

# An Economist's Take on Carbon Pricing in the United States: Why and How

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# Climate Change is a Market Failure

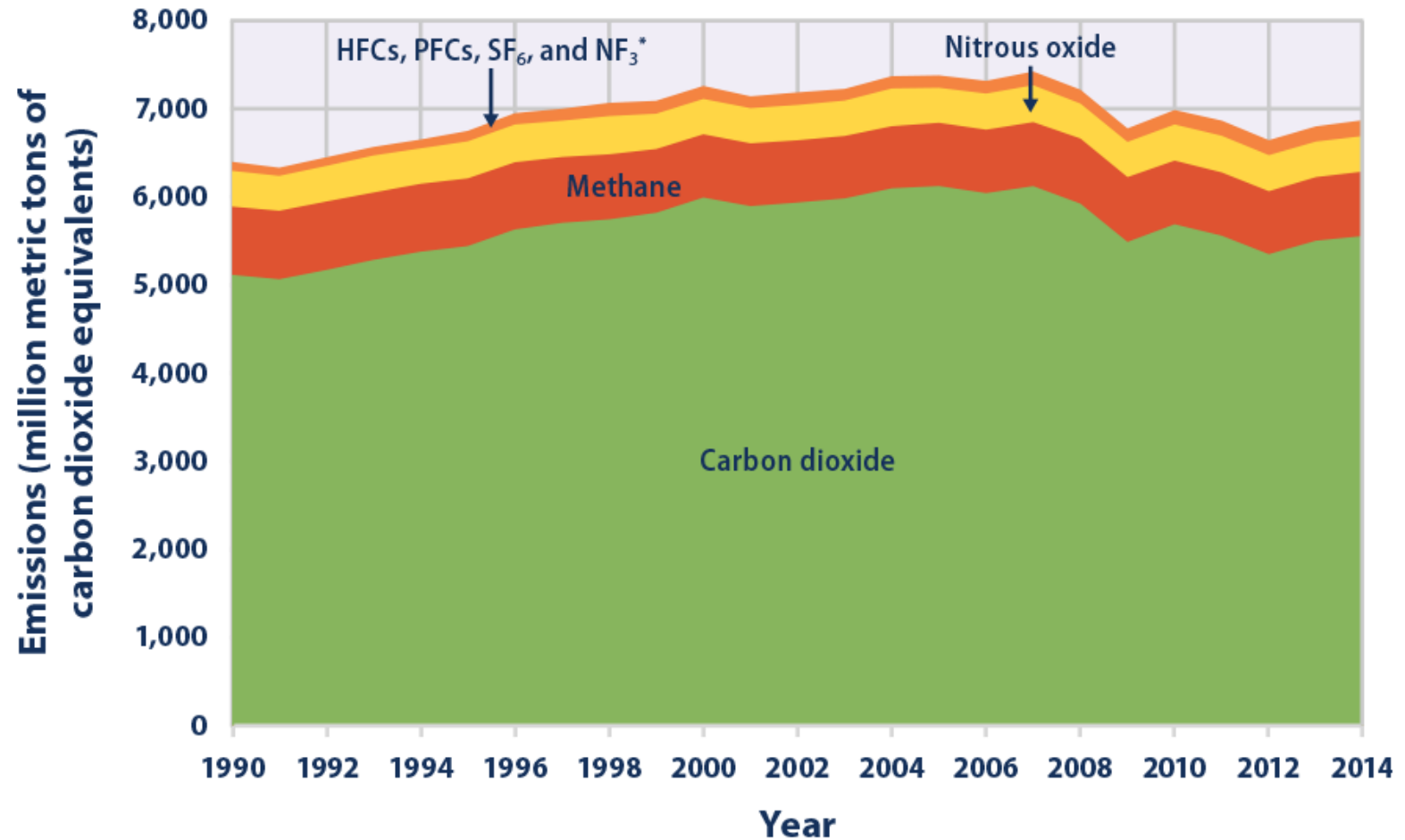
- Prices don't reflect damage to the environment.
- Damages are externalities.
- An economy-wide price on GHG's ensures that all economic decisions incorporate both private and social costs.
- Other market failures



## Portfolio of policies includes

- Emissions mitigation
- Climate science research
- Technology R&D
- Adaptation/resilience
- Support for poor countries
- Diplomacy
- Transition assistance for coal workers & communities

## U.S. Greenhouse Gas Emissions by Gas, 1990–2014



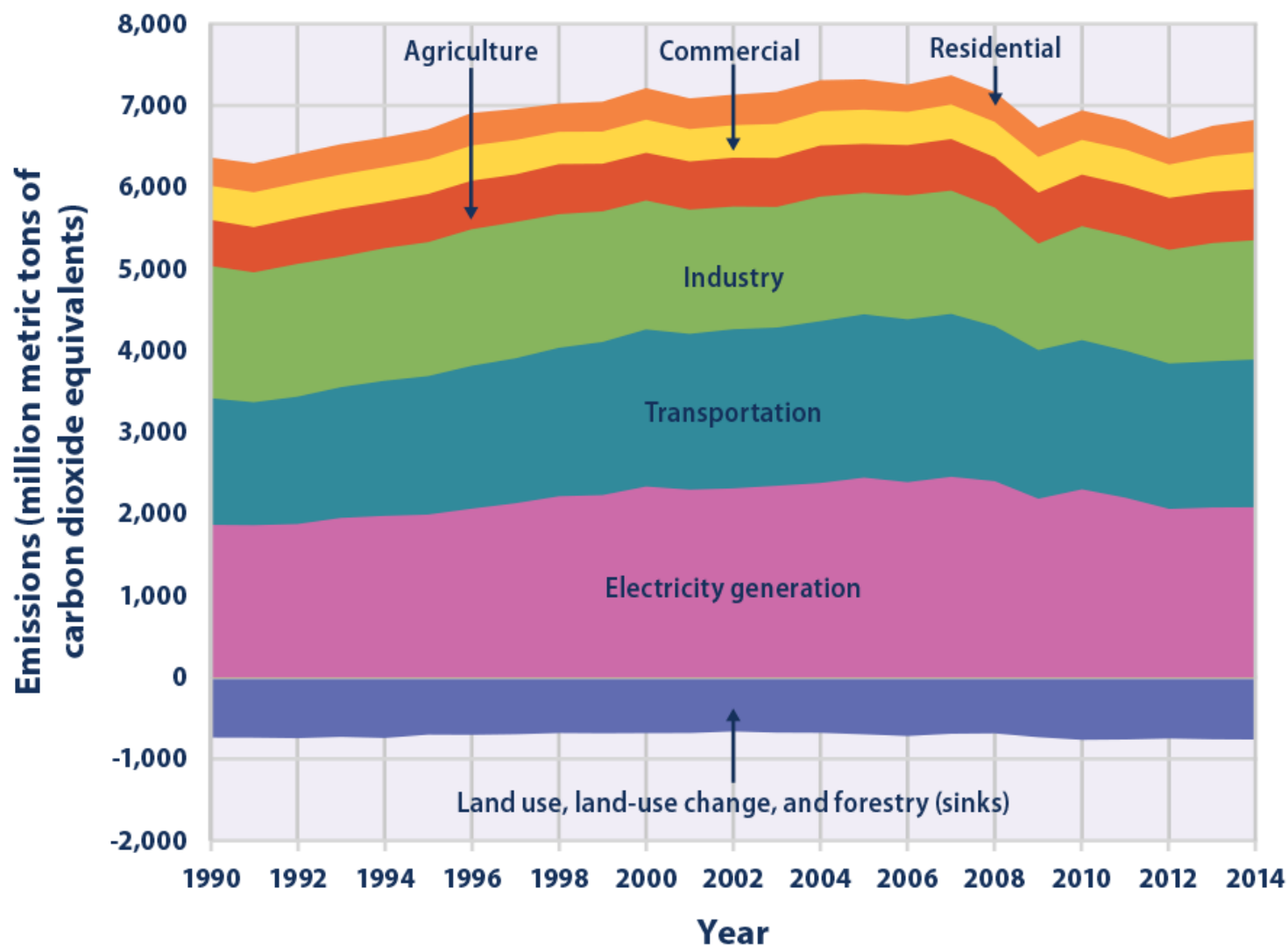
\* HFCs are hydrofluorocarbons, PFCs are perfluorocarbons, SF<sub>6</sub> is sulfur hexafluoride, and NF<sub>3</sub> is nitrogen trifluoride.

Data source: U.S. EPA (U.S. Environmental Protection Agency). 2016. Inventory of U.S. greenhouse gas emissions and sinks: 1990–2014. EPA 430-R-16-002. [www.epa.gov/climatechange/ghgemissions/usinventoryreport.html](http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html).

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

Source: EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: <https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions>

## U.S. Greenhouse Gas Emissions and Sinks by Economic Sector, 1990–2014



Data source: U.S. EPA (U.S. Environmental Protection Agency). 2016. Inventory of U.S. greenhouse gas emissions and sinks: 1990–2014. EPA 430-R-16-002. [www.epa.gov/climatechange/ghgemissions/usinventoryreport.html](http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html).

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at [www.epa.gov/climate-indicators](http://www.epa.gov/climate-indicators).

Source: EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: <https://www.epa.gov/climate-indicators/climate-change-indicators-us-greenhouse-gas-emissions>

# Benefits of Mitigation

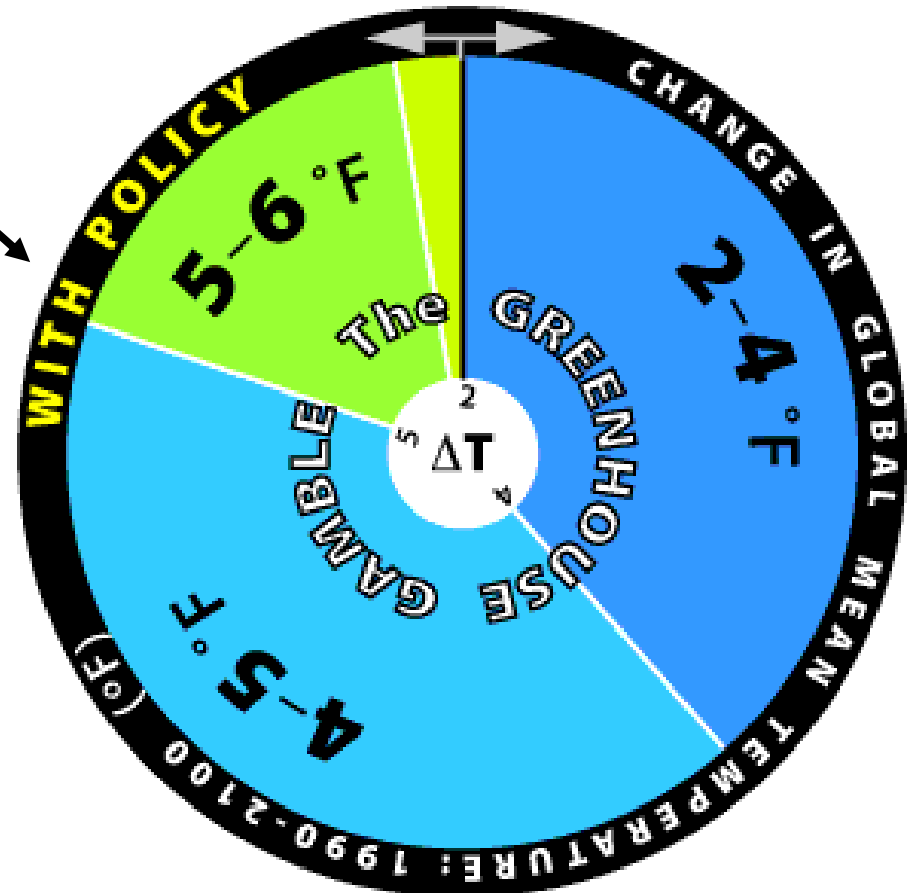
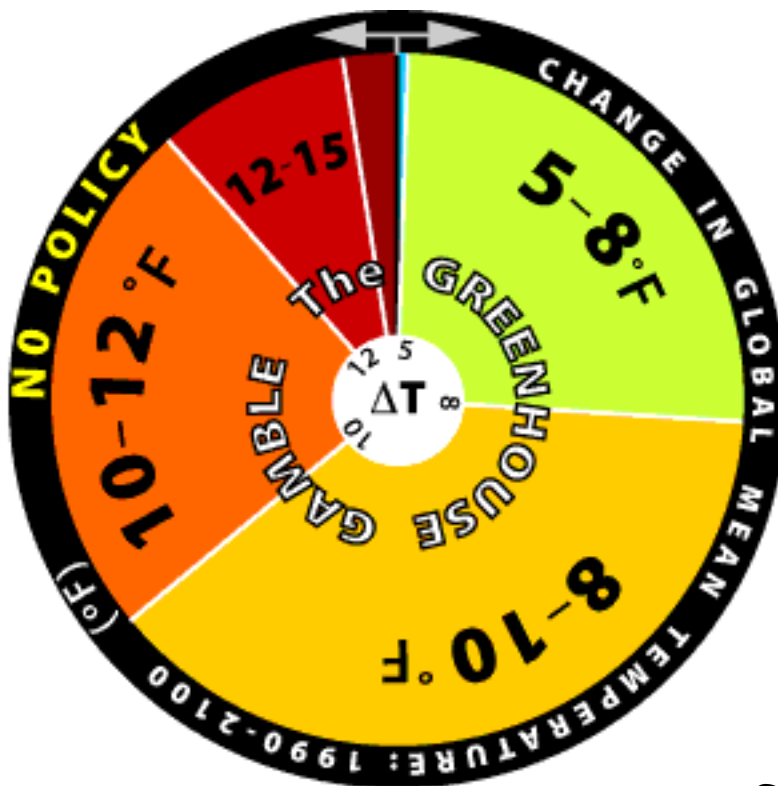
- Monetizing human health and ecological benefits
  - » How to compute the present value of future benefits?
  - » Uncertainties and potential threshold impacts
  - » Policy benefits depend on what other countries do
  - » Domestic or global benefits?



**Revised Social Cost of CO<sub>2</sub>, 2010 – 2050 (in 2007 dollars per metric ton of CO<sub>2</sub>)**

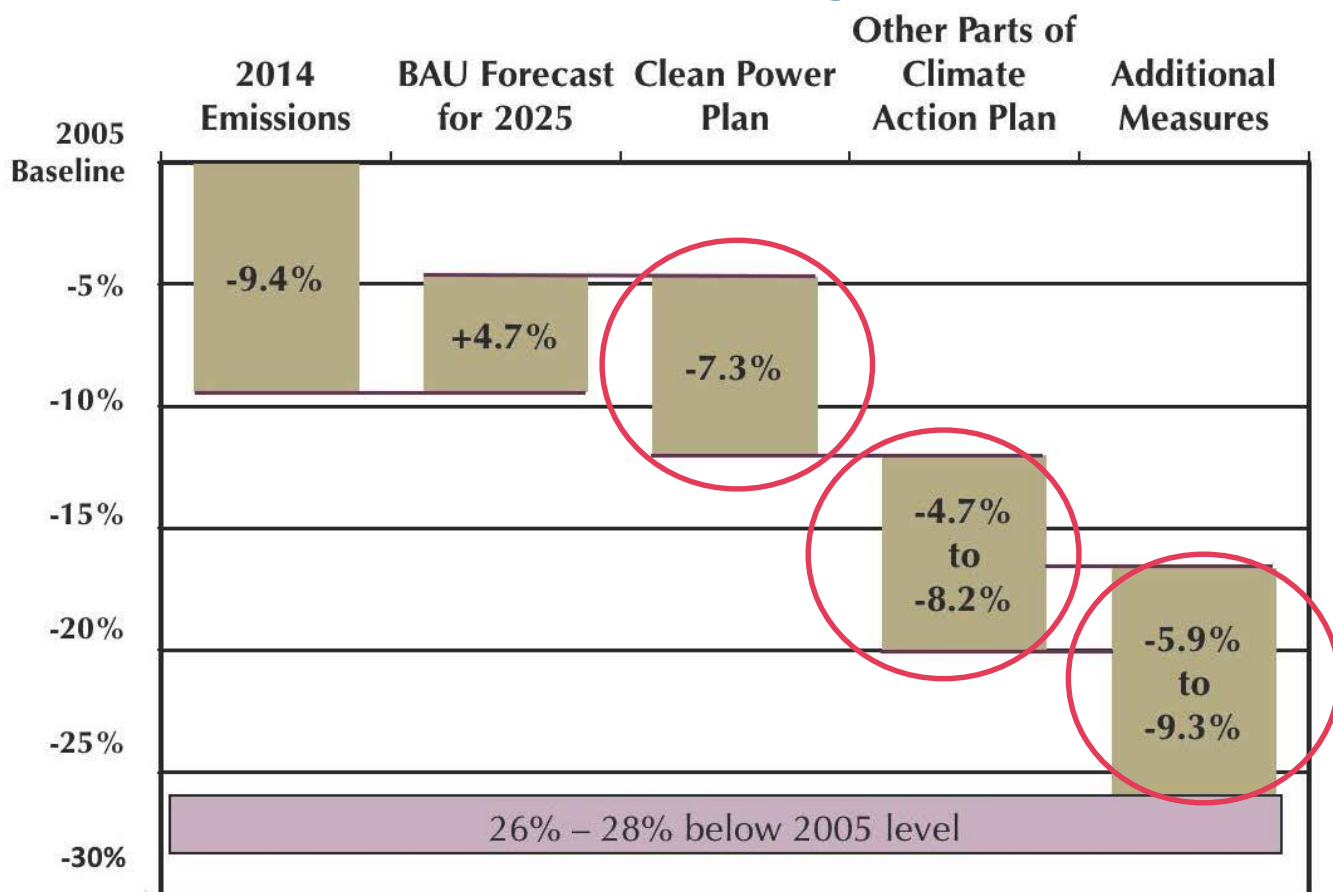
Discount Rate	5.0%	3.0%	2.5%	3.0%
Year	Avg	Avg	Avg	95th
2010	11	33	52	90
2015	12	38	58	109
2020	12	43	65	129
2025	14	48	70	144
2030	16	52	76	159
2035	19	57	81	176
2040	21	62	87	192
2045	24	66	92	206
2050	27	71	98	221

We can buy better probabilities if we stabilize concentrations



Source: MIT Joint Program on the Science and Policy of Global Change  
[http://globalchange.mit.edu/resources/gamble/policy\\_F.html](http://globalchange.mit.edu/resources/gamble/policy_F.html)

# The US NDC: 2025 Emissions Pledge





# Summary of Clean Air Act approach (Despite best efforts by EPA)

- Economically inefficient
  - » state-level implementation, sector by sector
- Environmentally inadequate
  - » Incomplete (covers only electricity)
  - » Uncertain (litigation, rate-based standards, investment uncertainty, disparate state actions)
  - » Slow (extended regulatory process, state-level implementation, sector by sector)
- No tools for ameliorating disproportionate burdens
- No tools for preserving competitiveness
- Vulnerable to Administration priorities
- Weak diplomatically

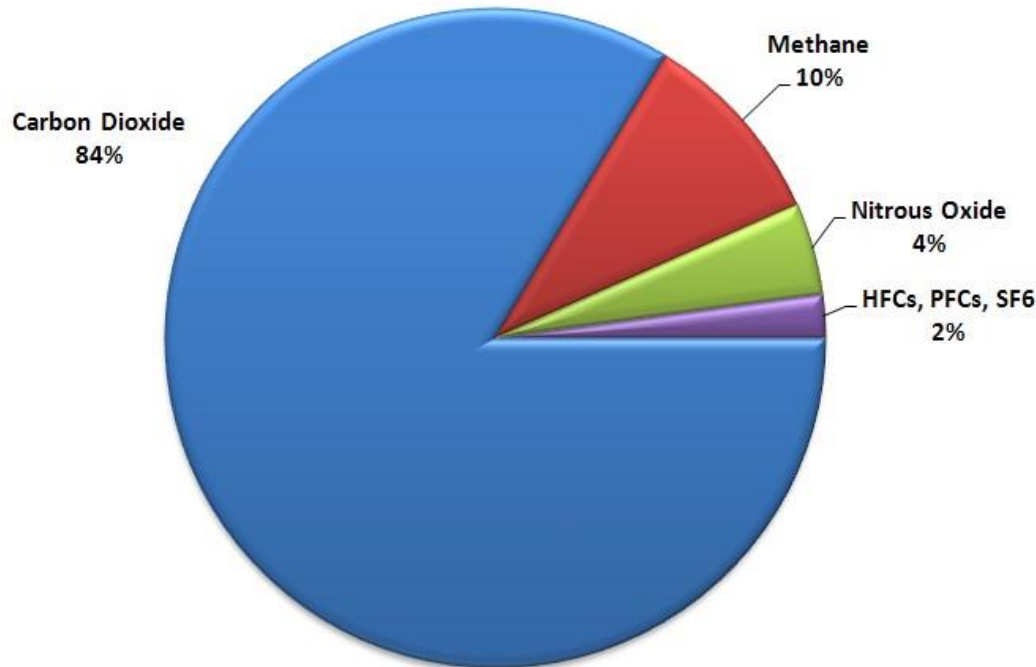
# What would better authority look like?

- Economy-wide
- All GHGs
- All states
- All sectors
- Harnesses market forces
- Diplomatically powerful

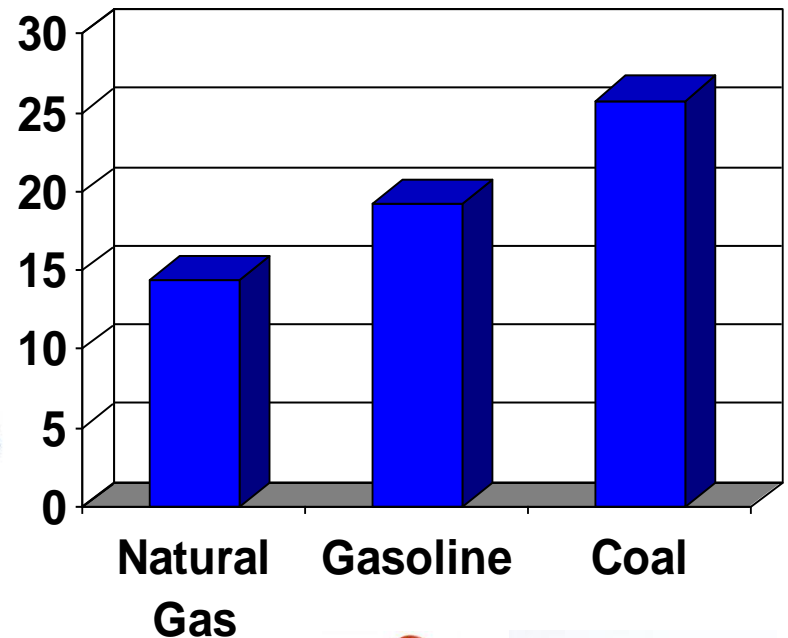
# Price on carbon

Shifts relative prices of different fuels and activities.

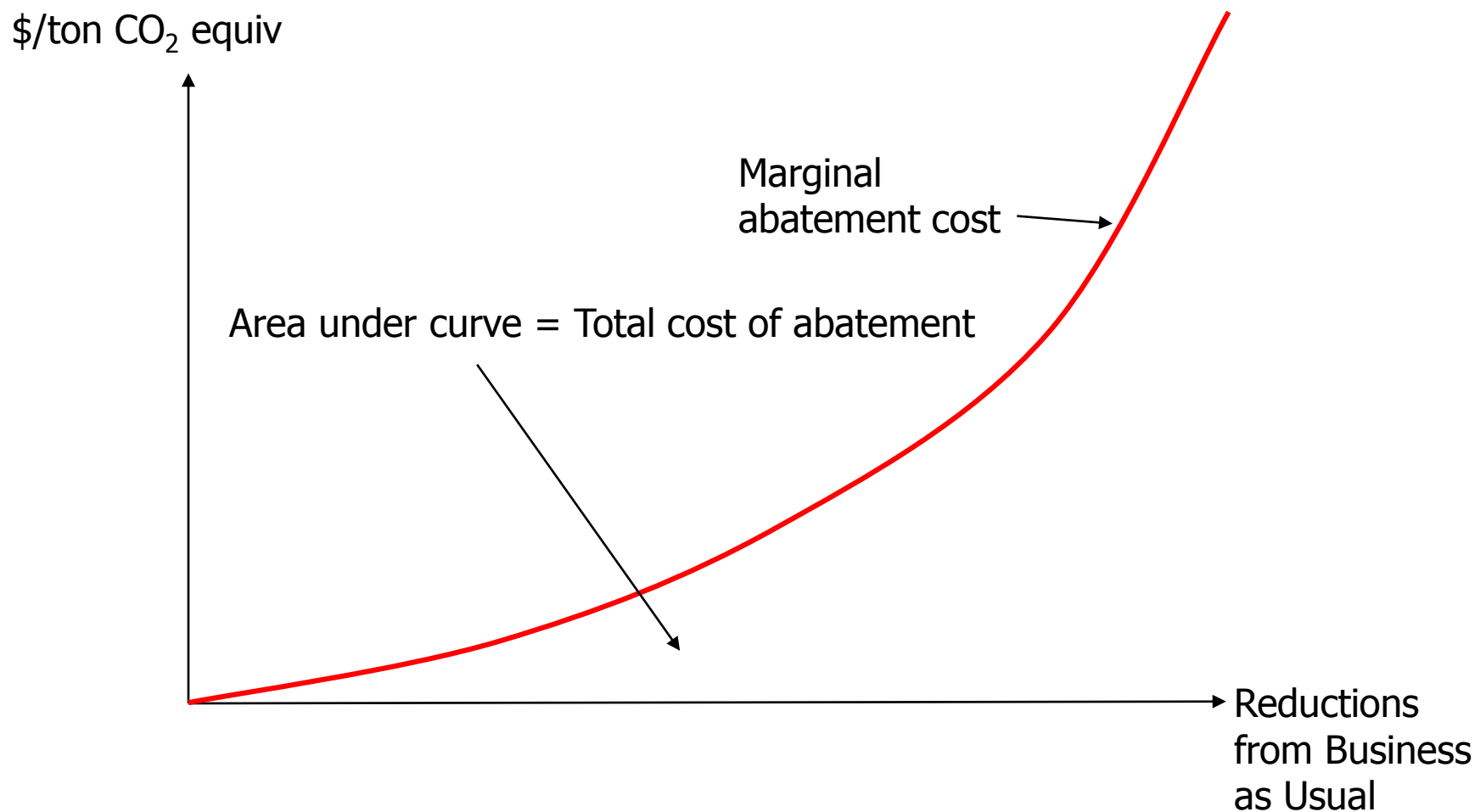
U.S. Greenhouse Gas Emissions 2010



Emissions in Kg C/mBTU

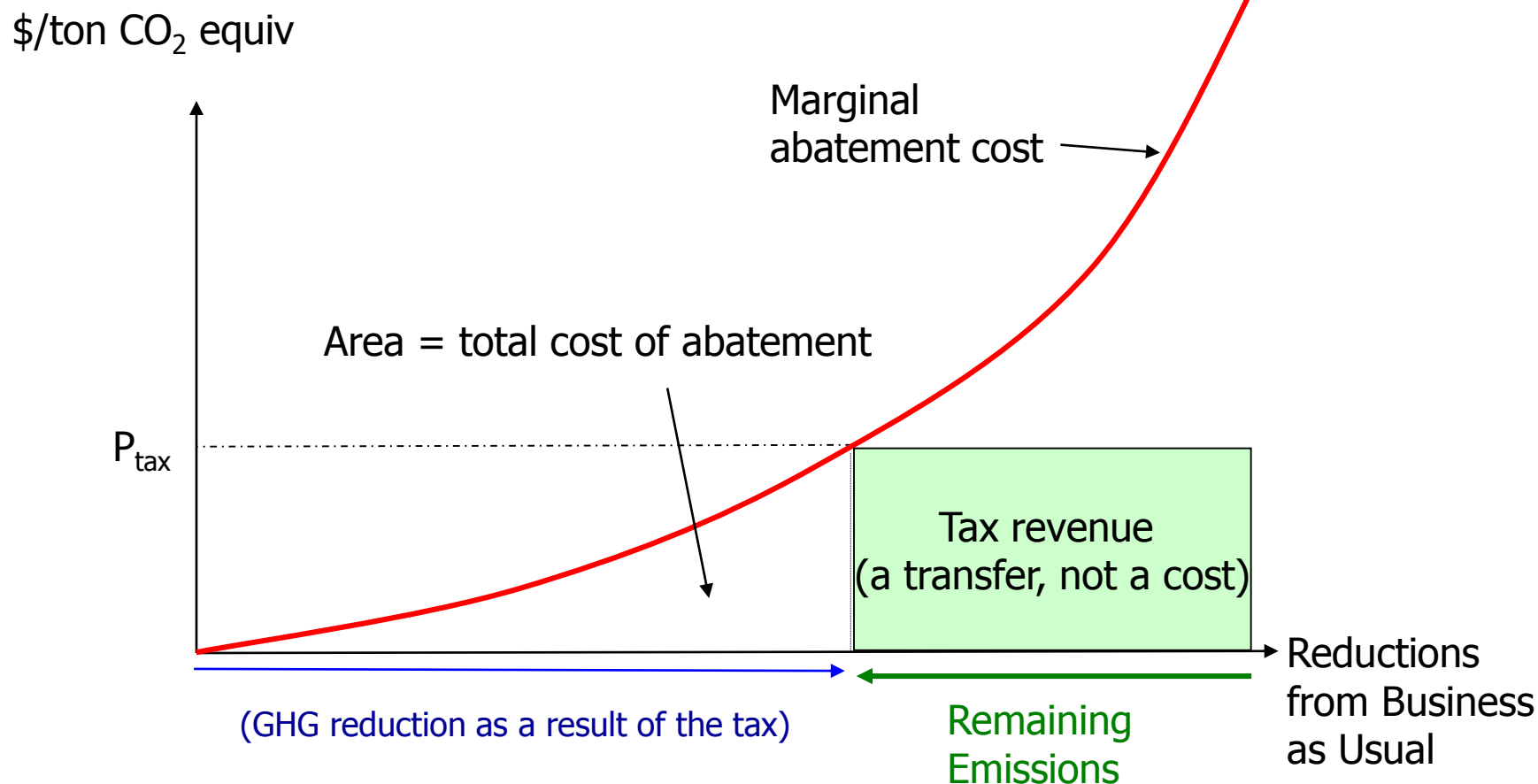


# Greenhouse Gas Abatement Cost Curve

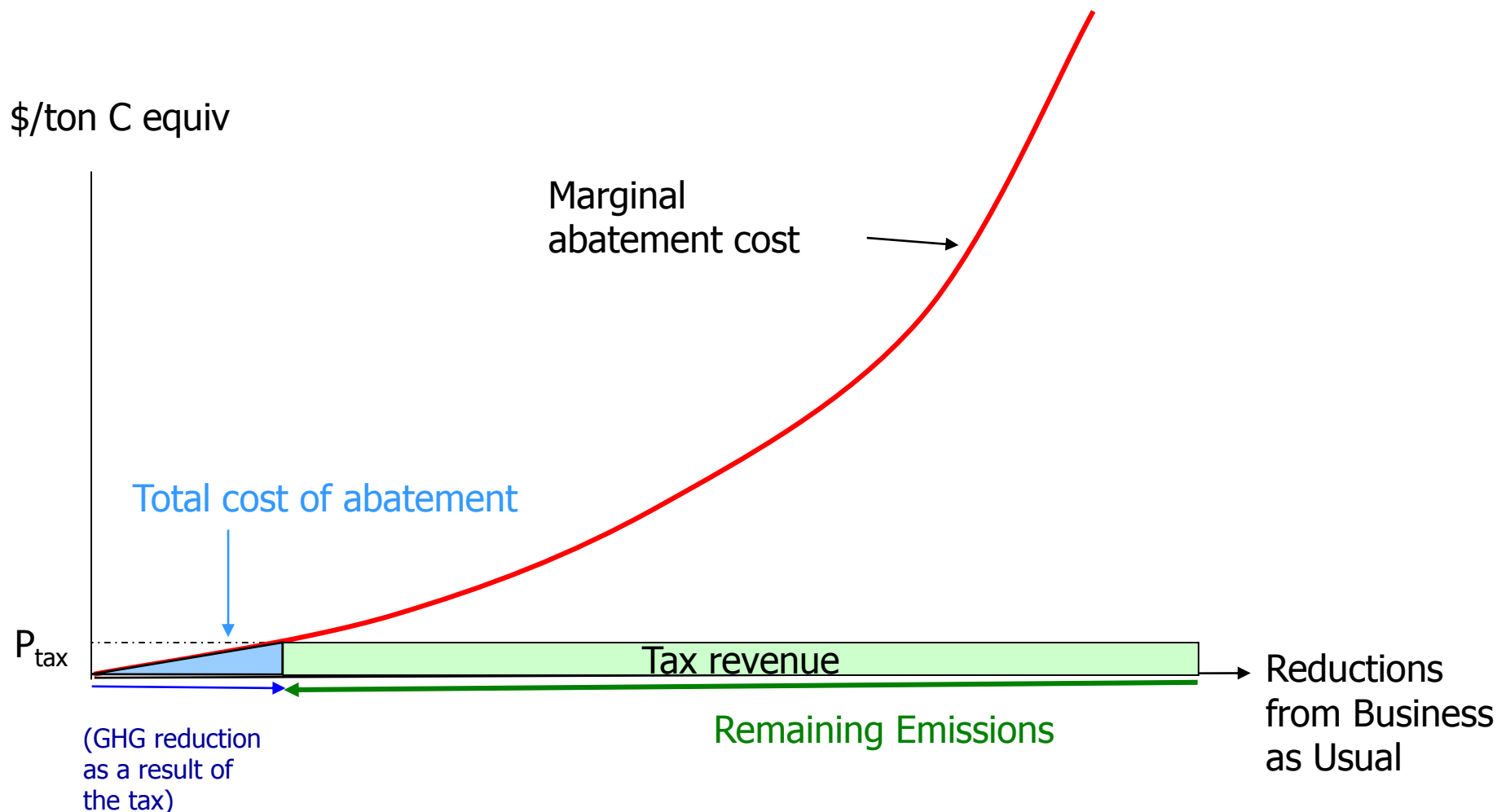


# Carbon or GHG Tax:

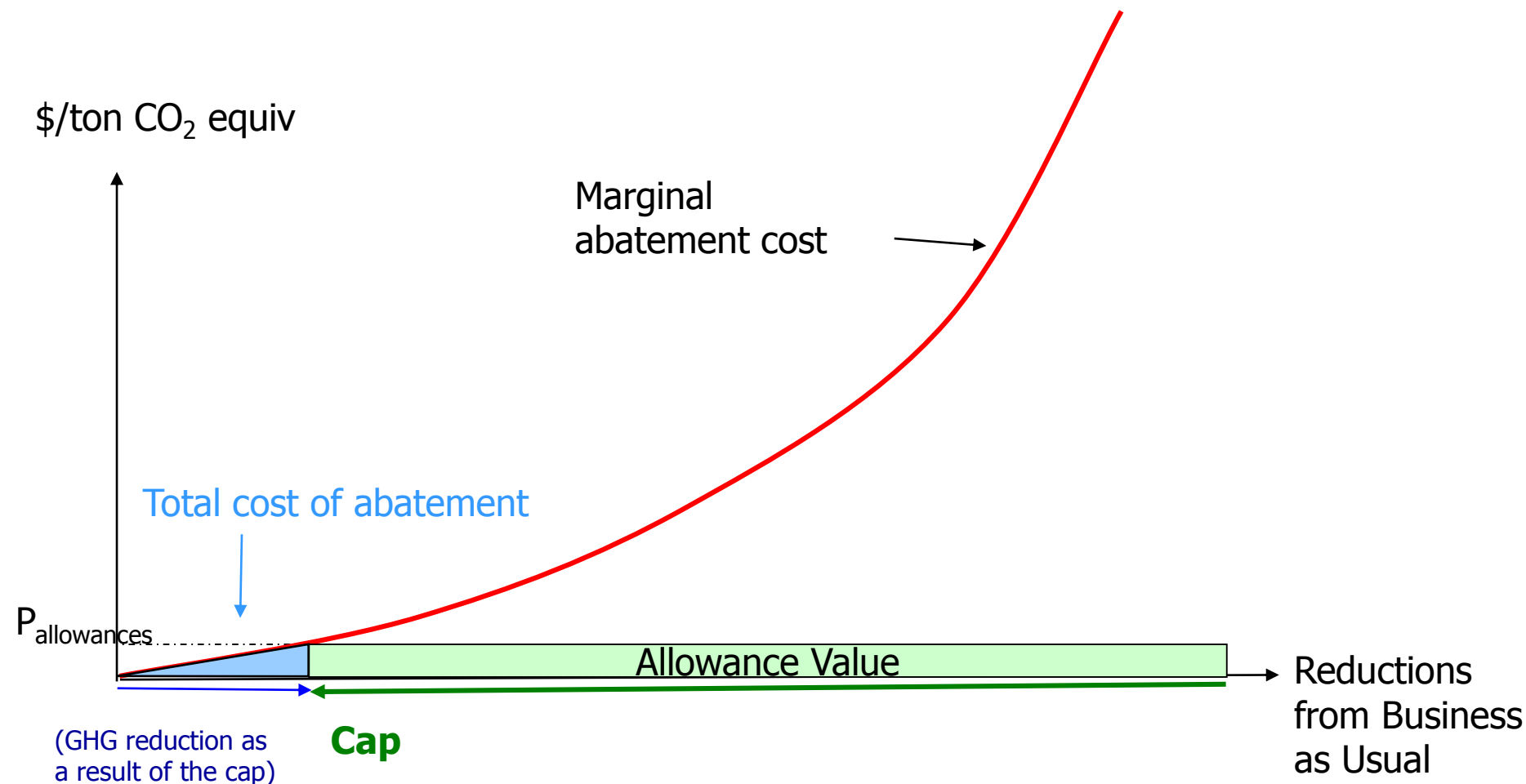
Firms/consumers reduce emissions up to point where it's cheaper to pay the tax.



Closer to the scale of actual proposals...  
In early years, tax revenue swamps total abatement cost.



Cap-and-trade works much the same way as a tax, except you know the emissions, not the price.



# Carbon tax design elements

1. What to call it (e.g. tax or fee?)
2. Base (sources/fuels/gases)
3. Who must pay (upstream or downstream?)
4. Initial rate and trajectory
5. What to do with the revenue
6. Changes in other federal energy/environment policies?
7. What to do about state policies?



# Carbon tax design elements

7. Tax credits?
8. Allow offsets or imported allowances as tax expenditures?
9. Which agency should collect it?
10. Policies to mitigate leakage and/or loss of competitiveness?
11. Diplomatic strategy

# CBO/JCT Carbon Tax Score (GHG tax @ \$25/ton, rising at 2% real)

Revenues—Option 42

## Impose a Tax on Emissions of Greenhouse Gases

Billions of Dollars	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Total	
											2017–2021	2017–2026
Change In Revenues	57.4	90.3	93.6	96.5	98.6	101.3	104.6	108.1	111.5	115.2	436.5	977.2

Sources: Staff of the Joint Committee on Taxation; Congressional Budget Office.

This option would take effect in January 2017.



Almost \$1 trillion in revenue  
over the 10 year budget window

## US Treasury analysis of a GHG tax starting at \$49/ton CO<sub>2</sub>

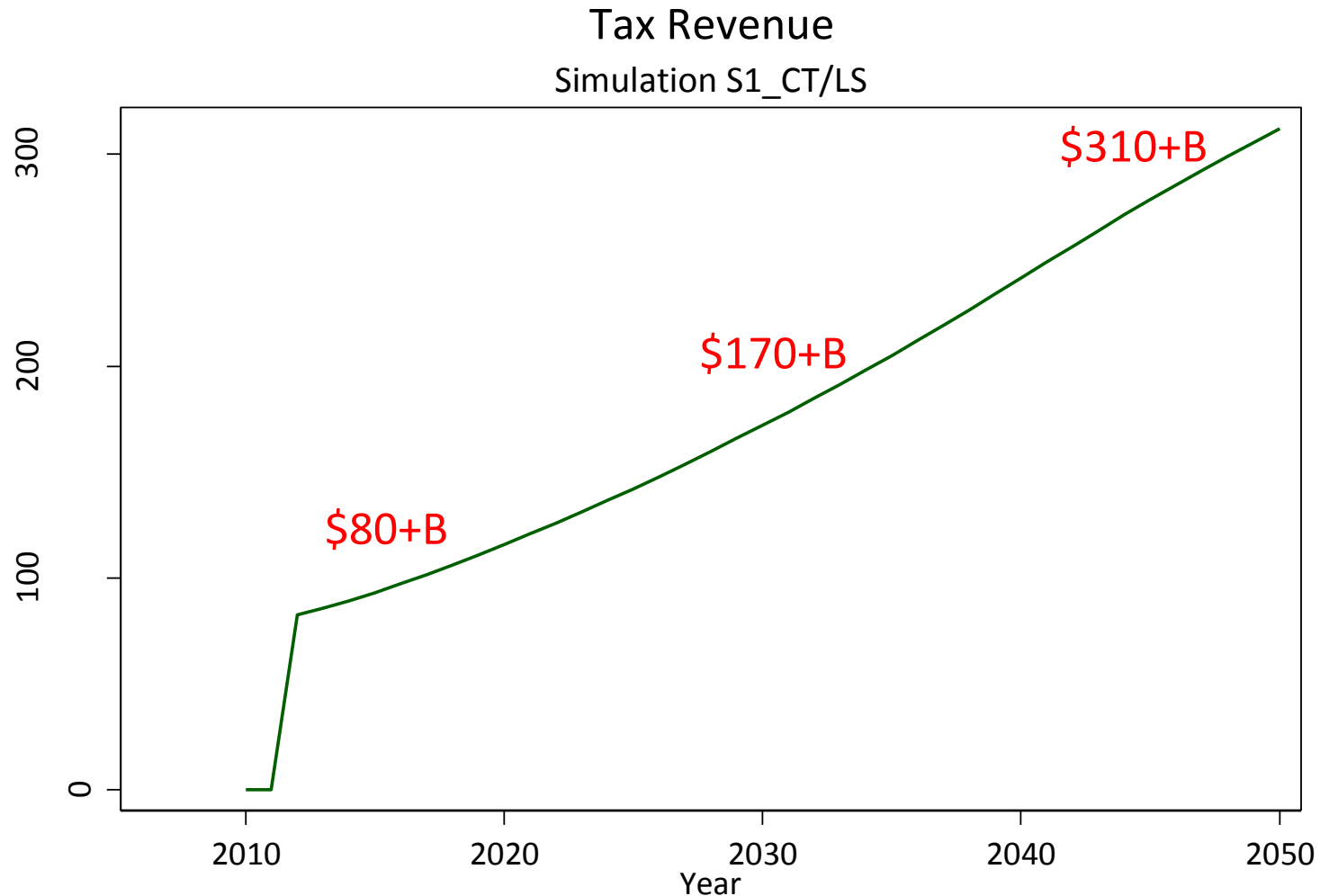
**\$2,221 billion** in net revenue over the 10-year  
window from 2019 through 2028

**Table 2. Tax, Net Revenue, and Emissions under a Carbon Tax (main scenario)**

	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Tax <sup>a</sup> (\$/mt CO <sub>2</sub> -e, nominal)	\$49	\$52	\$54	\$56	\$58	\$60	\$62	\$65	\$67	\$70
Revenue and Emissions										
Net revenue <sup>b,c</sup> (\$bn, nominal)	\$194	\$210	\$218	\$214	\$214	\$219	\$225	\$235	\$240	\$250
Net revenue as pct. of GDP <sup>b,c</sup>	0.90	0.93	0.92	0.87	0.83	0.82	0.80	0.80	0.79	0.79
Emissions (covered sources, <sup>c</sup> mmt CO <sub>2</sub> -e)	6,261	5,951	5,551	5,271	5,091	5,032	5,005	4,970	4,941	4,930
Emissions (covered sources) as pct. of baseline <sup>c</sup>	0.95	0.91	0.86	0.82	0.79	0.79	0.79	0.79	0.79	0.79

# Potential revenue is large even for a modest tax...

(Fossil carbon tax @ \$16/ton, rising at 4% real)

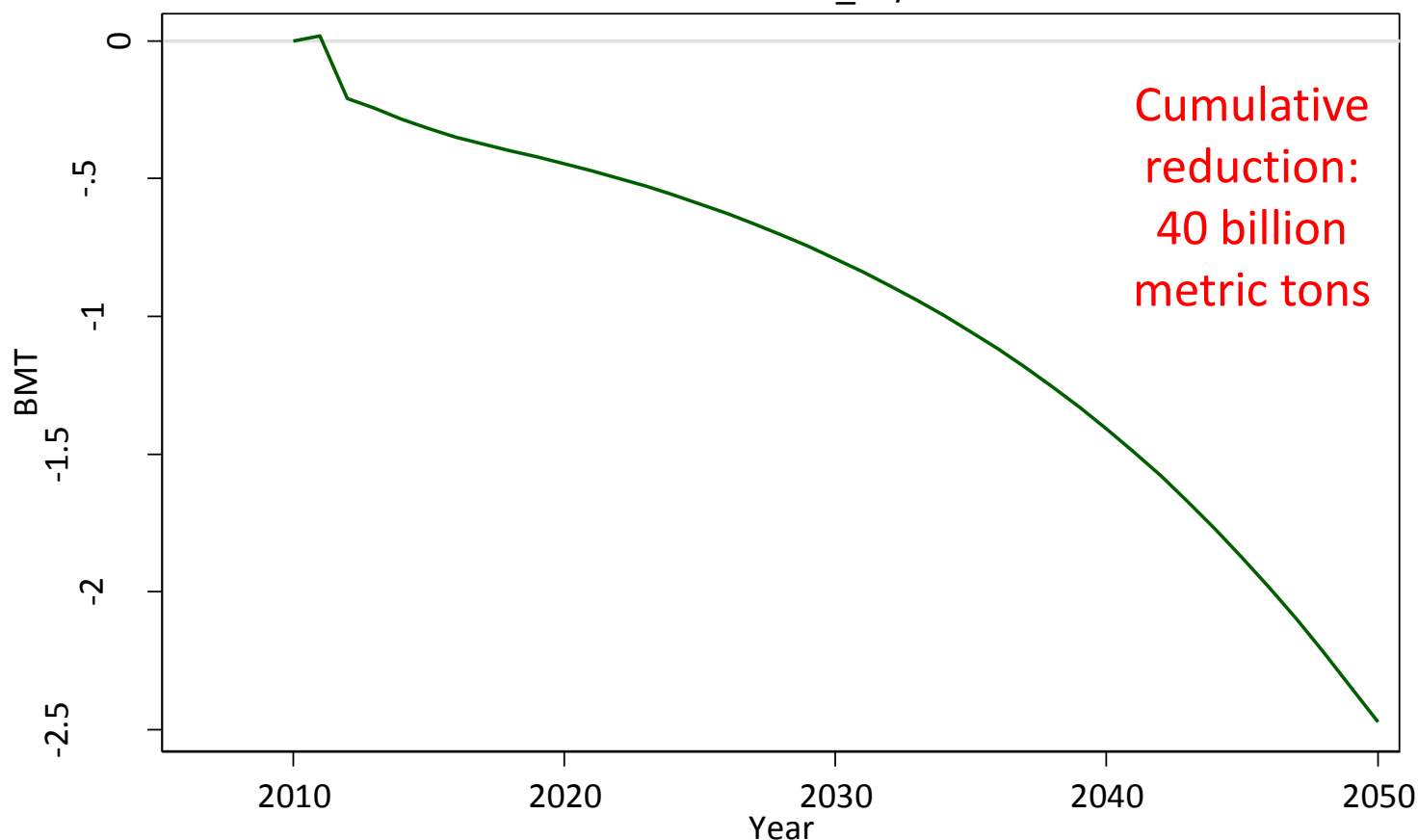


**Source: Carbon Taxes and U.S. Fiscal Reform**  
*Warwick McKibbin, Adele C. Morris, Peter J. Wilcoxon and Yiyong Cai*  
*National Tax Journal*, 2015, vol. 68, issue 1, 139-156

# Emissions decline significantly

## Change in Carbon Dioxide Emissions

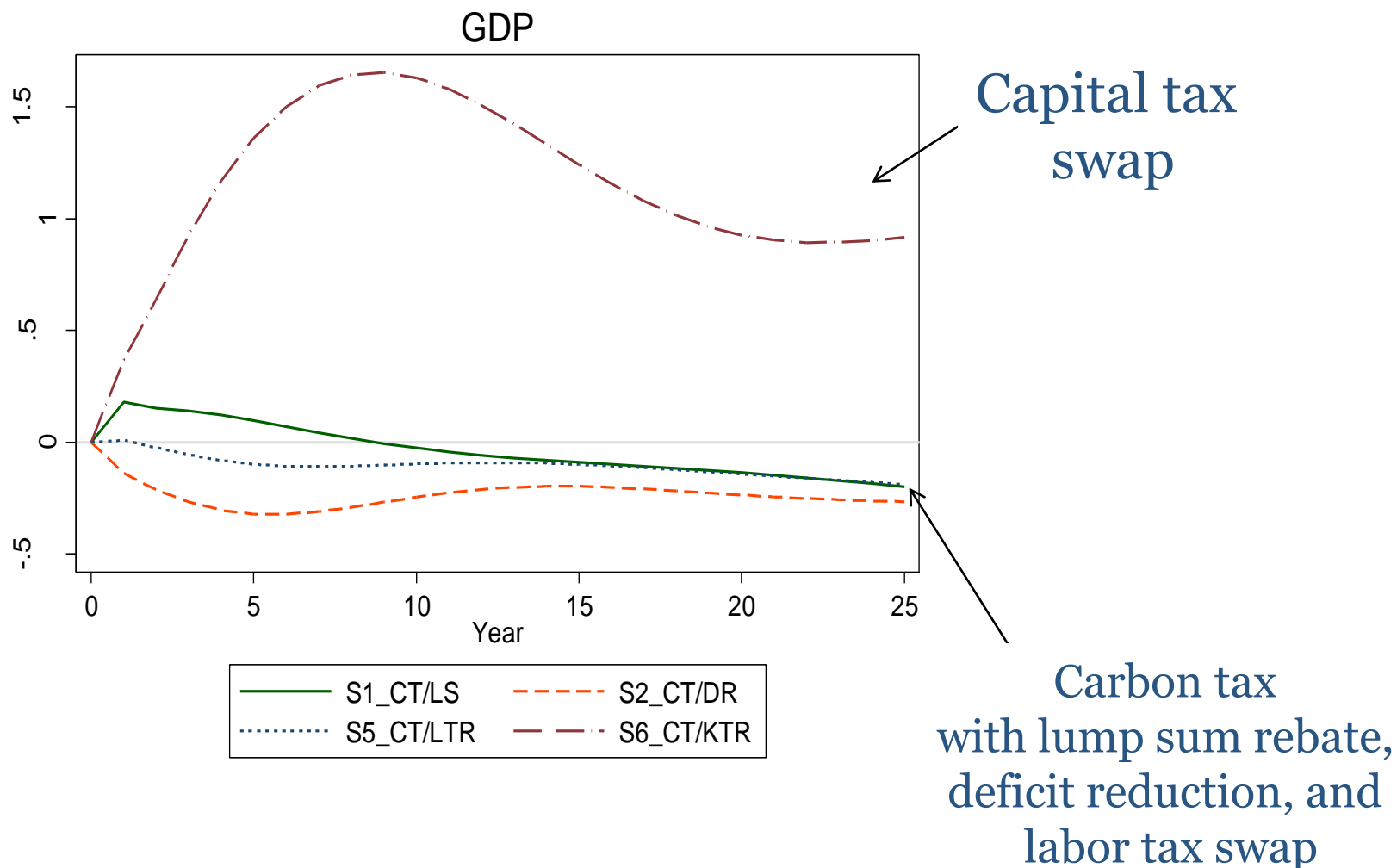
Simulation S1\_CT/LS



Cumulative  
reduction:  
40 billion  
metric tons

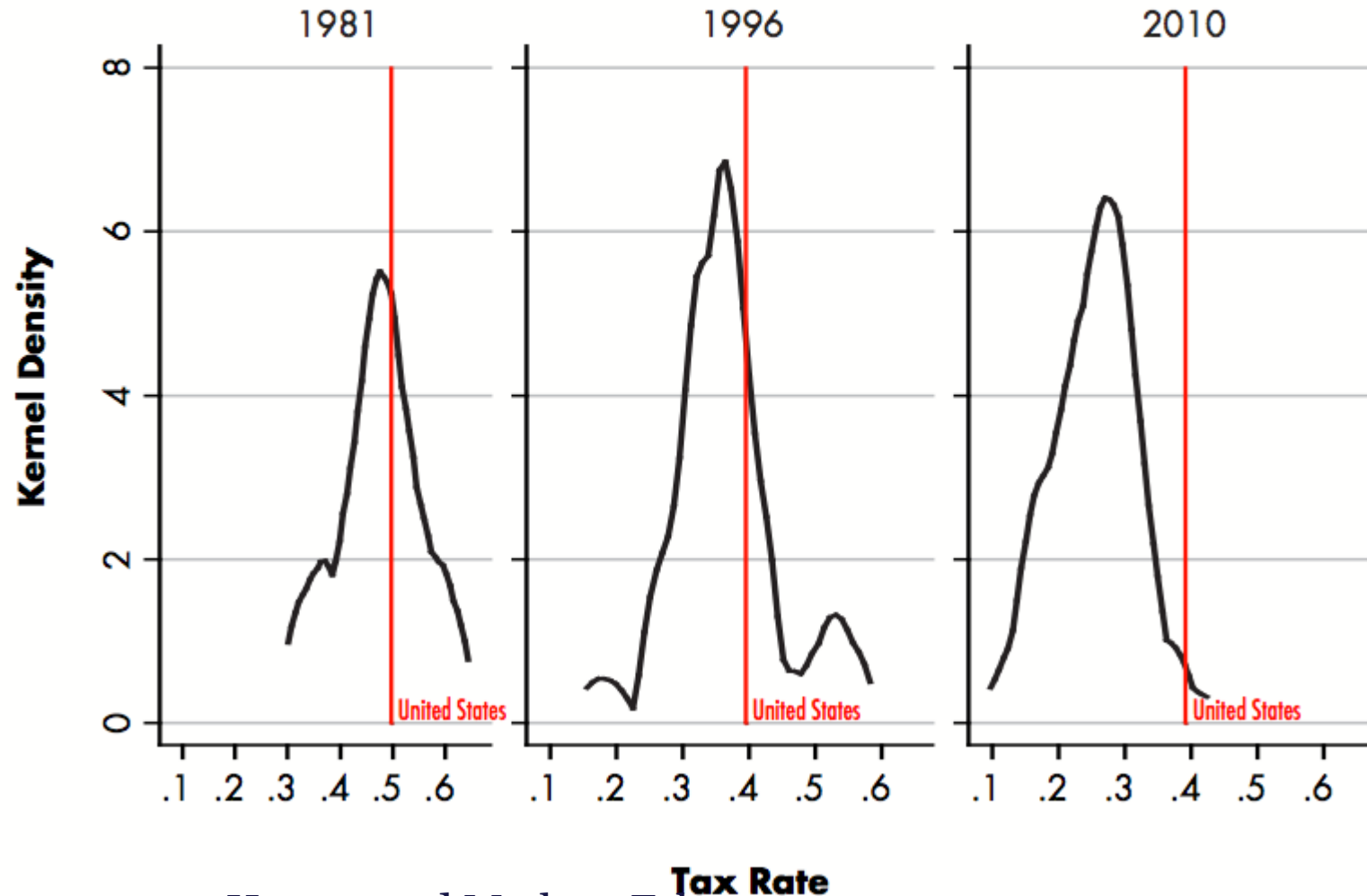
34% below  
baseline in  
2050

# Our capital tax swap results are sharply different than other scenarios (G-Cubed)



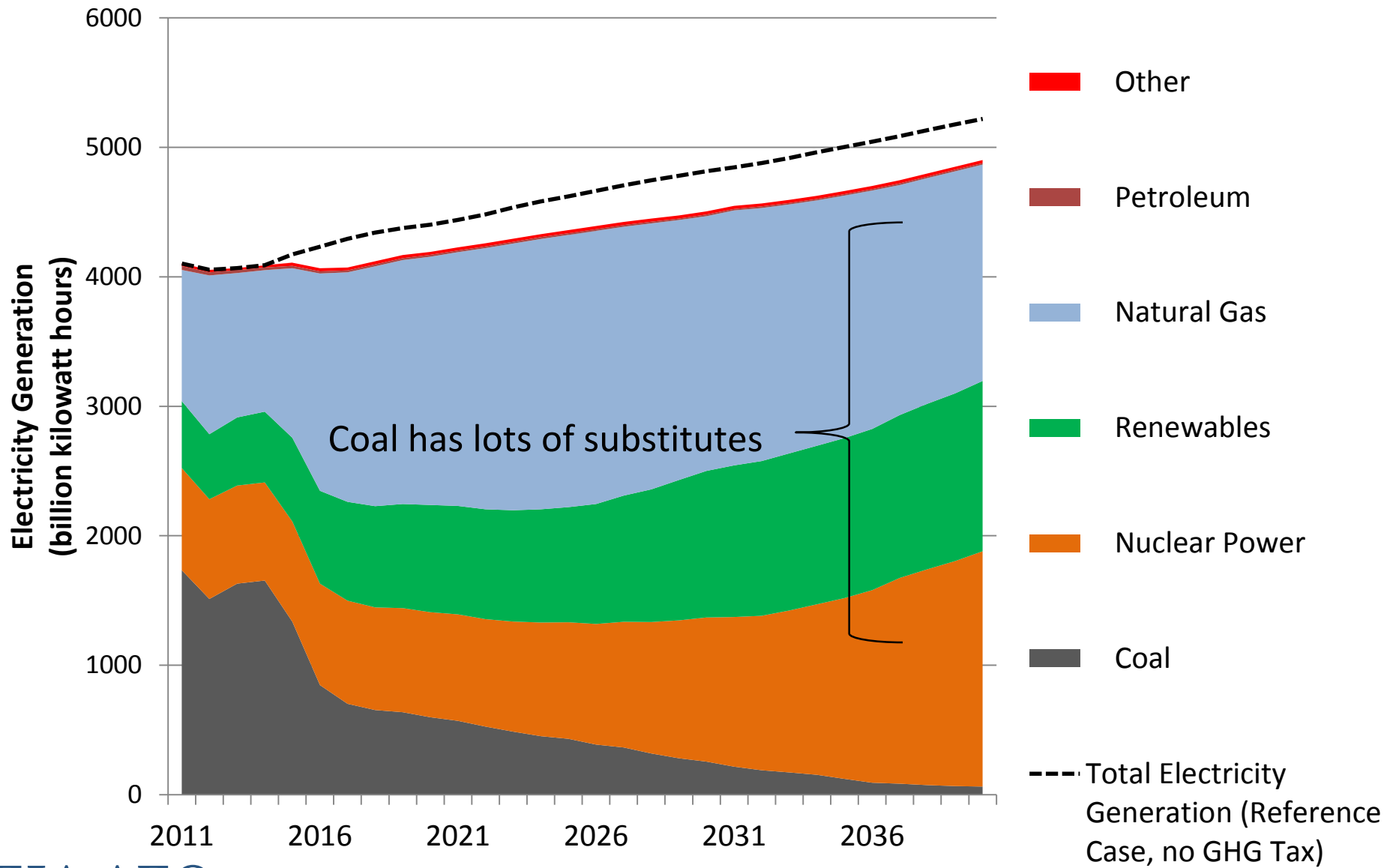
# Why swap out corporate income tax?

## DISTRIBUTION OF TOP STATUTORY CORPORATE TAX RATES IN THE OECD



Hassett and Mathur, February 2011

## An illustrative \$25 per metric ton CO<sub>2</sub> fee scenario, 2011-2040





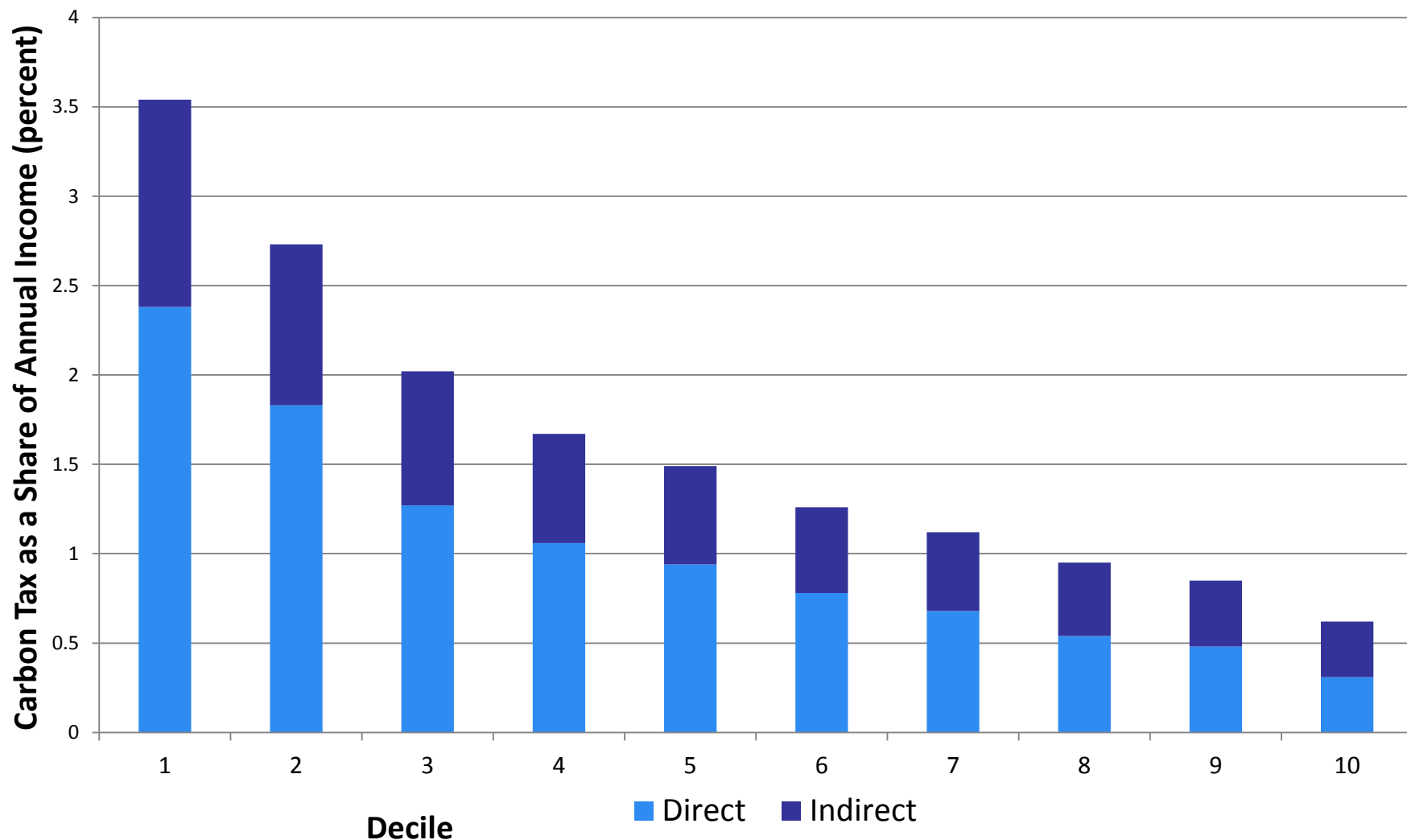
# Use of Revenue Affects Macroeconomic Outcomes

- Rank order in most models
  1. Revenue neutral capital tax swap
  2. Revenue neutral labor tax swap
  3. Revenue used for deficit reduction
  4. Lump sum rebates to households
- Double dividend?
  - › Some models and scenarios show that a revenue neutral capital tax swap can increase GDP. Others don't.

## Use of Revenue Also Affects Distributional & Regional Outcomes

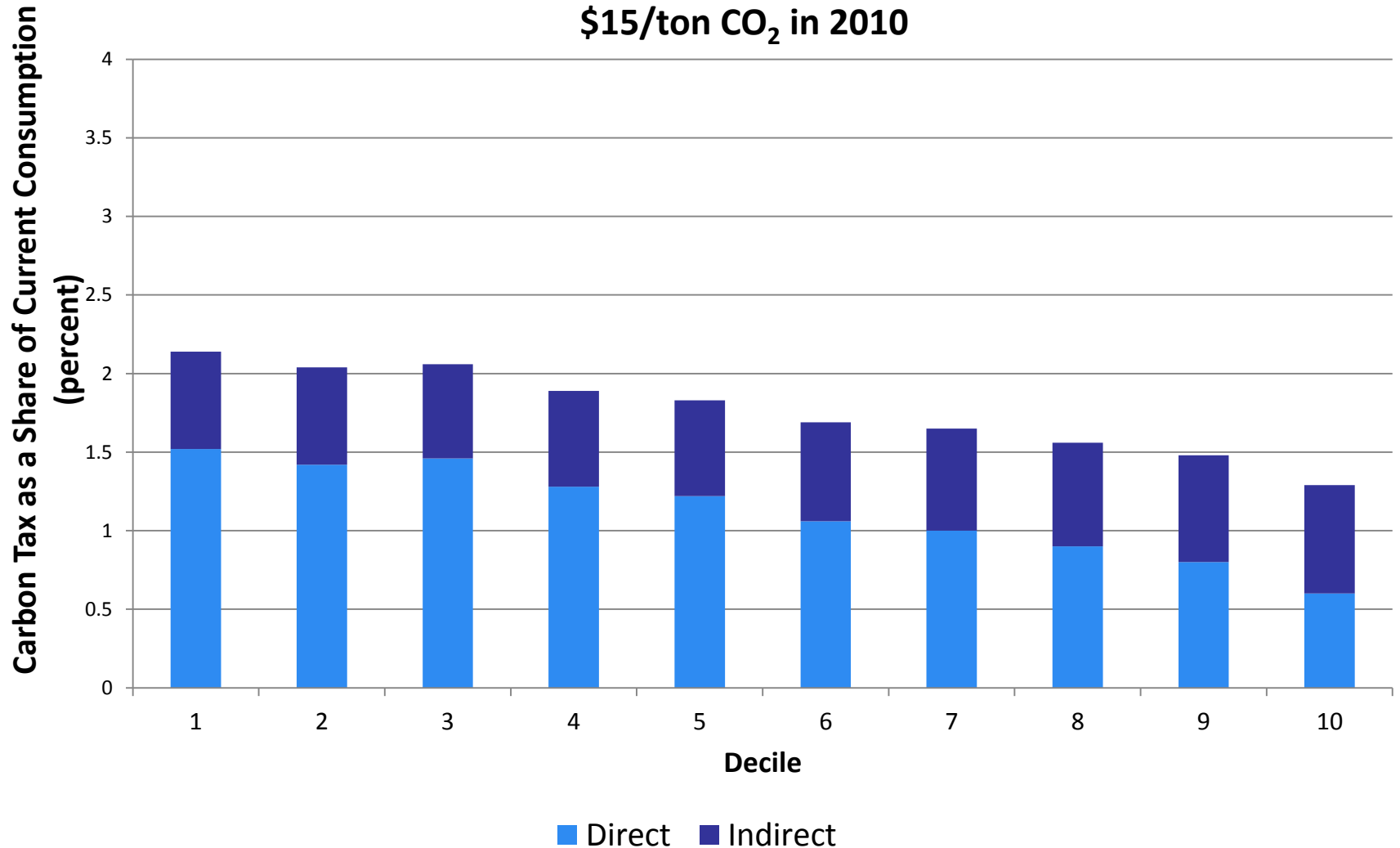
- Rank order of Progressivity
  1. Lump sum rebates
  2. Labor tax swap
  3. Capital tax swap
- › Capital income tax burden is regionally concentrated

## Short Run Distribution of Carbon Tax Burden by Annual Household Income, \$15/ton CO<sub>2</sub> in 2010



Source: Mathur and Morris 2012

**Short Run Distribution of Carbon Tax Burden by Current Household  
Consumption  
\$15/ton CO<sub>2</sub> in 2010**



Source: Mathur and Morris 2012

# How to hold low income households harmless

- Target revenue for redistribution
- Options
  - » Rebates, perhaps means tested
  - » Expand EITC or other tax credits
  - » Direct electronic benefits transfers or rebates
  - » Other benefits (Medicaid, Pell grants)
  - » Adjust for family size
- Other populations, e.g. coal workers & communities

# Other federal energy and environment policies?

- Clean energy tax incentives and direct spending, e.g.
  - » Renewable production tax credits
  - » Biodiesel tax credits
  - » Electric vehicle subsidies
- Clean Air Act regulations of GHGs. Backstop?
- Convert energy efficiency regulations to information provision
- Renewable fuel standard

# Illustrative Competitiveness Provisions

- Impose modest and gradual carbon price
- Replace/suspend regulatory authority
- Reduce corporate income tax rates
- Establish border carbon adjustments for the most EITE products
- Vigorous diplomacy

# States can adopt a carbon tax

- Reduce GHG emissions
  - » Obviate more costly ways to reduce emissions/complement existing policies
- Raise revenue
  - » Lower deficits/debt
  - » Tax shift or swap
  - » New spending

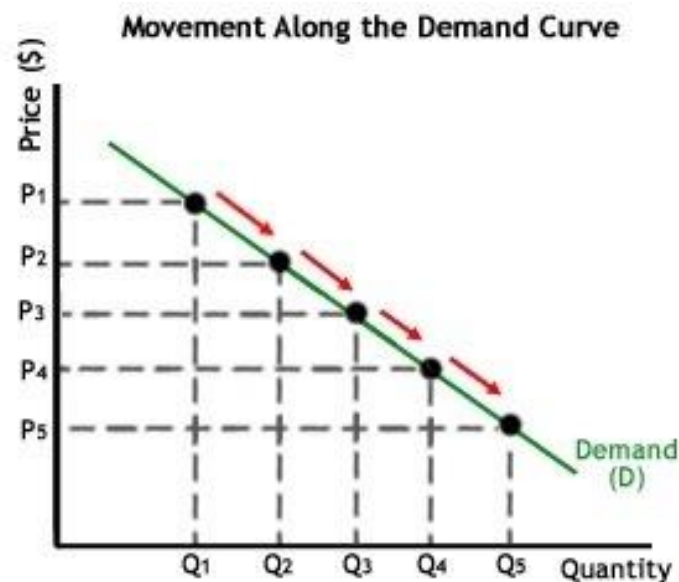


## Could it happen in a Trump Administration?

- Revenue
- Clean Air Act preemption
- Business interests
- Wards off disparate state policies
- Offers an approach for Paris

# Conclusion

- Price on carbon can be a key climate policy.
- Could pay for pro-growth fiscal reform
- Better environmentally and economically
- Better diplomatically
- Design issues are manageable



# Options for further reading:

**11 essential questions for  
designing a policy to price carbon**  
**Adele Morris**

Friday, July 8, 2016

[https://www.brookings.edu/research/  
11-essential-questions-  
for-designing-a-policy-to-price-carbon/](https://www.brookings.edu/research/11-essential-questions-for-designing-a-policy-to-price-carbon/)



**TAX POLICY CENTER**  
URBAN INSTITUTE & BROOKINGS INSTITUTION

## HOW TO USE CARBON TAX REVENUES

Donald B. Marron and Adele C. Morris

February 2016

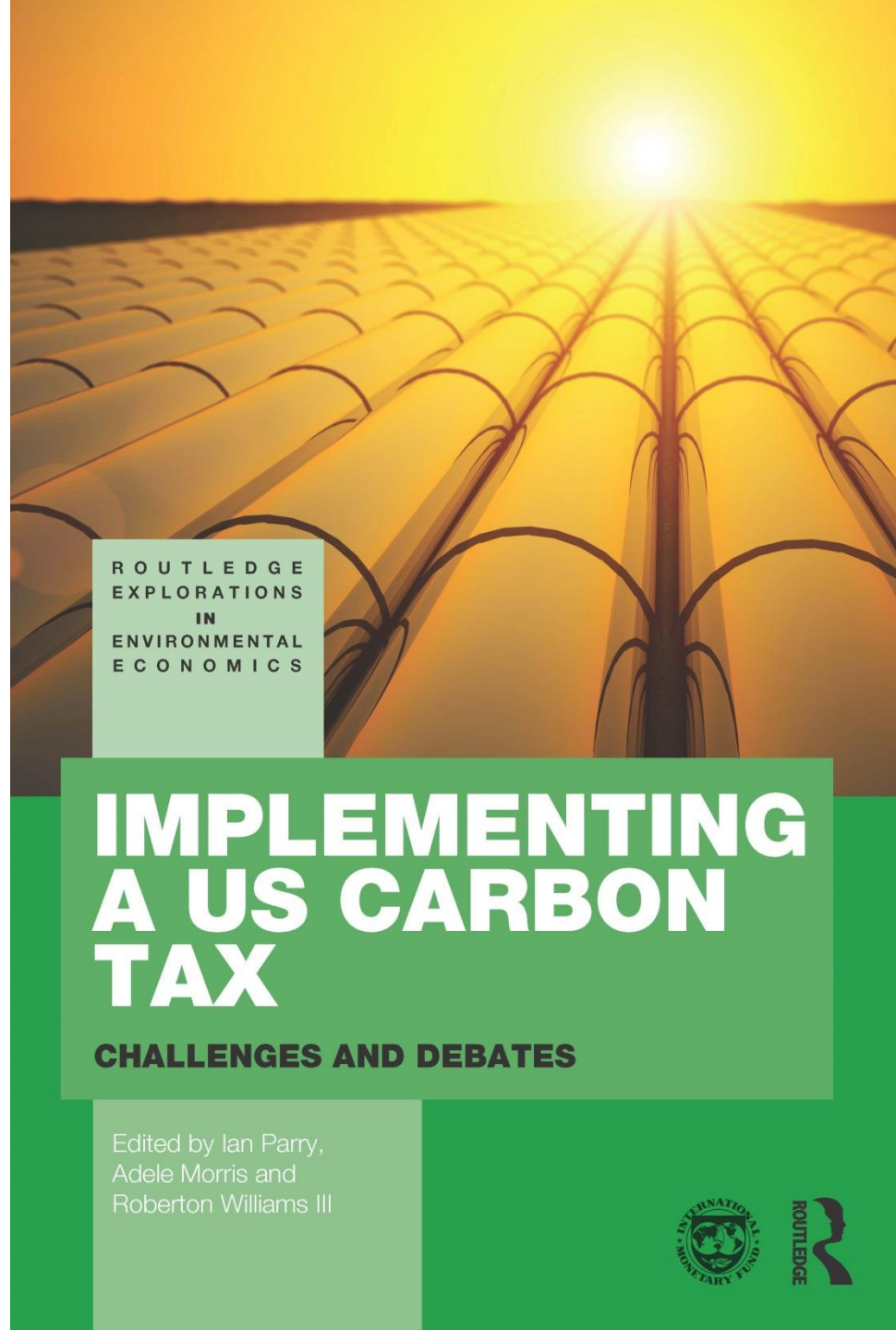
### ABSTRACT

How should governments use the considerable revenue carbon taxes can raise? There are many options for cutting other taxes, increasing spending, or reducing borrowing. We organize the options into four goals: offset the new burdens that a carbon tax places on consumers, producers, communities, and the broader economy; support further efforts to reduce greenhouse gas emissions; ameliorate the harms of climate disruption; and fund unrelated public priorities. We identify important tradeoffs across the goals and make several recommendations for policy design. Revenue neutrality, for example, can assuage public concerns about expanding government, but spending may be better than tax reductions for achieving some goals. We recommend that governments use some revenue to reduce other taxes and to soften the blow to lower-income households, coal workers, and their communities, that they be cautious about using revenues to pursue emissions reductions the tax itself encourages, and that they avoid tight earmarks. Governments should also pay special attention to using revenue in ways that attract and sustain stakeholder and public support for a carbon tax.

# Book

[http://www.amazon.com/Implementing-Carbon-Tax-Explorations-Environmental/dp/1138825360/ref=sr\\_1\\_1?ie=UTF8&qid=1423668157&sr=8-1&keywords=morris+parry+williams](http://www.amazon.com/Implementing-Carbon-Tax-Explorations-Environmental/dp/1138825360/ref=sr_1_1?ie=UTF8&qid=1423668157&sr=8-1&keywords=morris+parry+williams)

Book launch was April 22,  
2015 at AEI



ROUTLEDGE  
EXPLORATIONS  
IN  
ENVIRONMENTAL  
ECONOMICS

## IMPLEMENTING A US CARBON TAX

**CHALLENGES AND DEBATES**

Edited by Ian Parry,  
Adele Morris and  
Roberton Williams III



# Policy Brief

## A CARBON TAX IN BROADER U.S. FISCAL REFORM: DESIGN AND DISTRIBUTIONAL ISSUES



CENTER FOR CLIMATE  
AND ENERGY SOLUTIONS

by

Adele C. Morris  
*The Brookings Institution*

Aparna Mathur  
*American Enterprise Institute*

May 2014

<http://www.c2es.org/docUploads/carbon-tax-broader-us-fiscal-reform.pdf>



# Five carbon tax swap studies: NTJ, March 2015

- ***CARBON TAXES AND U.S. FISCAL REFORM***, Warwick J. McKibbin, Adele C. Morris, Peter J. Wilcoxon, and Yiyong Cai
- ***CARBON TAXES AND FISCAL REFORM IN THE UNITED STATES***, Dale W. Jorgenson, Richard J. Goettle, Mun S. Ho, and Peter J. Wilcoxon
- ***ENVIRONMENTAL POLICY FOR FISCAL REFORM: CAN A CARBON TAX PLAY A ROLE?*** Sugandha D. Tuladhar, W. David Montgomery, and Noah Kaufman
- ***CARBON TAXES, DEFICITS, AND ENERGY POLICY INTERACTIONS***, Sebastian Rausch and John Reilly
- ***THE INITIAL INCIDENCE OF A CARBON TAX ACROSS INCOME GROUPS***, Roberton C. Williams III, Hal Gordon, Dallas Burtraw, Jared C. Carbone, and Richard D. Morgenstern

Volume 68, No. 1 March, 2015	
NATIONAL TAX JOURNAL	
ARTICLES	
Summaries of Articles	
Louis Kaplow	Myopia and the Effects of Social Security and Capital Taxation on Labor Supply
Bradley T. Heim and Yulianti Abbas	Does Federal Deductibility Affect State and Local Revenue Sources?
William M. Doerner and Keith R. Ihlanfeldt	The Role of Representative Agents in the Property Tax Appeals Process
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FORUM: CARBON TAXATION AND FISCAL REFORM	
Dale W. Jorgenson, Richard J. Goettle, Mun S. Ho, and Peter J. Wilcoxon	Carbon Taxes and Fiscal Reform in the United States
Warwick J. McKibbin, Adele C. Morris, Peter J. Wilcoxon, and Yiyong Cai	Carbon Taxes and U.S. Fiscal Reform
Sebastian Rausch and John Reilly	Carbon Taxes, Deficits, and Energy Policy Interactions
Sugandha D. Tuladhar, W. David Montgomery, and Noah Kaufman	Environmental Policy for Fiscal Reform: Can a Carbon Tax Play a Role?
Roberton C. Williams III, Hal Gordon, Dallas Burtraw, Jared C. Carbone, and Richard D. Morgenstern	The Initial Incidence of a Carbon Tax Across Income Groups
BOOK REVIEW	
Sally Wallace	<i>Critical Issues in Taxation and Development</i> , edited by Clemens Fuest and George R. Zodrow

CLIMATE AND ENERGY ECONOMICS DISCUSSION PAPER | JULY 28, 2016

## STATE-LEVEL CARBON TAXES: OPTIONS AND OPPORTUNITIES FOR POLICYMAKERS



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