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Climate Change Economics
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Kiwanis Club of San Jose
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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
    - ○ Furman (D), Rosen (R), Bernanke (R), Yellen (D), Tyson (D), Goolsbee (D)
  - 3 Nobel Prize Winners
    - ○ 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 Safety Net**
- **Trade and Globalization**
- **Economic Mobility**
- **Immigration**

- **COVID-19**
- **Housing Policy**
- **Federal Budgets**
- **Federal Debt**
- **2017 Tax Law**
- **Autonomous Vehicles**
- **Black-White Wealth Gap**

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Credits and Disclaimer

- **This slide deck was authored 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

- **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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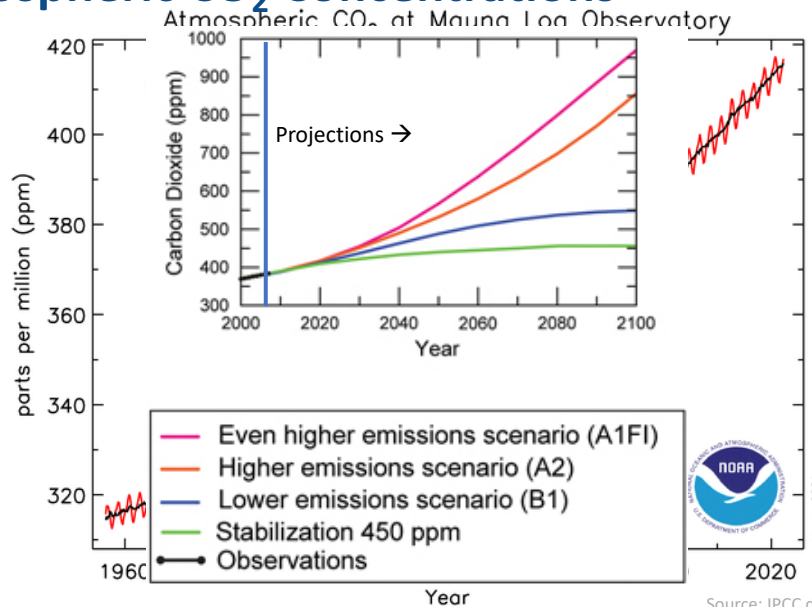EDUCATION DELEGATION

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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 the costs & benefits of pollution*

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Atmospheric CO_2 Concentrations

Atmospheric CO_2 at Mauna Loa Observatory

Projections →

Carbon Dioxide (ppm)

Year

parts per million (ppm)

— Even higher emissions scenario (A1FI)
— Higher emissions scenario (A2)
— Lower emissions scenario (B1)
— Stabilization 450 ppm
— Observations

1960   2020

Year

March 2021

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Source: IPCC data distribution center and climate.gov

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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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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.

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A Climate Change Ladder

- **Emissions**

- **Mitigation (a.k.a. Abatement)**

- **Adaptation**

- **Damages**

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Reducing Emissions

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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.

Expected costs of reducing emissions

Expected damages from allowing climate change
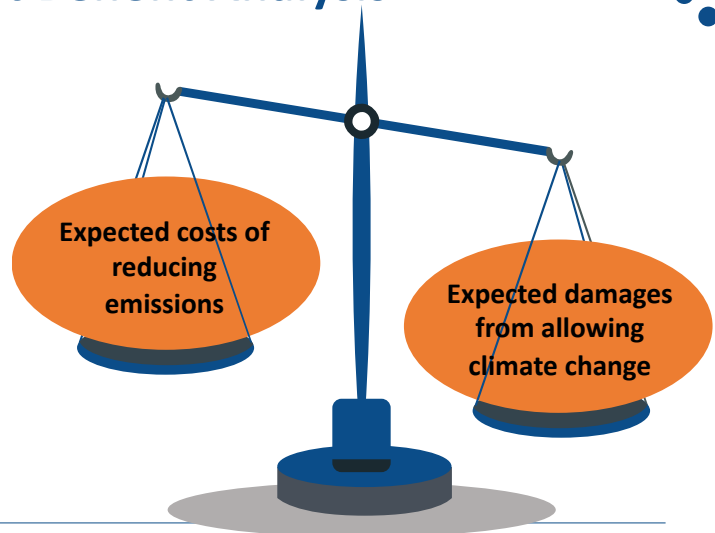
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Cost-Benefit Analysis of
Fighting Climate Change

- **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.
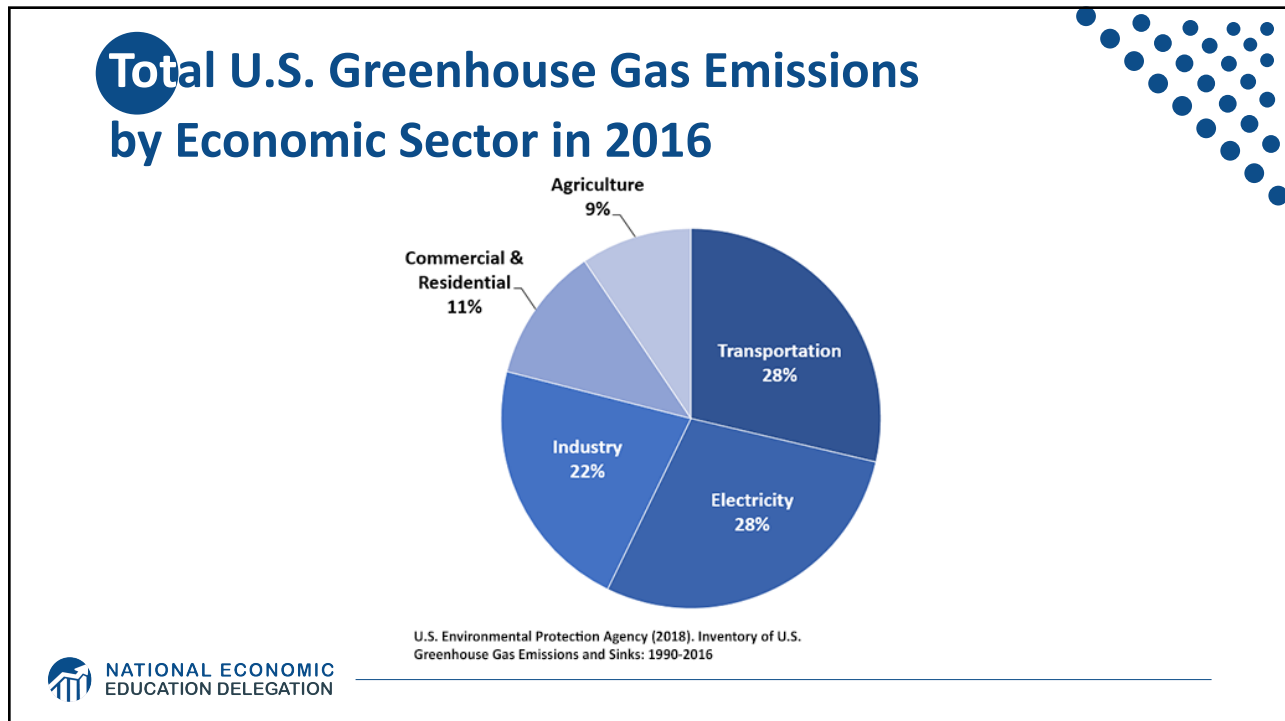
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Global Net Emissions
Are What We Care About

- **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
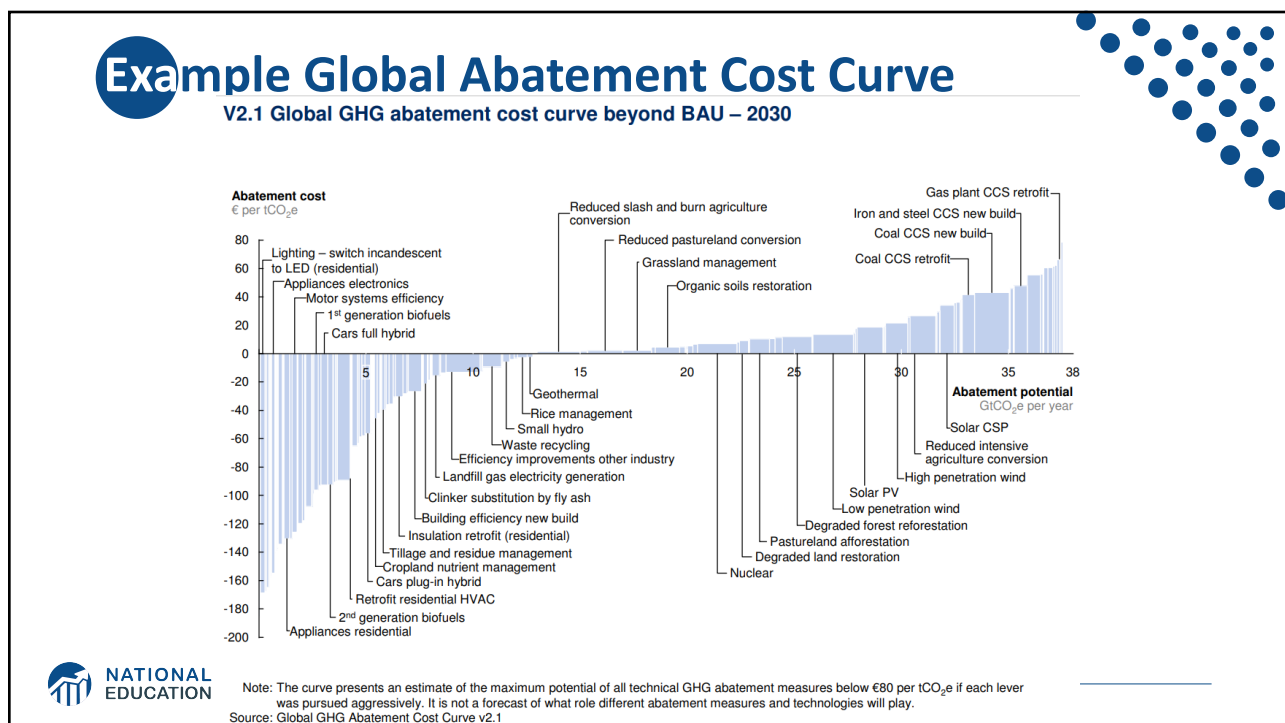 - Increase sinkage by planting trees, or other measures

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

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Example Global Abatement Cost Curve

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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!
    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 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**
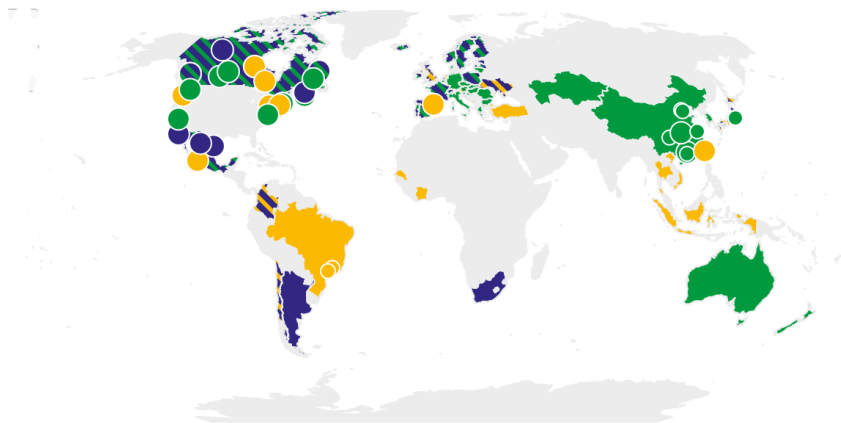- **Public transportation**
- **Land use / zoning policies**

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Climate Change Policy in Action

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Incentive-Based Climate Policies Right Now

- ● 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 consider...
- ● Carbon tax implemented or scheduled, ETS under consideration

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California's Cap and Trade System: 2012+

0.7%

of global greenhouse gas emissions

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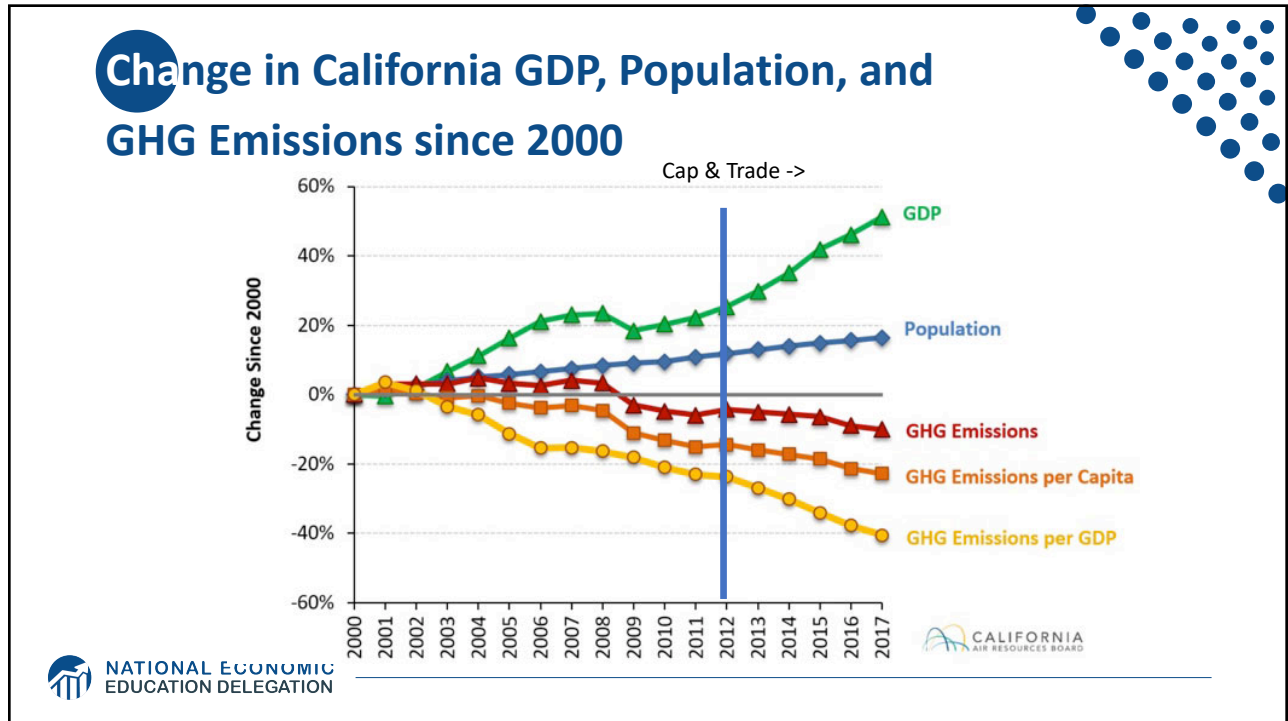## California's AB32: Global Warming Solutions

- **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
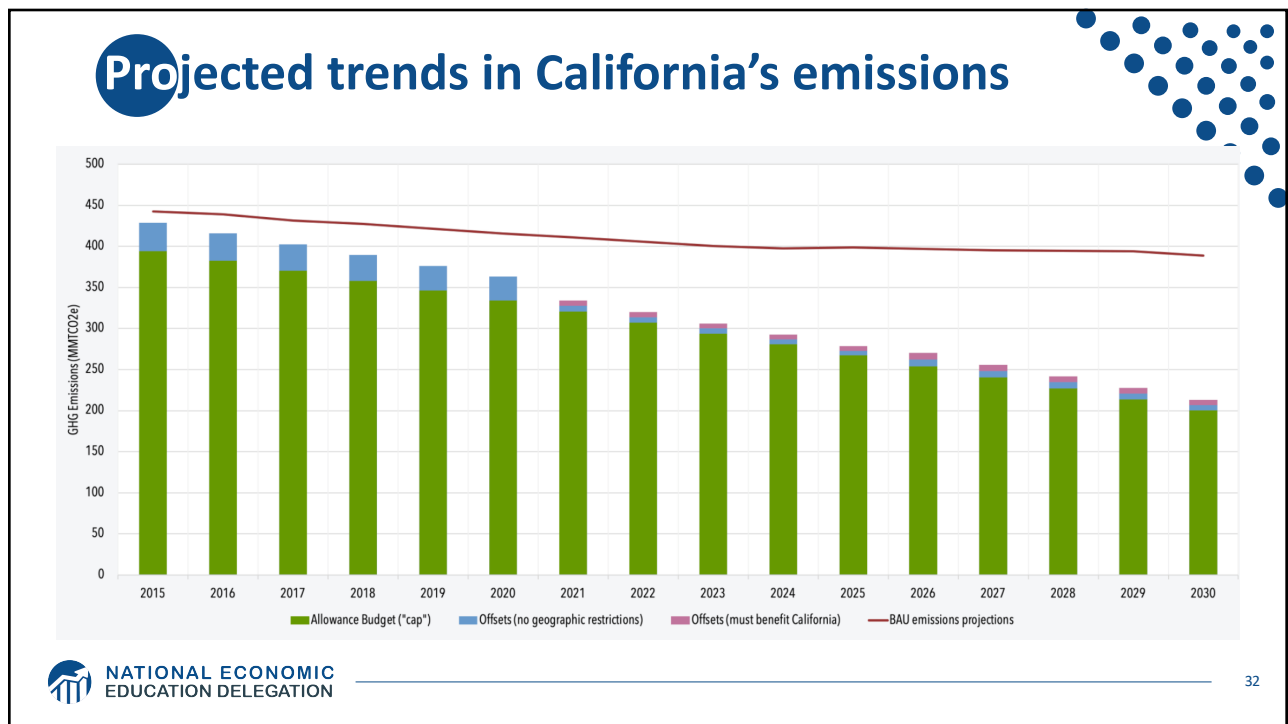 - Clean Cars Program
  - Low Carbon Fuel Standard

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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.**

- **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!

Questions?

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