# Carbon Taxation: What are the Revenue Possibilities?

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Tufts University

Symposium for the High-Level
Commission on Carbon Prices

Ecole Normale Supérieure
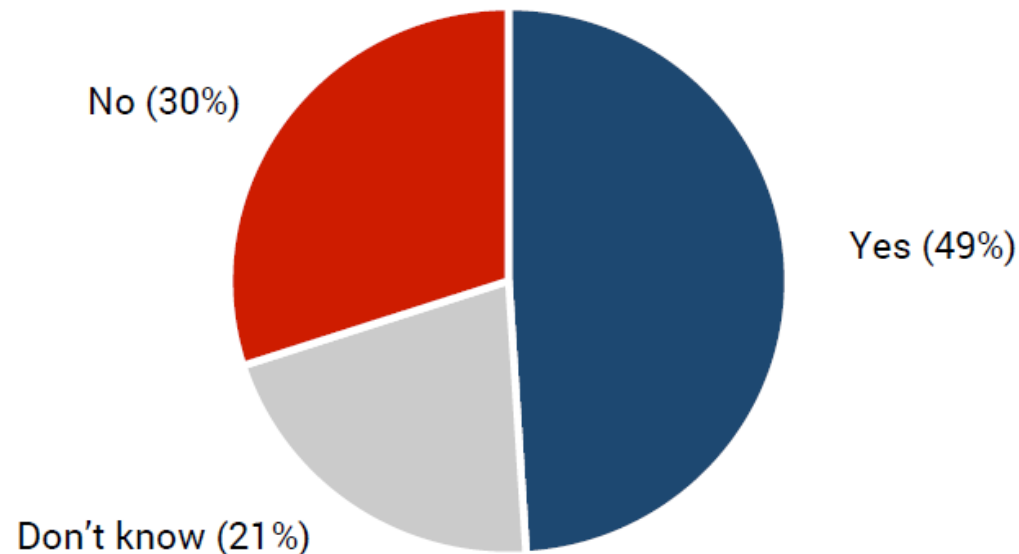Paris, France

May 17, 2017

# Outline of Talk

- Evolving views on climate policy
- Carbon tax for fiscal reasons
- Laffer Curve analysis

Joint work with Mei Yuan,
John Reilly, and Sergey Paltsev
of MIT Joint Program on Global Change

# About Half of Trump Voters Think Global Warming is Happening

**- Fewer than one in three think global warming is <u>not</u> happening -**

*Do you think global warming is happening?*

No (30%)

Yes (49%)

Don't know (21%)

**Do you think global warming is happening?**
**Base: Trump Voters (n=401). November 2016.**

YALE PROGRAM ON
**Climate Change Communication**

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**CENTER for CLIMATE CHANGE COMMUNICATION**

# More Than Six in Ten Trump Voters Support Taxing and/or Regulating the Pollution that Causes Global Warming

*In general, which of these two approaches to reducing the pollution that causes global warming do you prefer, if either?*

Don't know (16%)

Do both – Regulate <u>and</u> tax pollution (31%)

Do neither (21%)
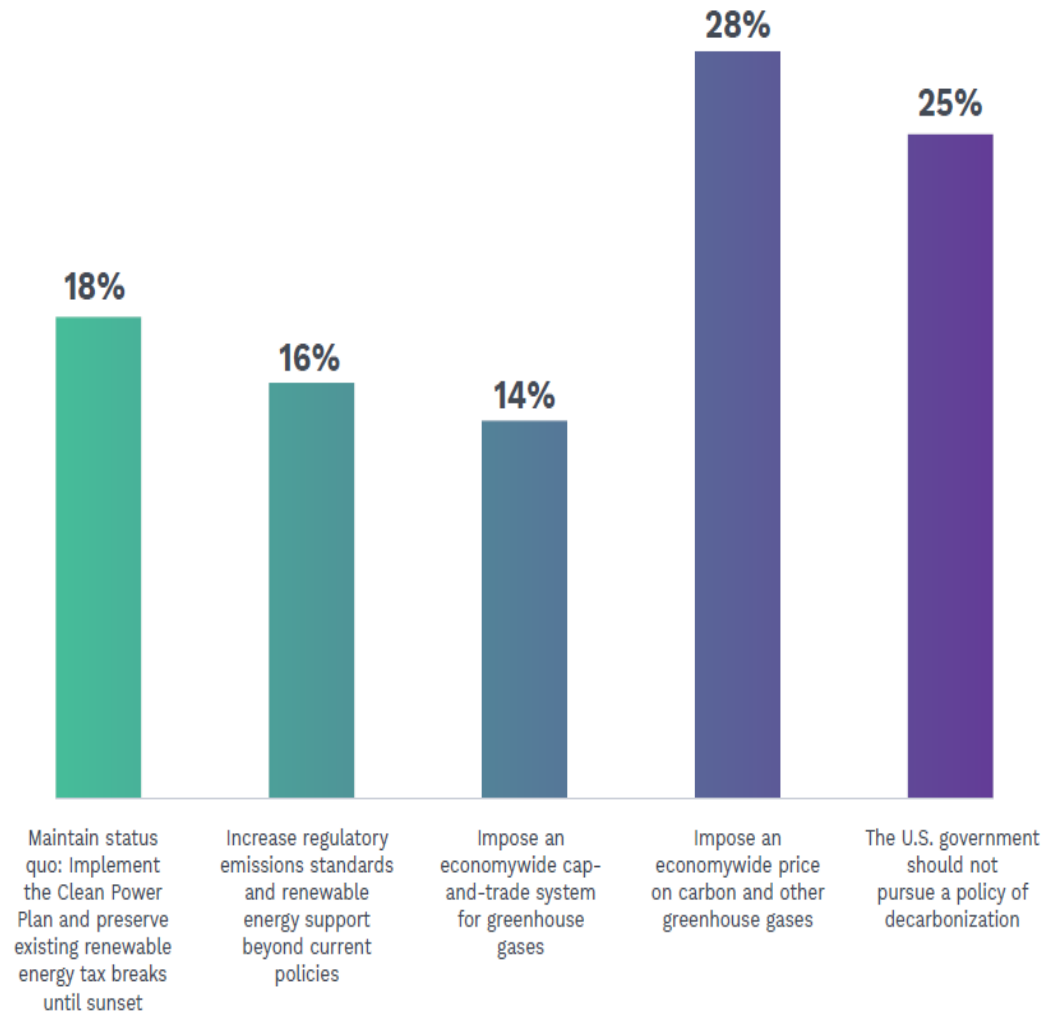
Regulate pollution (18%)
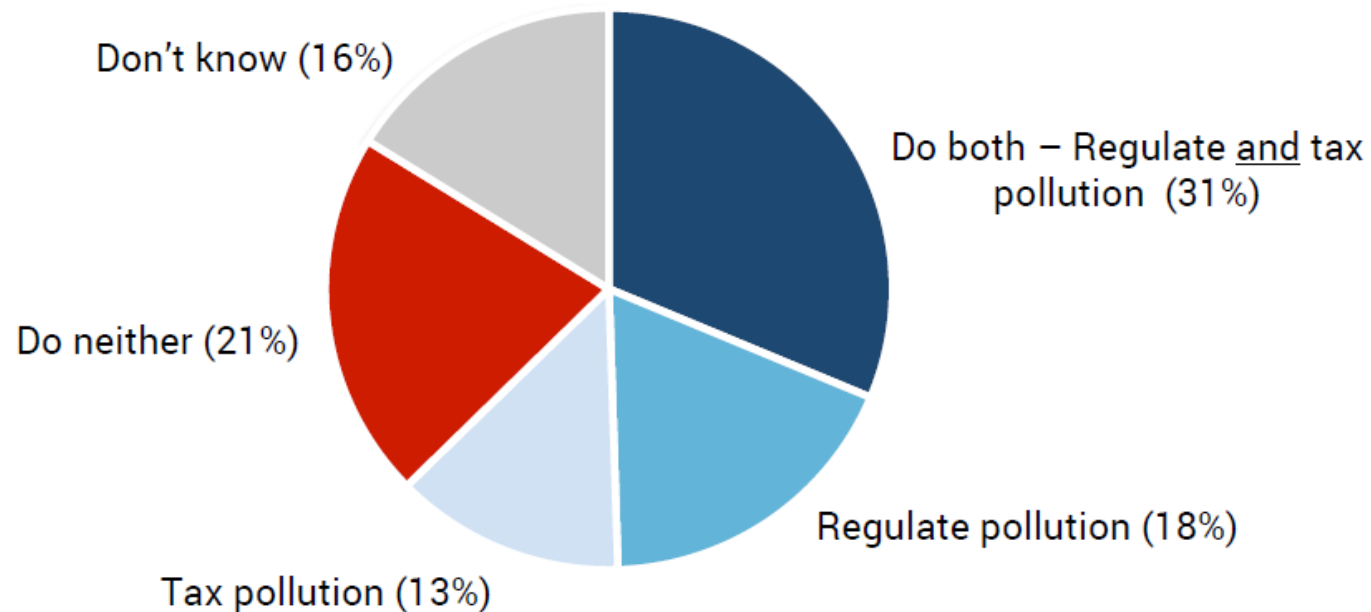
Tax pollution (13%)

Governments can reduce the pollution that causes global warming in two main ways: (1) <u>Tax</u> pollution (require companies to pay a tax on the pollution they emit, which encourages them to reduce their emissions). (2) <u>Regulate</u> pollution: (legally require companies to limit the amount of pollution they emit). In general, which of these two approaches to reducing the pollution that causes global warming do you prefer, if either?

**Base: Trump Voters (n-401). November 2016.**

YALE PROGRAM ON
Climate Change
Communication

GEORGE MASON UNIVERSITY
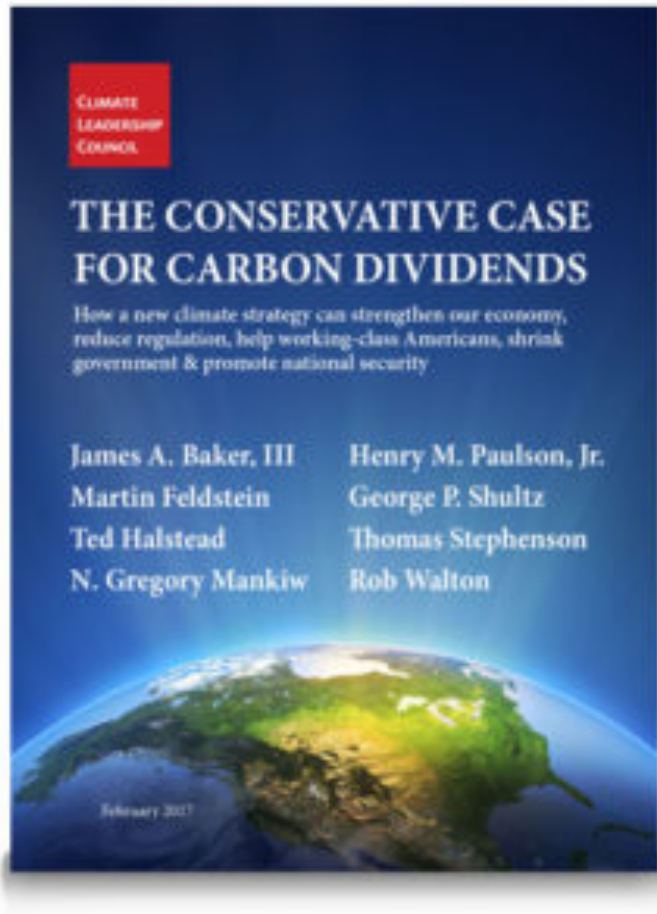CENTER *for* CLIMATE CHANGE
COMMUNICATION

# 2017 State of the Electric Utility Survey

➤ Survey of over 600 electric utility executives

In your opinion, how should the U.S. federal government approach decarbonization policy?



| | | | | |
|---|---|---|---|---|
| 18% | 16% | 14% | 28% | 25% |
| Maintain status quo: Implement the Clean Power Plan and preserve existing renewable energy tax breaks until sunset | Increase regulatory emissions standards and renewable energy support beyond current policies | Impose an economywide cap-and-trade system for greenhouse gases | Impose an economywide price on carbon and other greenhouse gases | The U.S. government should not pursue a policy of decarbonization |

# Republicans Beginning to Embrace Carbon Pricing



THE CONSERVATIVE CASE FOR CARBON DIVIDENDS

## Four Pillars to Their Plan

- A gradually increasing carbon tax

- Carbon dividends for all Americans

- Border carbon adjustments

- Significant regulatory rollback

# Republicans Beginning to Embrace Carbon Pricing

CLIMATE LEADERSHIP COUNCIL

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# Questions for Analysis

- What tax is needed to hit emissions targets?

- How much revenue is generated—gross versus net?

- Does revenue fall off as emissions fall?

- How would tax interact with existing policies, costs of new technology?

- Revenue neutrality—what does it mean in a federal system?

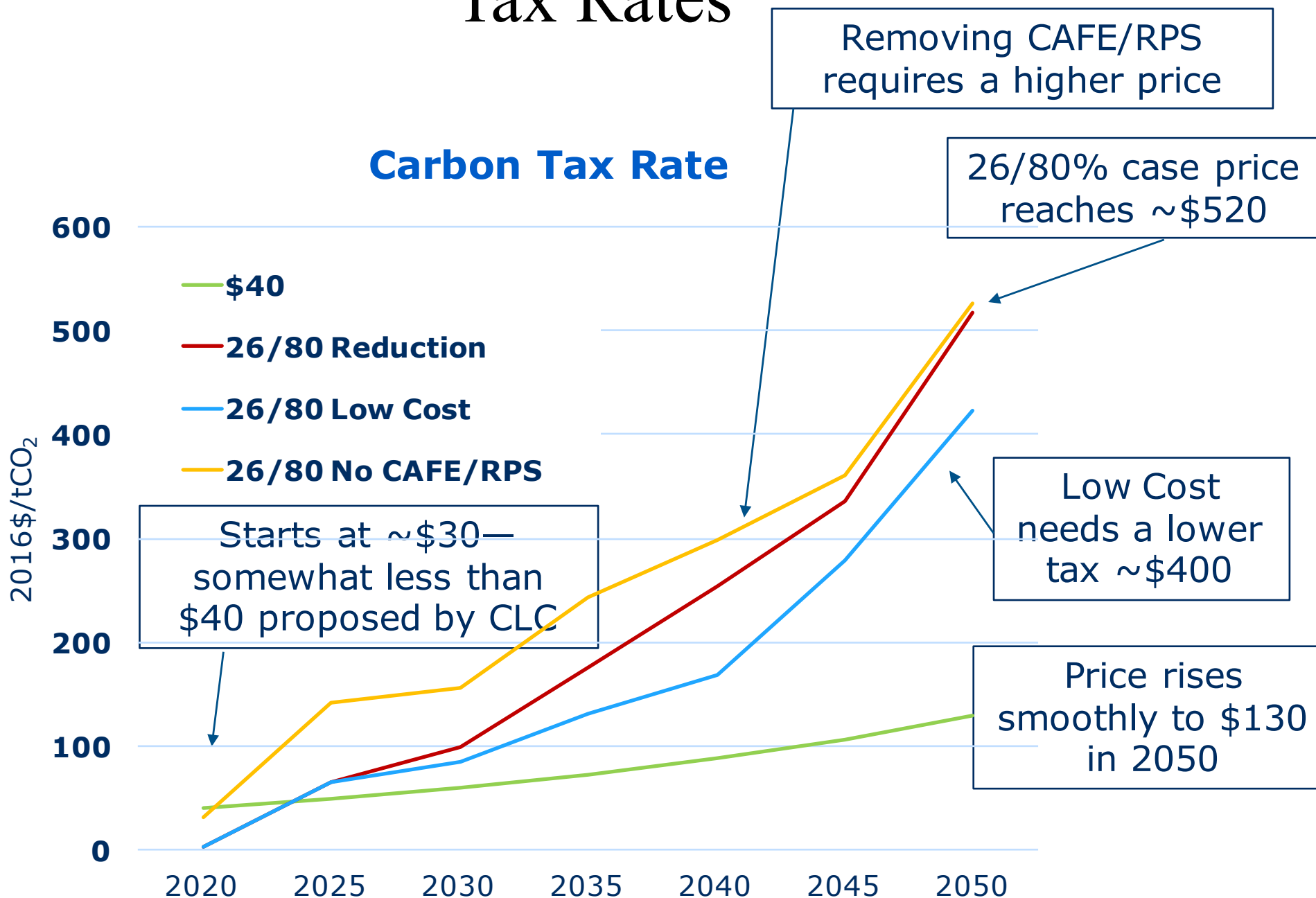- How big is the Carbon Dividend? Does it persist?

# MIT USREP Model

- MIT US Regional Energy Policy (USREP) model
  - Recursive dynamic model of U.S. economy
  - Similar to MIT Emissions Prediction and Policy Analysis (EPPA) Model
- Designed to analyze US energy and greenhouse gas policies
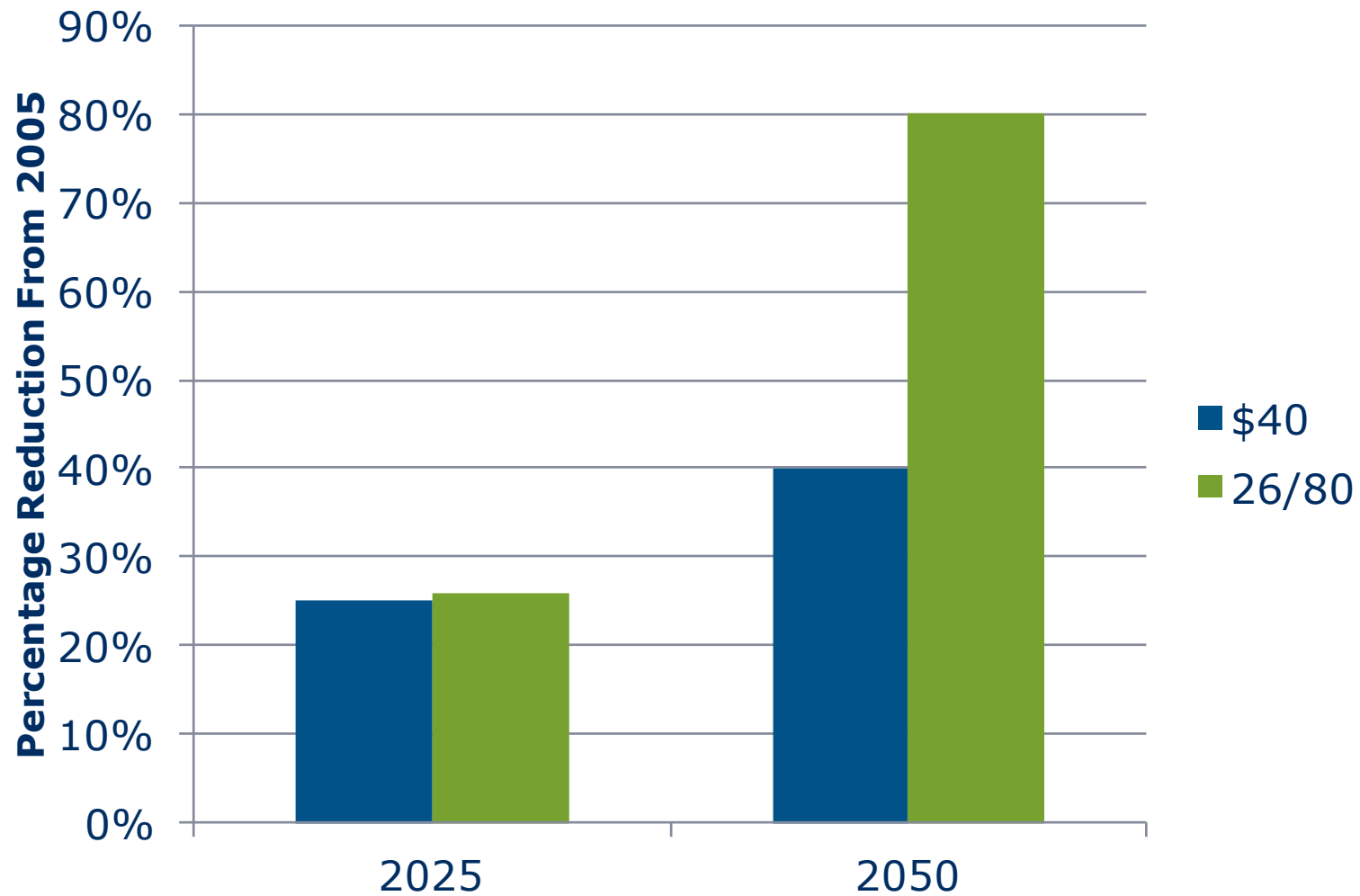- Captures heterogeneity across regions and income groups in the United States

# Scenarios for Analysis

1. Carbon tax starts at $40 in 2020, rising 4% annually

2. Carbon tax to reduce emissions 26% by 2025 and 80% by 2050, relative to 2005

3. As in (2) but low cost electric vehicles and low carbon electricity

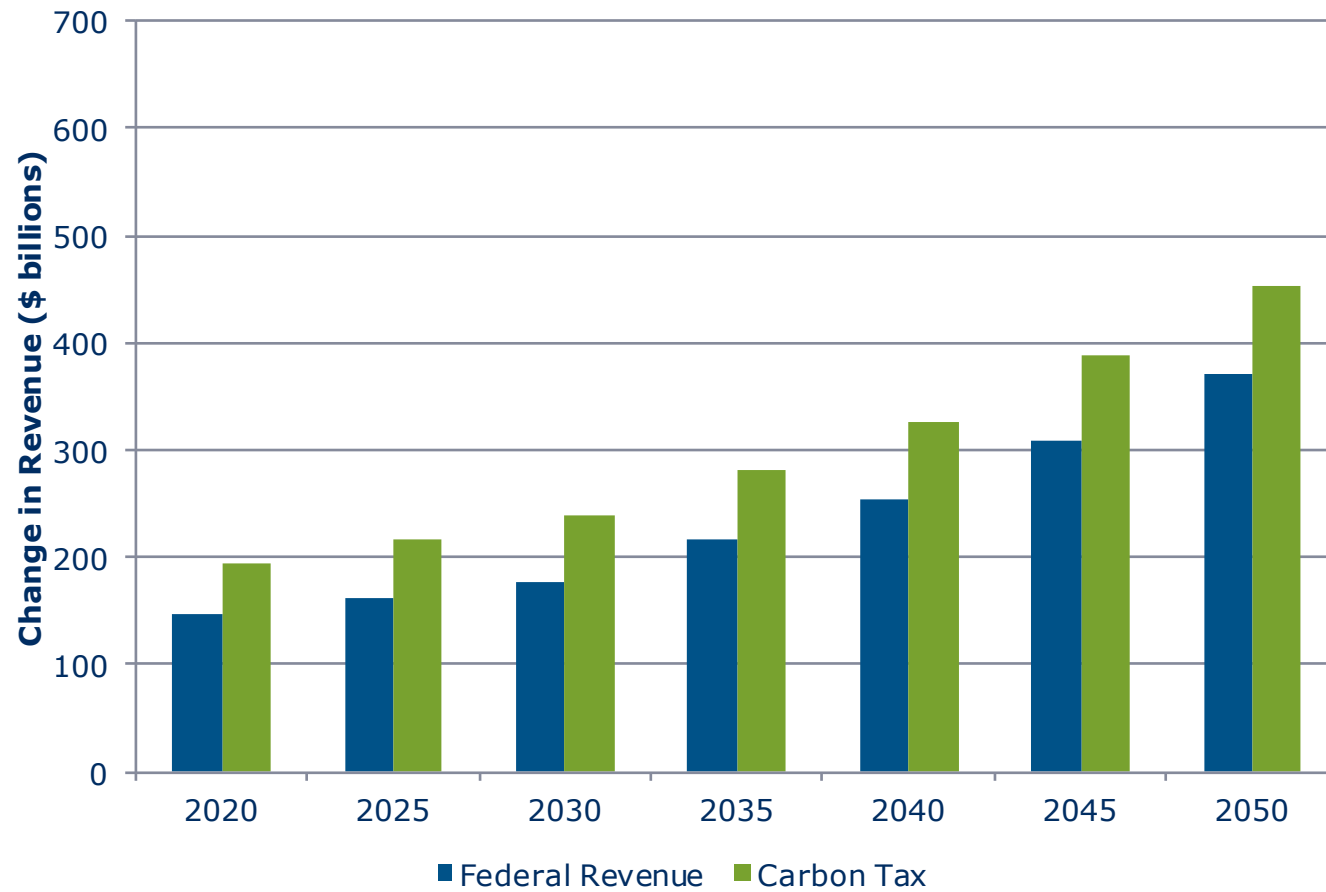4. As in (2), removing CAFE & Renewable targets

# Tax Rates



**Carbon Tax Rate**

Legend:
- **$40** (green)
- **26/80 Reduction** (dark red)
- **26/80 Low Cost** (light blue)
- **26/80 No CAFE/RPS** (orange)

Y-axis: 2016$/tCO$_2$ (0, 100, 200, 300, 400, 500, 600)

X-axis: 2020, 2025, 2030, 2035, 2040, 2045, 2050

Annotations:
- Removing CAFE/RPS requires a higher price
- 26/80% case price reaches ~$520
- Starts at ~$30—somewhat less than $40 proposed by CLC
- Low Cost needs a lower tax ~$400
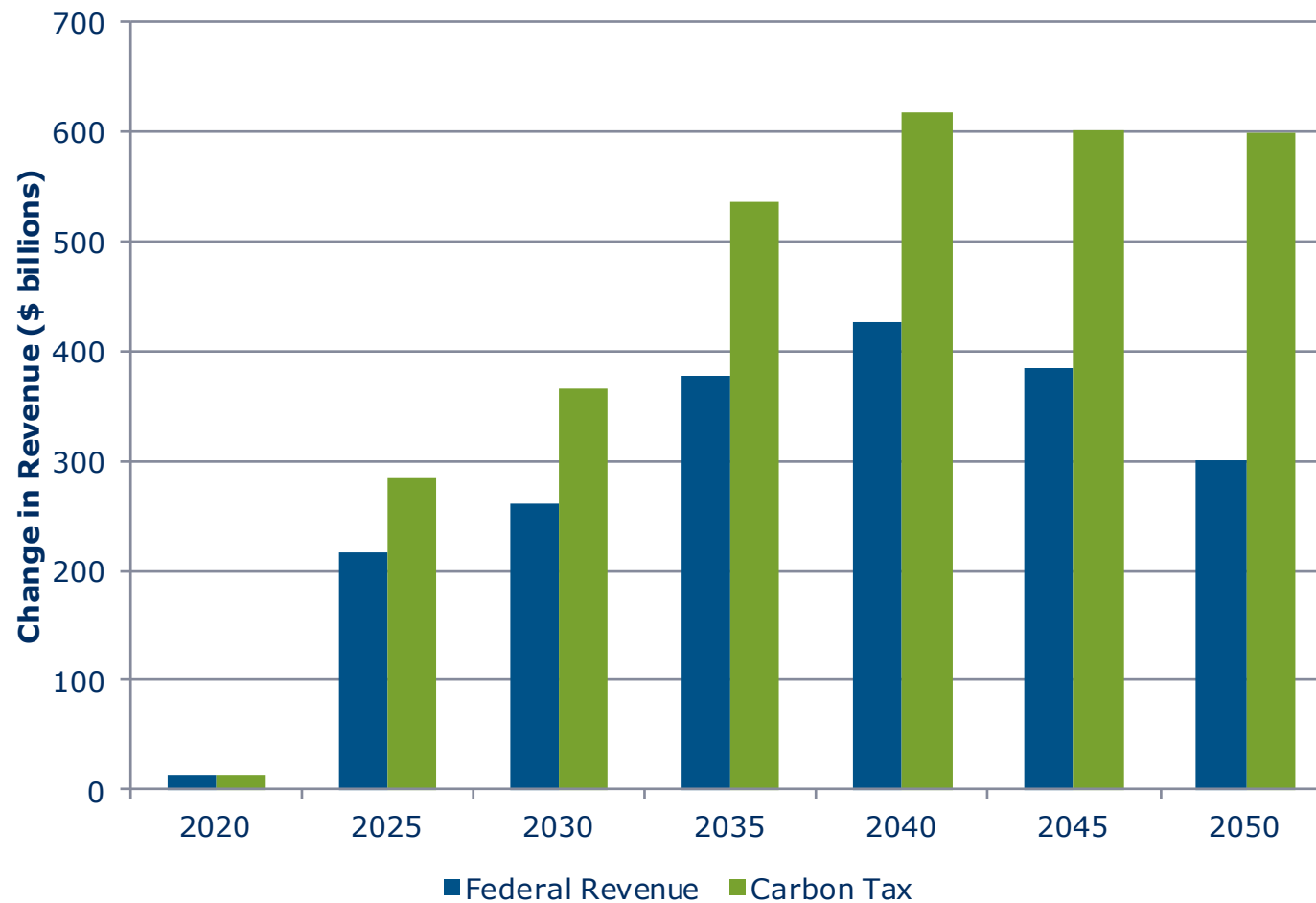- Price rises smoothly to $130 in 2050

# Emission Reductions
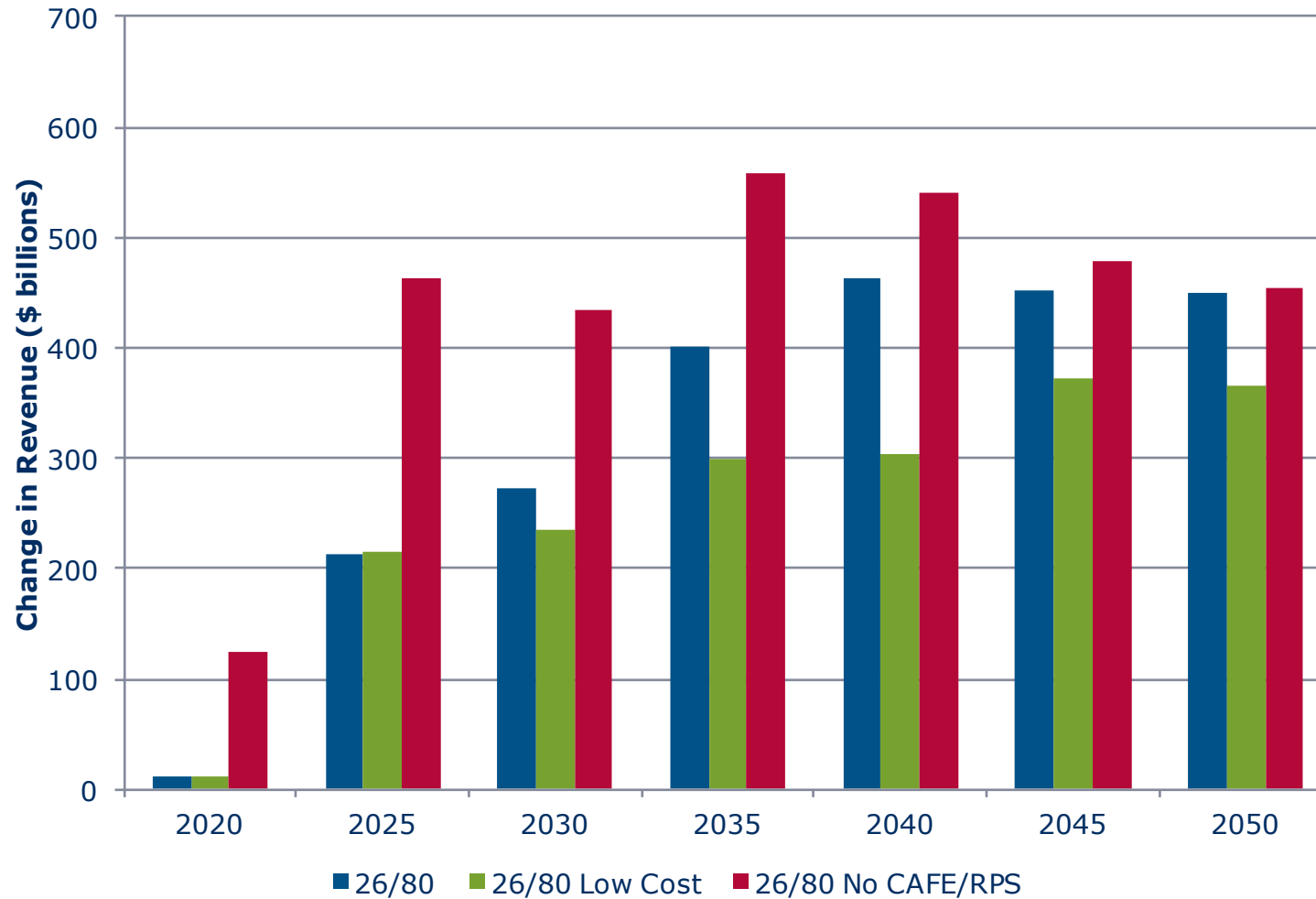
# Federal Revenue

**$40 Scenario**

# Federal Revenue

## 26/80 Scenario

# Technology & Policy Interaction



Assume CBO/JCT scoring rules:  25 percent offset

# Carbon Dividends

| Quarterly Payments Per Person | | | | |
| --- | --- | --- | --- | --- |
| | $40 | 26/80 | 26/80 Low Cost | 26/80 No CAFE/RPS |
| 2020 | $109 | $8 | $8 | $92 |
| 2025 | $117 | $154 | $154 | $334 |
| 2030 | $124 | $190 | $164 | $302 |
| 2035 | $142 | $271 | $202 | $377 |
| 2040 | $161 | $304 | $200 | $355 |
| 2045 | $187 | $290 | $239 | $308 |
| 2050 | $213 | $282 | $229 | $284 |

# Answers to Questions

- Tax rate of $425 – 530 per ton $CO_2$ for 80% reduction by 2050
  - Rate depends on technology and policy assumptions

- Carbon tax revenue between $450 & $620 billion by 2050
  - Total revenue increase could fall short by as much as 50 percent

- Net Federal Revenue peaks in 2035 or 2040 for 26/80 scenarios

- With emission targets, revenue falls with cheaper low carbon technology and rises with removal of other policies

- Carbon tax reduces federal revenue *and* state income tax revenue
  - Federal scoring rules don't account for changes in state tax revenue

- Carbon dividends of $200 – 300 per person are stable through 2050 even as emissions fall sharply
  - Annual dividends to a family of four between $3,200 and $4,800

# Final Thoughts

- Some hints of bipartisan support for a carbon tax
- Some of the support is for fiscal rather than environmental reasons
  - Revenue source for personal and corporate income tax rate reductions
- Carbon tax is a dependable revenue source out to 2050
  - Revenue peak in 2040-2045 for 26/80 case
  - Revenue falls by 5 to 8 percent in 2050 from peak
  - Emissions fall by 80 percent in 26/80 case
- Equal sized per-person rebates has a populist feel to it
  - Our previous work shows such a rebate beneficial for low to middle income households
  - Benefits accrue to households (on average) in lowest 7 deciles
- Republicans would want a "Grand Bargain" trading regulatory authority for a tax
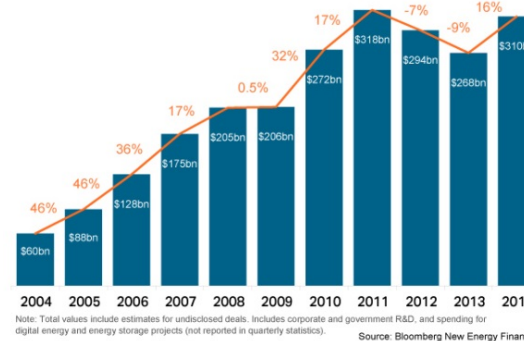  - Environmental groups may want some assurances on performance
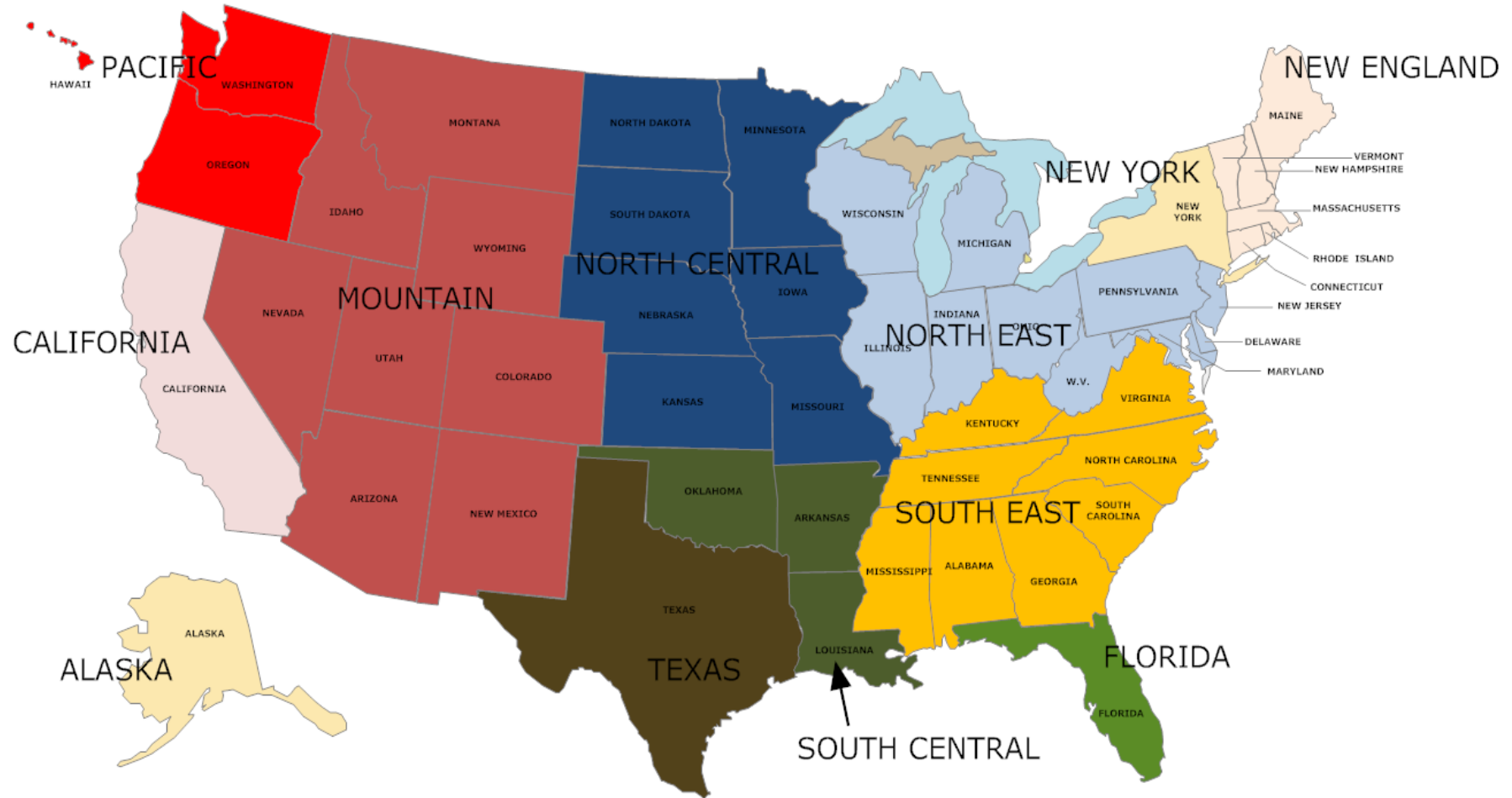
# Thank You

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## http://works.bepress.com/gilbert_metcalf/





New Investment in Clean Energy
BILLIONS OF DOLLARS, 2004-14



Note: Total values include estimates for undisclosed deals. Includes corporate and government R&D, and spending for digital energy and energy storage projects (not reported in quarterly statistics).
Source: Bloomberg New Energy Finance

# Regional Heterogeneity

# Household Heterogeneity

| Income class | Annual Income (2006$) | Cumulative Population for whole US (in %) |
|---|---|---|
| hhl | Less than $10,000 | 7.3 |
| hh10 | $10,000 to $15,000 | 11.7 |
| hh15 | $15,000 to $25,000 | 21.2 |
| hh25 | $25,000 to $ $30,000 | 31.0 |
| hh30 | $30,000 to $50,000 | 45.3 |
| hh50 | $50,000 to $75,000 | 65.2 |
| hh75 | $75,000 to $100,000 | 78.7 |
| hh100 | $100,000 to $150,000 | 91.5 |
| hh150 | $150,000 plus | 100.0 |

# Sectors and Inputs

| Region | Sectors | Primary Input Factors |
|---|---|---|
| Alaska (AK) | **Non-Energy** | Capital |
| California (CA) | Agriculture (AGRIC) | Labor |
| Florida (FL) | Services (SERV) | Land |
| New York (NY) | Energy-Intensive (EINT) | Crude Oil |
| New England (NENGL) | Other Industries (OTHR) | Shale Oil |
| South East (SEAST) | Transportation (TRAN) | Natural Gas |
| North East (NEAST) | **Energy** | Coal |
| South Central (SCENT) | Coal (COAL) | Nuclear |
| North Central (NCENT) | Conventional Crude Oil (OIL) | Hydro |
| Mountain (MOUNT) | Oil from Shale (OIL) | Wind |
| Pacific (PACIF) | Refined Oil (ROIL) | |
| | Natural Gas (GAS) | |
| | Electric: Fossil (ELEC) | |
| | Electric: Nuclear (NUC) | |
| | Electric: Hydro (HYD) | |
| | Advanced Technologies | |