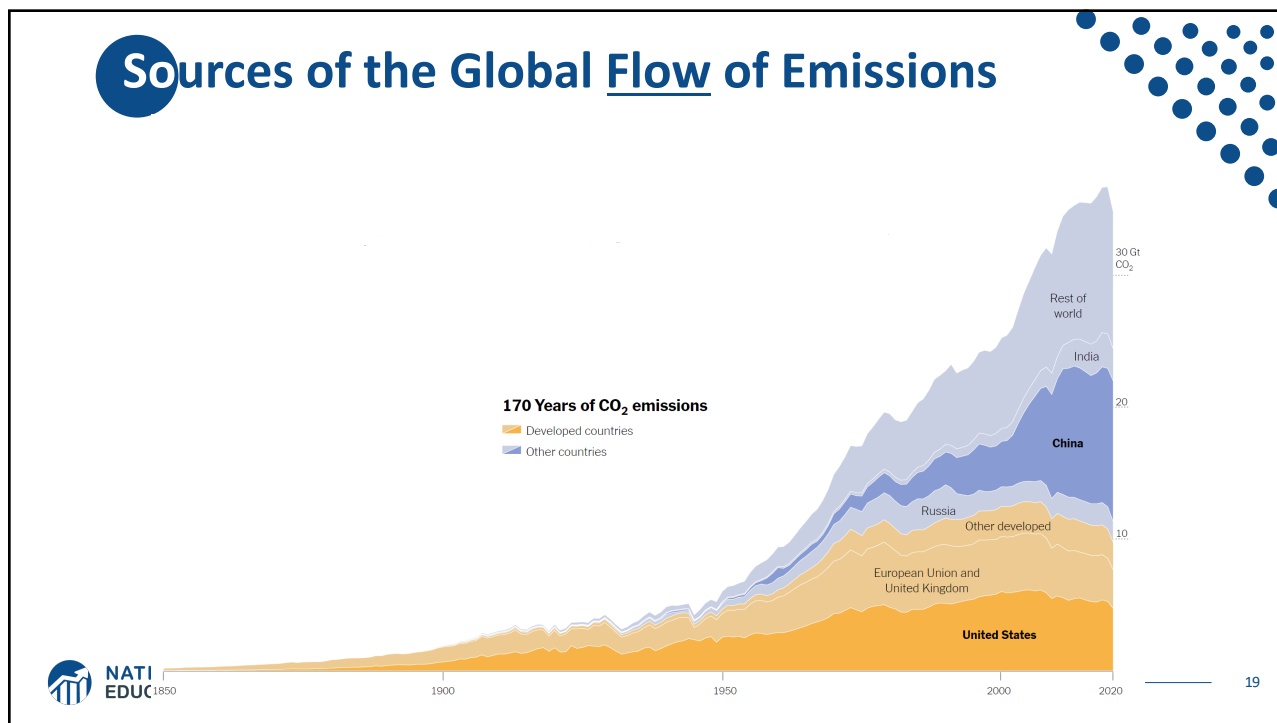
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Reducing Emissions

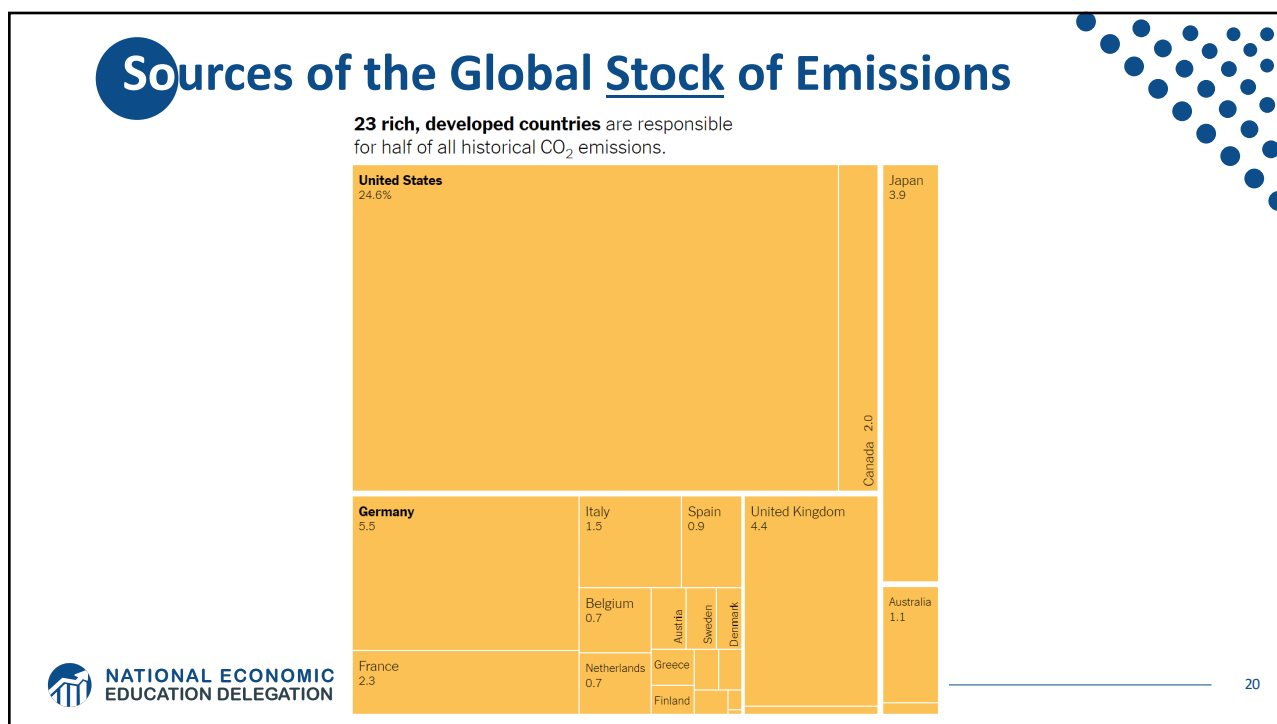


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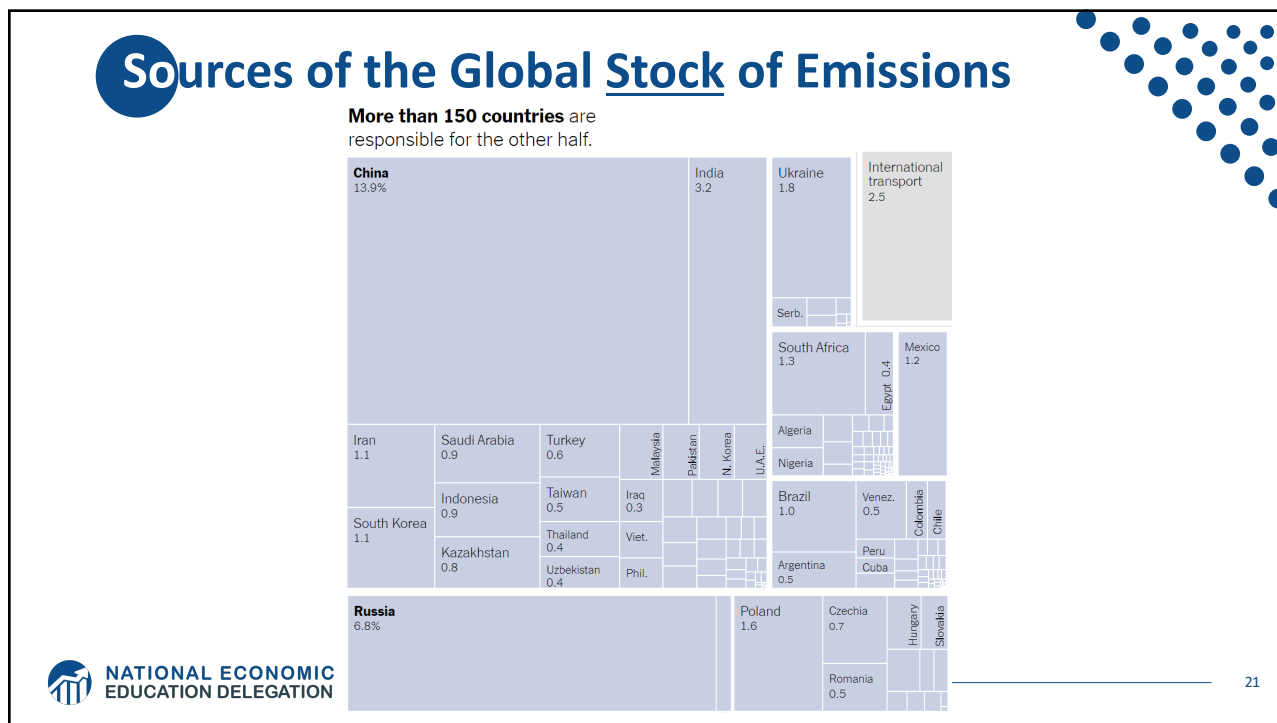
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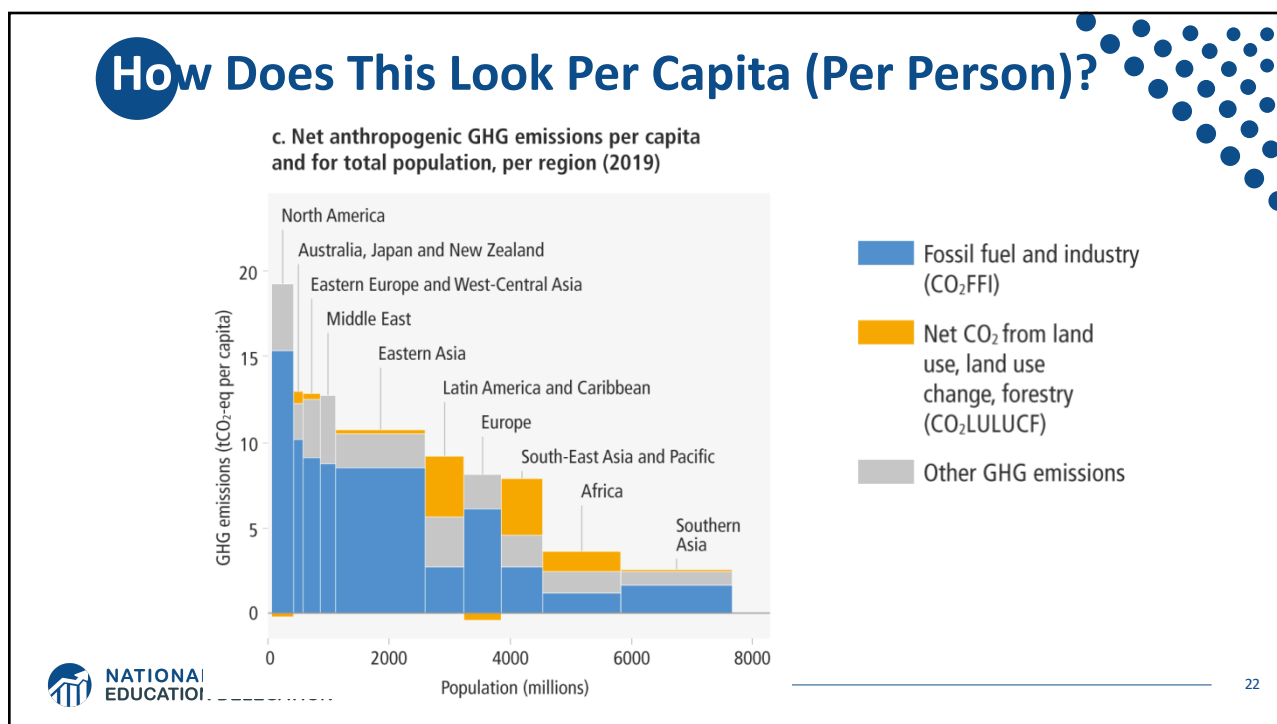
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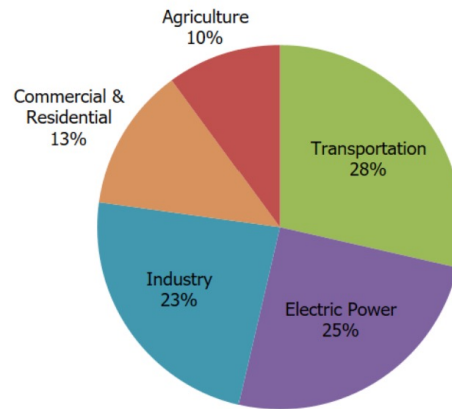


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Total US Greenhouse Gas Emissions by Economic Sector in 2021



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Total Emissions in 2021 are 6,340 [Million Metric Tons of CO₂ equivalent](#). Percentages may not add up to 100%

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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!



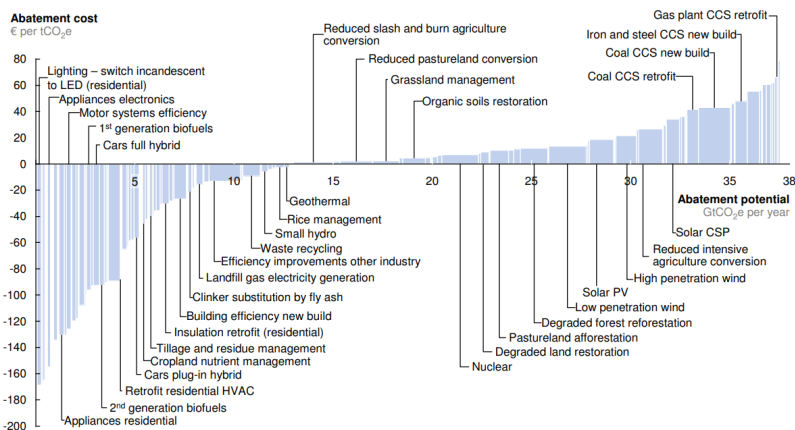
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Example Abatement Cost Curve

(Don't trust these numbers, this is just to show the idea)

V2.1 Global GHG abatement cost curve beyond BAU – 2030



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



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



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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



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Climate Change Policy in Action



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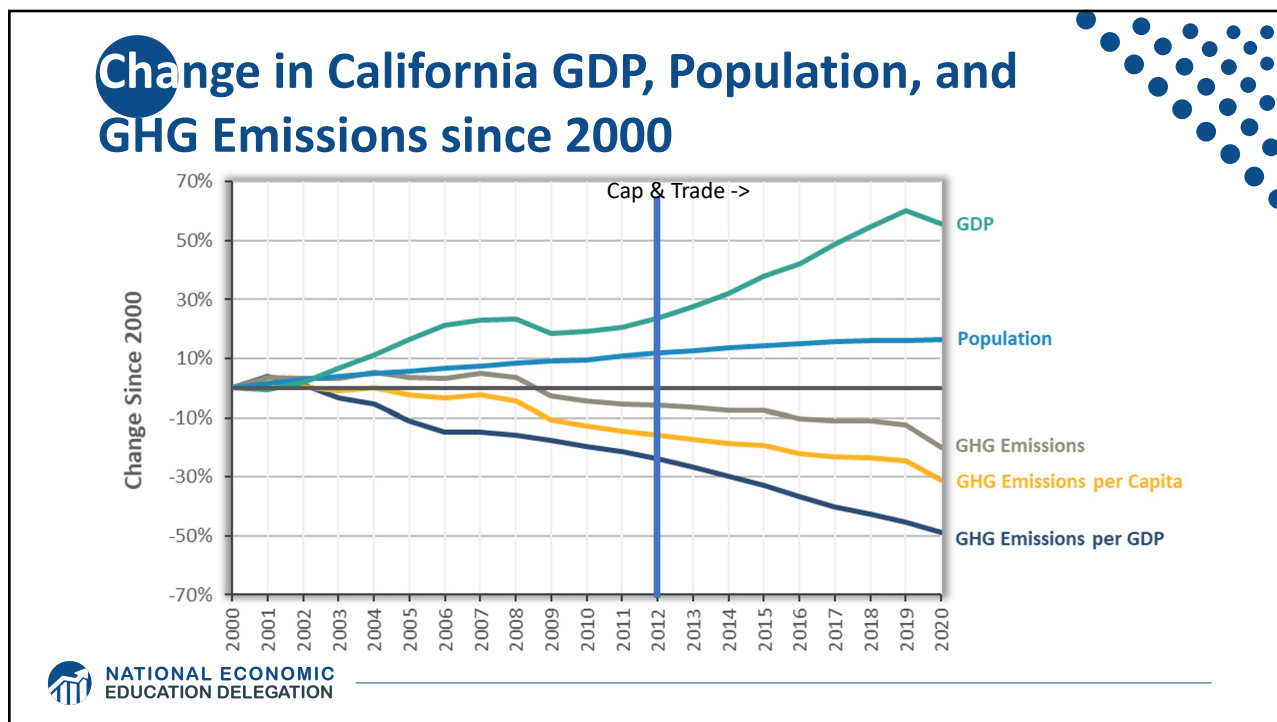
California's AB32: Global Warming Solutions



- **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.**
 - Fortunately, a lot of action is happening – we need to double down!
- **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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