

# Economics of a Carbon Tax: 3 Studies Compared

SCOTT WILLIAMSON, PROGRAM MANAGEMENT OFFICER, CCS



THE CENTER FOR  
**CLIMATE STRATEGIES**

# Who am I?

- ▶ Program Manager, Center for Climate Strategies ([www.climatestrategies.us](http://www.climatestrategies.us))
- ▶ Subnational/International Climate Policy Analyst ~10 years
  - ▶ USAID, NREL
  - ▶ State Climate Action Plans (KY, NY, PA, MD, MN)
- ▶ REMI Journeyman
  - ▶ Southern California (SCAG) Long-range Transportation Plan
  - ▶ Oregon and Washington Low-Carbon Fuel Standard
    - ▶ Detailed Supply Scenarios
  - ▶ PA Climate Action Plan 2015 Update – 12 policies, energy efficiency
  - ▶ Minnesota CSEO (climate action planning) – 20 policies, multiple sectors
  - ▶ DC Carbon Price!

# What is



- ▶ Center for Climate Strategies ([www.climatestrategies.us](http://www.climatestrategies.us))
  - ▶ 2004 – Present
- ▶ 20+ State Climate Action Plans (KY, NY, SCAG, MD, MN most recently)
  - ▶ Multi-Sector, Multi-Criteria, Custom Plans
  - ▶ Stakeholder/Policy Design Process and Analysis
  - ▶ Long-time REMI user
- ▶ International Low-Emissions Efforts/Paris Agreement Roadmaps
  - ▶ USAID – Guatemala, Ukraine, Mexico
  - ▶ NREL/State/UNEP – West Africa, Central Africa, Capacity Building & Support

# Carbon Tax: The Central Concept

- ▶ **Low, but steadily rising, price applied to carbon sources**
  - ▶ Price based on emissions intensity, *not* per unit energy
  - ▶ Aggressive: \$25+/ton fee level, rising \$10+/ton every year
  - ▶ Milder: ~\$10/ton, rising just above inflation
- ▶ **Price Signal – crucial to design!**
  - ▶ Long-term policy – rising price announced over 10+ years
  - ▶ Homes and businesses: Opportunity to avoid – and Time to avoid – tax burden.
  - ▶ 3 year *plan-ahead* → ~30% larger response!
- ▶ **Return of Revenue to Economy**
  - ▶ Typically not to general revenue, or paying off a bond
  - ▶ \$\$, green investment, tax offsets – or a mix?
- ▶ **No Cap, No Credits – Not a Cap & Trade** (such as RGGI, California, Washington)

# Carbon... Tax? Fee? Price?

“It’s Not a Tax, You Guys!”  
-- Most carbon-tax advocates

- ▶ *Fee* funds a dedicated purpose outside general revenue
  - ▶ Rebates, Investments/spending, or Programs (green or other), or a blend
  - ▶ Falling revenue over time? “Great! We’re cutting emissions!”
- ▶ *Tax* for general revenue - fiscal reform/lowering other taxes
  - ▶ Falling revenue over time? “Terrible! We need to fund essential programs!”
- ▶ *Price* – either a fee or tax sets a price, and ideally a price signal

# Carbon Fee & Rebate: Intended Market Shift

- ▶ Incentive to Power Suppliers (who typically pay the fee directly):
  - ▶ Lower tax burden on clean energy sources (less tax per unit energy) – more price competitive
  - ▶ Low-emissions sources offer improved competitiveness, faster ROI
- ▶ Incentive to households and businesses (who see fee reflected in bills):
  - ▶ Switch to clean sources, adopt efficiency measures & equipment
- ▶ Potential for efficiency vs. distortion:
  - ▶ Administrative simplicity vs. more complex approaches (arguable, and depending on revenue use, of course)
  - ▶ Redirection of revenue – driver of stimulus, investment, or tax reduction

# Carbon Fee & Rebate: Perceived Political Advantage

- ▶ **Market Friendliness & Absence of Mandate**
  - ▶ Attractive to those who prize regulated-party flexibility
- ▶ **Broad Appeal**
  - ▶ Centrist groups, Reagan Republicans, etc. in vocal support
  - ▶ Bipartisan Groups (CCL, CLC, Bipartisan caucus) behind the concept
  - ▶ Conservatives may seek alternative to regs (clean air, clean water)
  - ▶ Liberals may seek equity from rebate, social program support
- ▶ **State-level interest**
  - ▶ Canadian examples influential (BC, Alberta)
  - ▶ NE States: RGGI covers electricity only – carbon pricing could also cover transportation or heating fuels

The screenshot shows the Citizens' Climate Lobby website. At the top, there is a logo for "Citizens' Climate Lobby" and a "Join CCL" button. Below the logo, the text "70 Climate Solutions Caucus Members" is displayed. The members are organized into two columns: "35 Republican Members" and "35 Democratic Members". The first row shows Carlos Curbelo (R-FL-26) and Ted Deutch (D-FL-22). The second row shows Ileana Ros-Lehtinen (R-FL-27) and Alan Lowenthal (D-CA-47). The third row shows two more members, one Republican and one Democrat, though their names are not visible in the image.



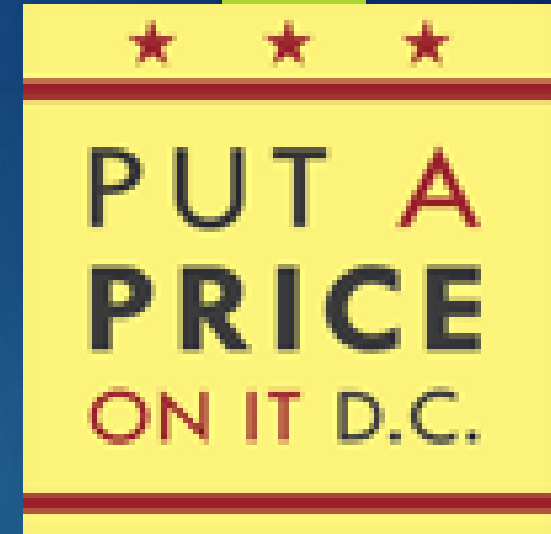
# Study Summaries

DISTRICT OF COLUMBIA, VERMONT, AND MASSACHUSETTS



# DC Fee & Rebate

- ▶ Fee: \$20/ton in 2019, increasing \$10/ton each year
  - ▶ 2032: \$150/ton (the cap on the policy)
- ▶ Immediate payback of revenue:
  - ▶ 75% rebate to households
  - ▶ 20% investment
  - ▶ 5% business cost abatements
- ▶ Commitment to progressive impact – lower-income households must be better off
  - ▶ Rebate weighted to low-income residents
  - ▶ Result: ~30% of population receives ~40% of the rebate funds



# What Gets Priced?

- ▶ Electricity Emissions
  - ▶ Context: DC RPS = 50% of electricity would be exempt from price by 2032
    - ▶ (Electricity getting cleaner already)
- ▶ Emissions from Gas & Other Fuels
- ▶ Transportation? No!
  - ▶ Price on motor fuels → leakage, no GHG reductions, economic losses....
  - ▶ Alternatives: Excise tax, parking meters, parking garages
- ▶ State-level border issues:
  - ▶ Avoiding leakage: gas/diesel taxed indirectly, not at pump
  - ▶ Inter-state & tourist travel
  - ▶ Offset to business costs – again, avoid leakage, keep activity local

# Emissions Reductions

- ▶ Significant!
- ▶ DC on track to emit 7.5M – 8M tons per year (peak early 2020s)
  - ▶ DOEE Forecast: 2032 roughly equal to 2018
- ▶ Scenario: DC holds at 7.5M, starts to fall 0.2M per year
  - ▶ Final impact: below 6M tons in 2032
  - ▶ approx. 23% reduction (Electricity & Gas)

# Economic Impacts from REMI

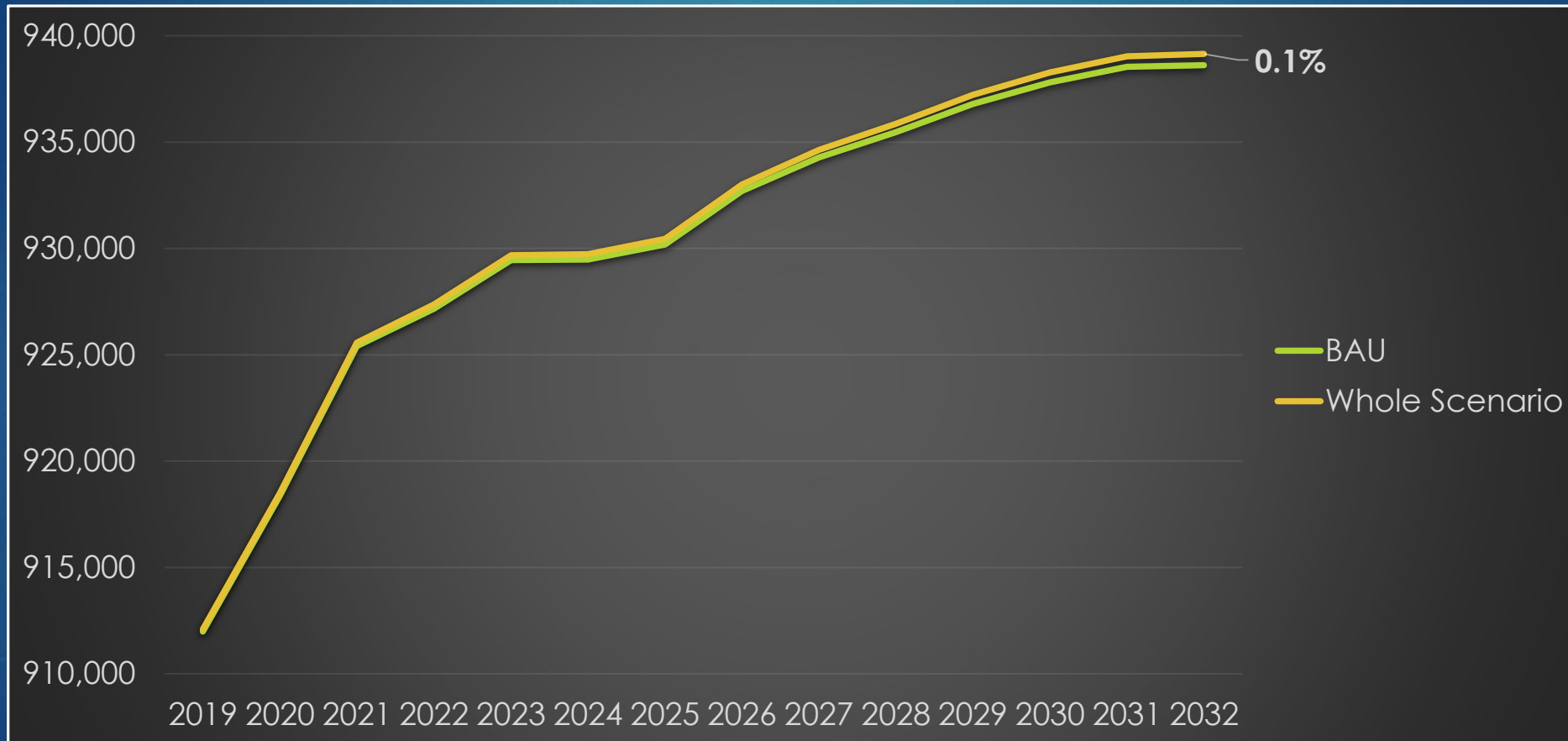
Jobs increase – net gain of 500+ new positions

- ▶ Top winners: construction, retail, nightlife, health care
- ▶ Sectors shedding jobs: utilities, consulting/legal/technical services

Net Neutral Overall Effect

- ▶ 500 more jobs: <0.06% of employment – a tiny change
- ▶ GDP, Incomes, Value Added, Output: <0.1% change
- ▶ Incomes slightly up, prices slightly up as well
- ▶ (still some buying power gained)

# Understanding the Jobs Impact: Comparing to Baseline



# Vermont: Different Prices, Different Uses of Revenue

3 cases tested:

▶ **LOW:**

- ▶ \$5/ton in first year, rising \$5/year
- ▶ Max: \$50/ton (reached in year 10)

▶ **MEDIUM:**

- ▶ \$10/ton in first year, rising \$10/year
- ▶ Max: \$100/ton (reached in year 10)

▶ **HIGH:**

- ▶ \$10/ton in first year, rising \$10/year
- ▶ Max: \$150/ton (reached in year 15)

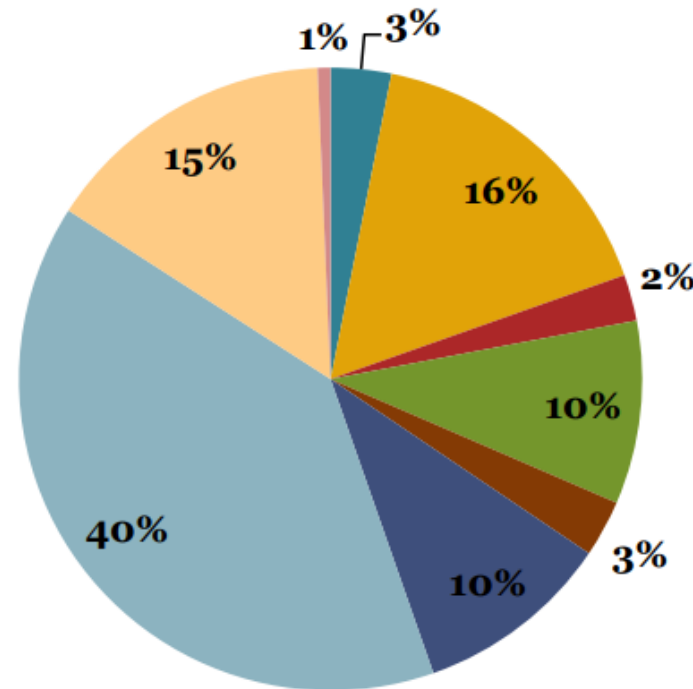


# Partial-Economy Coverage

- ▶ Vermont a RGGI member!
- ▶ All large electric power generation facilities covered

- ▶ Carbon price covers:
  - ▶ Transportation
  - ▶ Other Liquid fuels

Carbon Revenues by Sector and Fuel Source (HIGH in 2020)

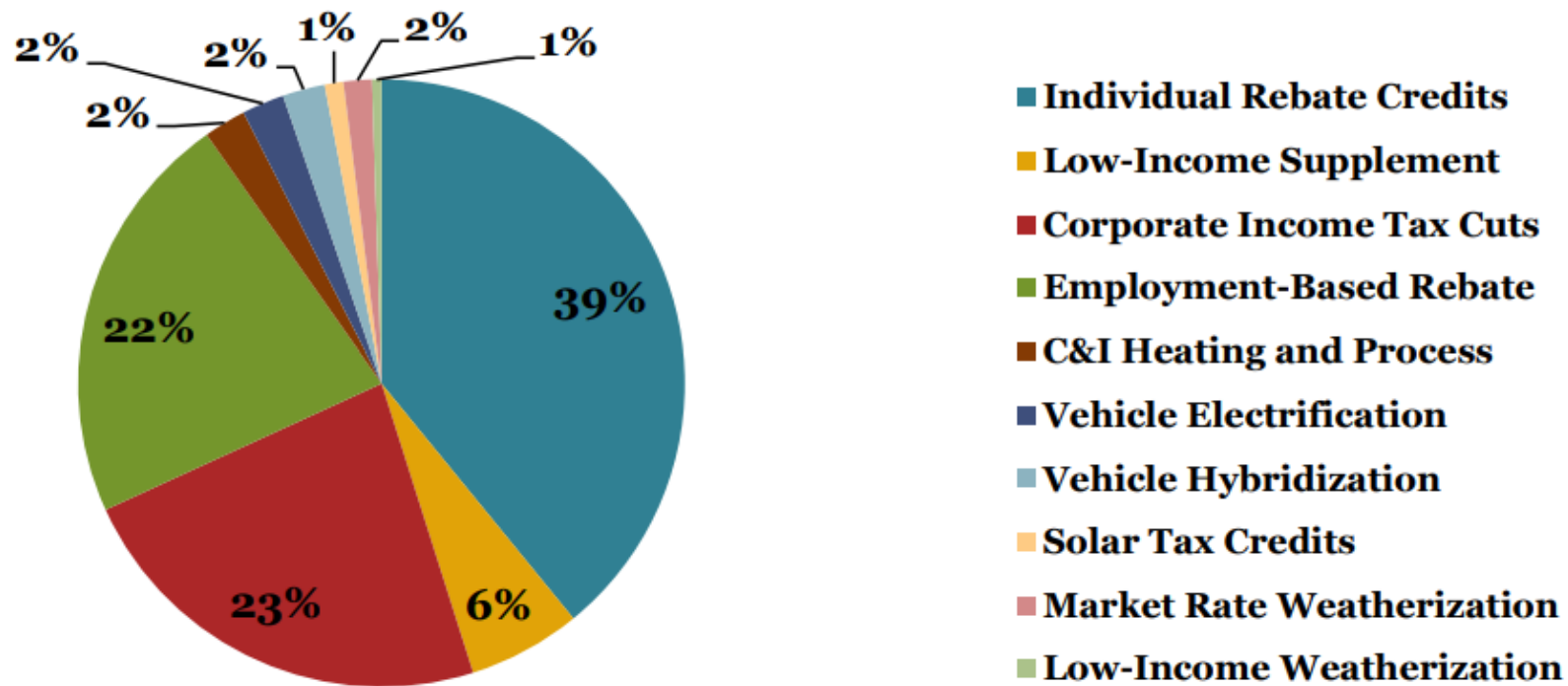


- Residential Natural Gas
- Residential Petroleum
- Commercial Natural Gas
- Commercial Petroleum
- Industrial Natural Gas
- Industrial Petroleum
- Motor Gasoline
- Motor Diesel
- Other Transportation

# Revenue Return: It's Complicated

- ▶ Goal: Each sector (household, gov, commercial, industrial) gets back about what it contributes
- ▶ No "Redistribution" – a 45/45/10 split

## Revenue Recycling





# Economic Impacts: Similar in Scale to DC

- ▶ “Low” scenario: ~1000 jobs by 2035
- ▶ “Medium”: ~2000 jobs by 2035
- ▶ “High”:
  - ▶ ~2750 jobs by 2035 (<0.5% of baseline employment)
    - ▶ DC: 500+ jobs (still <0.2% above baseline)
  - ▶ GSP: Also 0.2% to 0.5% growth (DC saw <0.1% change)
- ▶ Winners/Losers:
  - ▶ Like DC, Utilities lost while Real estate, health care, and restaurants saw gains
  - ▶ Unlike DC, Retail lost ground while professional/technical services grew

# Massachusetts: Blue State with a Red Idea

Like Vermont, 3 Scenarios. Unlike Vermont, far less aggressive:

- ▶ Low: Flat carbon price of \$15/ton, reached in 2<sup>nd</sup> year, never rising
- ▶ Medium: reaching \$30/ton over 4 years, never rising
- ▶ High: reaching \$45/ton over 5 years, then holding

Small tax rates still yield *big* impacts!

- ▶ Revenue over \$2.5B per year in high-scenario peak year
- ▶ DC/VT, with prices 3X higher, only collect \$600-700M/year at most
- ▶ Part of the Reason: *Electricity is included* – despite RGGI
  - ▶ (Also, Massachusetts is just bigger)

# Lower Carbon Price → Lower Carbon Reductions

- ▶ \$15/ton cap (low): 3-4% emissions reduction
- ▶ \$30/ton cap (med): 6% emissions reduction
- ▶ \$45/ton cap (high): 9% emissions reduction
  - and only after ~20 years of waiting for full market response!
  
- ▶ DC: 23% emissions reduction
  - ▶ On top of aggressive clean-electricity policy *and* without pricing gasoline
- ▶ Vermont: 40+% emissions reduction
  - ▶ Caveat: reduction is only on non-electricity emissions (liquid/gaseous fuels)

# Economic Impacts of Tax offsets?

- ▶ Vast majority of revenue: directly reducing other taxes
- ▶ Economic gains expected!
  - ▶ Employment steadily rising over 15-20 years before gains decline
  - ▶ 4,000 new jobs from low scenario; 12,000 from high scenario

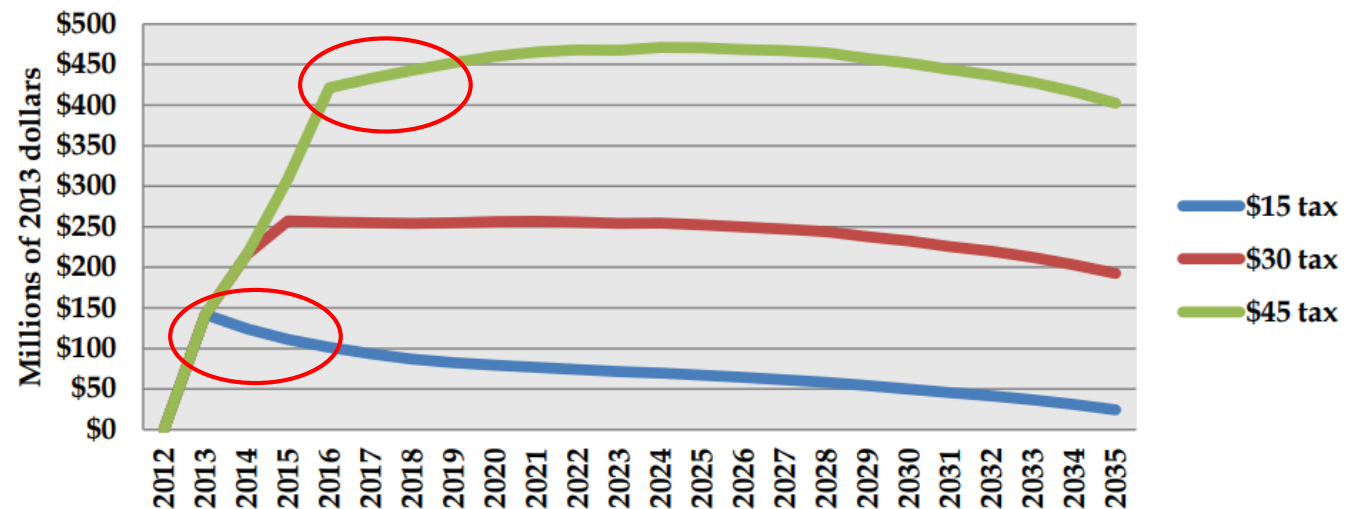
- ▶ GDP Gains: more durable at higher prices

Low scenario: GDP gains fall fast, falling to half strength in 6 years

Medium: gains hold for 10 years

High: gains grow for 10 years!

ADDITIONAL GROSS DOMESTIC PRODUCT (ANNUAL) TO BASELINE

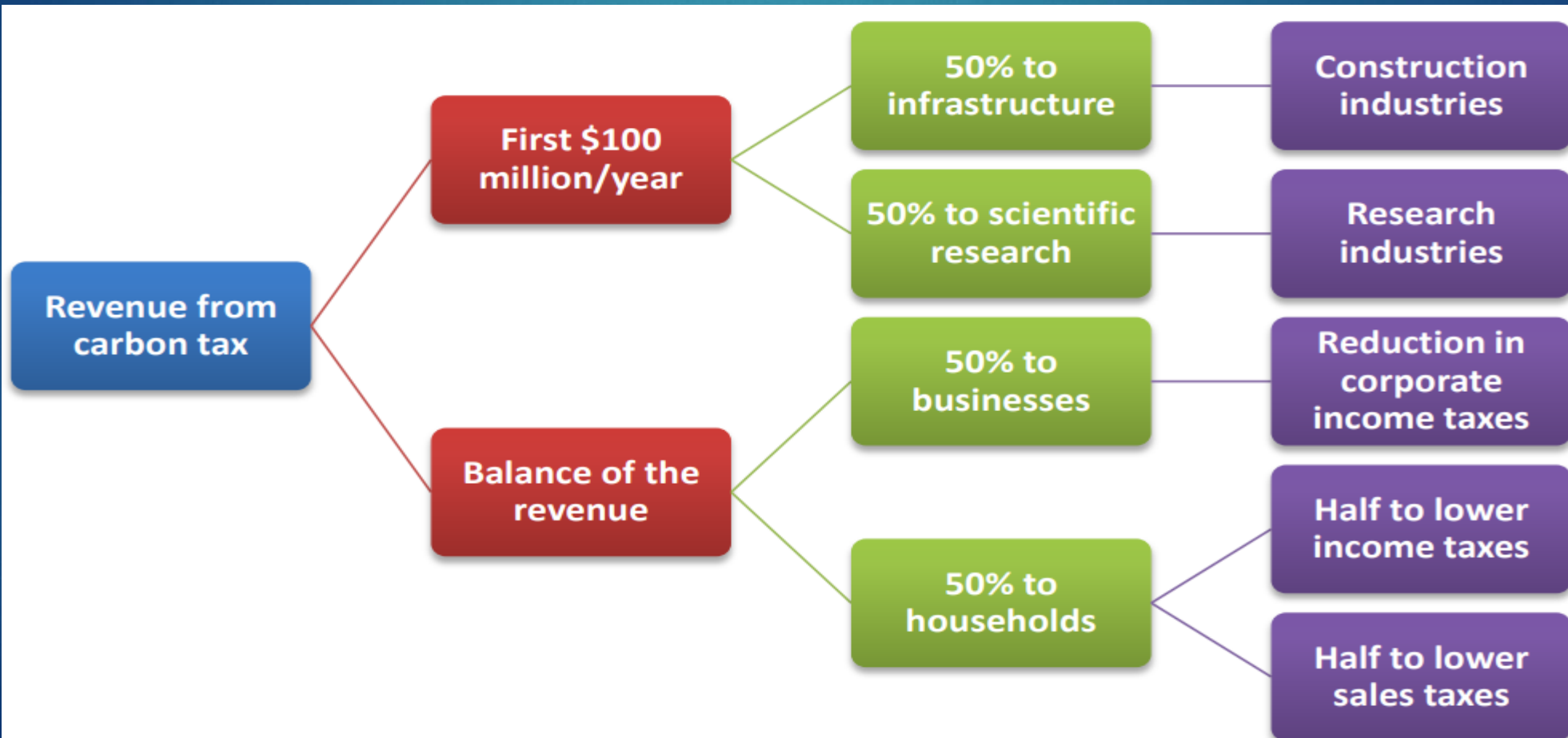


# Why Such Gains?

- ▶ Most fuels are imported, with little supply chain
- ▶ Displacing fuel imports with new buying power shifts activity to sectors with larger in-state benefits
- ▶ Winners: Construction, finance, health care, retail (after an early dip), professional services
- ▶ Losers: Utilities, fuels, retail (in the early going) as buying power weakens before rebounding

# Revenue: Mostly Tax Offsets!

- ▶ First \$100M every year: investments, research
- ▶ Rest: Corporate & Personal tax reductions



# Revenue: It Doesn't Last Long

- ▶ DC:
  - ▶ Start in 2019
  - ▶ Peak in 2029 – Revenue falling after 11 years!
  - ▶ Per-household rebate declines after 2027 – only 9 years before decline
- ▶ Vermont:
  - ▶ Start in 2017
  - ▶ Peak in 2031 – Revenue falling after 15 years (upon reaching price max)
  - ▶ Per-household rebates decline after peak (2031 in high scenario)
- ▶ Massachusetts:
  - ▶ No gradual price increases – peak price achieved in 3-5 years
  - ▶ Lower rates (<\$50/ton) mean revenue falls more slowly – but it still falls
  - ▶ Slowly falling revenue == slowly falling emissions (policy goal?)

# Key commonalities:

- ▶ Use of CTAM
  - ▶ Washington State elasticity tool w/ differentiated functions for each fuel
- ▶ Emissions reductions come from price mechanism
  - ▶ No new-tech arrival, aggressive federal action or magic investment
- ▶ Tiny net changes to total economic activity
  - ▶ Jobs, GSP/GDP, Incomes all within 1% of baseline
  - ▶ But: specific winner/loser sectors vary, and can see significant changes
- ▶ Competing increases in income and price indices
- ▶ Utility Sector Pain – Electricity/transpo has options, but gas/oil?
- ▶ Energy-importer states: reducing imports drives gain. Texas?



# Key Uncertainties

- ▶ Elasticity – will relationships hold at large price shifts?
  - ▶ 30%-50% price changes vs. baseline – same response as 3-5%?
- ▶ What kind of spending required to respond to large price shifts?
  - ▶ Just some switches and light bulbs? Or full building retrofits?
  - ▶ Could be significant – with significant impact on economy
  - ▶ Could delay responsiveness/"stickiness" of elastic response
- ▶ Other broad structural/economic changes (not in baseline forecast)
  - ▶ Vehicle electrification?
- ▶ Other environmental policy
  - ▶ DC: Green bank, building codes, solar subsidy, renewables, DERA....

# Acknowledgments

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  - ▶ Climate Action Liaison Coalition
  - ▶ Tech Networks of Boston
  - ▶ Vermont Public Interest Research and Education Fund
  - ▶ Vermont Energy Investment Fund
  - ▶ Vermont Businesses for Social Responsibility
- ▶ You all!

Thank you very much!

QUESTIONS & COMMENTS (HAPPY TO DISCUSS):

SWILLIAMSON@CLIMATESTRATEGIES.US

