

Carbon Fee & Rebate Policy for DC

ECONOMIC IMPACTS ANALYSIS WITH REMI PI+

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CLIMATE STRATEGIES

Carbon Fee & Rebate: Concept

- ▶ Low, but steadily rising, price applied to carbon sources
 - ▶ Electricity, natural gas, transportation fuels – by emissions intensity
 - ▶ Aggressive - \$25+/ton, rising \$10/ton every year
 - ▶ Milder - <\$20/ton, rising 5% every year – nearly flat
- ▶ 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
- ▶ Return of Revenue to Economy
 - ▶ Never general revenue, or paying off a bond
 - ▶ \$\$, green investment, tax offsets – or a mix?

Carbon Fee & Rebate: Concept

- ▶ Incentive to Power Suppliers:
 - ▶ Lower tax burden on clean energy sources (less tax per MWh) – more price competitive
 - ▶ Low-emissions sources offer improved competitiveness
- ▶ Incentive to households and businesses:
 - ▶ Switch to clean sources, adopt efficiency measures
- ▶ Strengths:
 - ▶ Simplicity vs. more complex approaches
 - ▶ Redirection of revenue – demand driver

Results of Related Studies: The National Scenario

- ▶ Citizens Climate Lobby: 100% Cash Back!
 - ▶ \$10/ton in 2016, \$20 in 2017, \$30 in 2018.... \$200/ton in 2035
 - ▶ Family of 4: \$290/month cash benefit in 2025, ~\$400/month in 2035

- ▶ Border adjustment
- ▶ Emissions: 50% less
- ▶ Employment: 2.5M+
- ▶ GDP: \$70-85B/year+

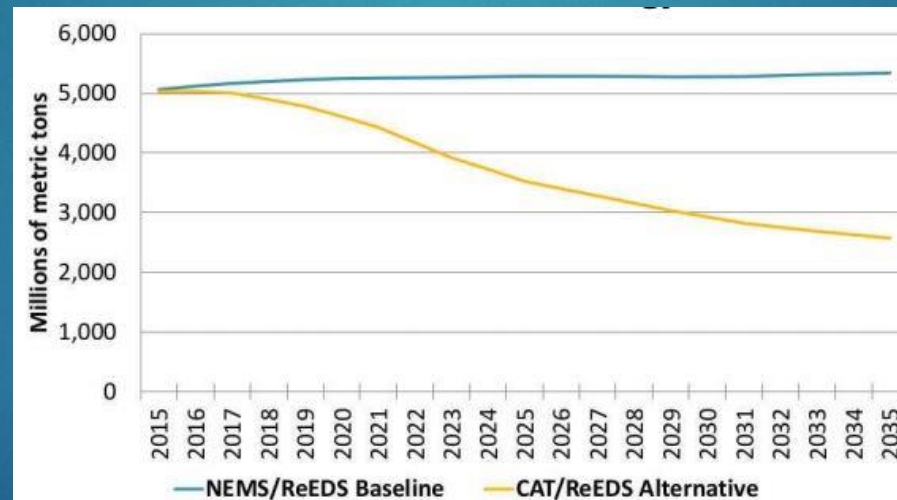


Figure 1: U.S. CO2 emissions under F&D (yellow) and without a carbon tax (blue). F&D reduces US emissions to 69% of 1990 levels by 2025, and to 50% by 2035.

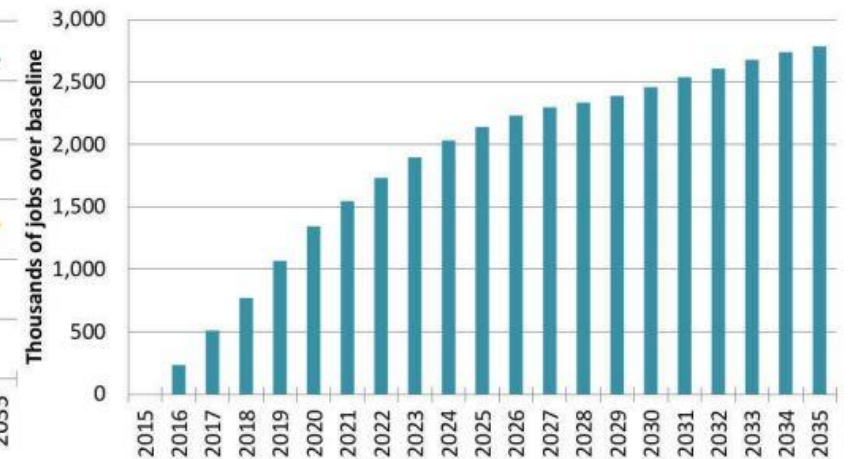


Figure 2: Thousands of jobs created by F&D relative to the case without a carbon tax. Over a million jobs created within 4 years, over 2 million within 9 years.

Studying a Fee/Rebate in DC

“Put A Price On It DC”

- ▶ Stakeholder coalition
 - ▶ Lead: Chesapeake Climate Action Network
- ▶ Unique policy design
 - ▶ Multiple uses of funds
- ▶ Difference from national study
 - ▶ Price, Borders, etc.
- ▶ Difference from other state studies – No RGGI!

Elements of Scenario

- ▶ Fee: \$20/ton in 2019, increasing \$10/ton each year
 - ▶ 2027: \$100/ton
 - ▶ 2032: \$150/ton (the cap on the policy)
- ▶ Immediate payback of revenue:
 - ▶ 75% - 20% - 5%
- ▶ Commitment to progressive impact – lower-income households must be better off
 - ▶ Rebate weighted to low-income residents
 - ▶ 85% of funds allocated evenly; 15% used to enhance low-income rebate
 - ▶ Result: ~30% of population receives ~40% of the rebate funds

REMI as Policy Design Tool

- ▶ Multiple scenarios tested, iteration with decision-makers
- ▶ Multiple elements tested for relative impact
 - ▶ Rebate share: 70%, 75% or 80%?
 - ▶ Tax offset to businesses: 5% - 30%?
 - ▶ Tax offset, or green investment?
 - ▶ Slow tax increase (3%/year) or fast (\$10/year)?
 - ▶ Cap: \$100/ton or \$150/ton?
- ▶ Goal: Balance policy-design goals – jobs, emissions, business burden....

Design of This Scenario: What Gets Taxed?

- ▶ Electricity and Gas
 - ▶ PJM mix
 - ▶ Context: DC RPS
- ▶ State-level border issues:
 - ▶ Avoiding leakage: gas/diesel taxed indirectly, not at pump
 - ▶ Inter-state & tourist travel: meter and garage fees
 - ▶ Offset to business costs – reduce, not just relocate, emissions
- ▶ Transportation: excise tax, parking meters, parking garages

Analytical Challenge #1: Modeling elasticity

- ▶ Workflow: CTAM and REMI
 - ▶ 2 Elasticity functions!
- ▶ CTAM more detailed, more easily modified, on both elasticity and stickiness
 - ▶ Energy supply specificity
 - ▶ Stickiness
- ▶ Modeled *price* response in CTAM
- ▶ Modeled consequent *spending* and *revenue return* in REMI
- ▶ Using price variables in REMI: double-triggering elasticity functions

Analytical Challenge #2: Modeling a Price Signal


- ▶ Price response \neq price *signal* response
- ▶ Planning ahead – how much?
 - ▶ Price on bill – or rebate check – as first awareness for many
 - ▶ Households \neq businesses, in terms of advance planning
- ▶ Other Assumptions: also moderate to conservative
 - ▶ Cost pass-through assumption: 100%
 - ▶ Sources of private capital: mostly within DC
 - ▶ Household and business investment capacity: low to moderate


Final Scenario: Direct Impacts


DC Carbon Fee and Rebate Initiative Summary of Projected Outcomes														
Scenario: \$20 per ton fee, rising \$10/year to \$150 per ton in 2032. 75% of revenue to progressive rebate, 20% to investment, 5% to small business tax abatement														
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Fee rate (dollars per ton of greenhouse gas emissions)	\$20	\$30	\$40	\$50	\$60	\$70	\$80	\$90	\$100	\$110	\$120	\$130	\$140	\$150
Total revenue generated (millions, 2015\$)	\$140.9	\$207.6	\$275.6	\$341.0	\$404.5	\$453.8	\$503.8	\$553.5	\$605.7	\$605.5	\$609.6	\$605.7	\$601.7	\$596.5
Total rebate to households (75% of all revenue, millions, 2015\$)	\$105.7	\$155.7	\$206.7	\$255.8	\$303.4	\$340.4	\$377.9	\$415.1	\$454.3	\$454.1	\$457.2	\$454.3	\$451.3	\$447.4
Total green investment (20% of all revenue, millions, 2015\$)	\$28.2	\$41.52	\$55.1	\$68.20	\$80.9	\$90.76	\$100.8	\$110.70	\$121.1	\$121.10	\$121.9	\$121.14	\$120.3	\$119.30
Total small business tax abatement (5% of all revenue, millions, 2015\$)	\$7.0	\$10.4	\$13.8	\$17.1	\$20.2	\$22.7	\$25.2	\$27.7	\$30.3	\$30.3	\$30.5	\$30.3	\$30.1	\$29.8
DC general monthly rebate (family of four, 2015\$)	\$43	\$63	\$82	\$101	\$118	\$131	\$144	\$157	\$170	\$169	\$168	\$166	\$163	\$160
Low-income monthly rebate (family of four, 2015\$)	\$74	\$108	\$142	\$174	\$204	\$227	\$249	\$271	\$294	\$291	\$290	\$286	\$282	\$277
Emissions Reductions	1.1%	3.2%	5.2%	7.5%	9.7%	12.1%	15.8%	17.9%	18.8%	19.7%	20.5%	21.3%	22.1%	22.8%


Direct Impacts → REMI Inputs


FILE
HOME
Navigation



 Select
Inputs


 Inputs
List


















 Forecast
Options


 Results


 Import


 Export

Policy Variable Inputs

Active	Edit	Group	
+	<input checked="" type="checkbox"/>		Residential Consumers Electricity and Gas Tax Impacts Modeled as Additional taxes rather than price impact (see preliminary runs)
+	<input checked="" type="checkbox"/>		Commercial Tax Impacts Modeled as Additional Taxes rather than price impact (see preliminary runs). Spread by output. Reduced to 66% of original total May 2, to reflect n
+	<input checked="" type="checkbox"/>		Industry Tax impacts Modeled as Additional Taxes rather than price impact (see preliminary runs) Spread by output. Reduced to 66% of original size May 2 to reflect natl/int
+	<input checked="" type="checkbox"/>		Assumed Household spending on efficiency and home improvements to avoid tax (April 5 Run 2: 10%, split 50% to appliances, 50% to construction), with responsive lowered
+	<input checked="" type="checkbox"/>		Gov spending of 20% of revenue (May 7 70/20/10 scenario) on construction and equipment to accelerate energy use reductions - 20% of revenue, 90% to construction/10 t
+	<input checked="" type="checkbox"/>		Private commercial industrial spending induced by tax and gov support on these, with production cost impact (April 5 Run 2: 25% equip, 75% construction, spread prod cost b
+	<input checked="" type="checkbox"/>		reduction in demand for utilities (elec & natural gas) with household spending gains & business production cost decreases
+	<input checked="" type="checkbox"/>		Parking meters (consumer side) - fee added to gradually double current rate (\$2.30/hr to \$4.60 in 2032), 28% paid by DC residents, rest is an export to tourists and commut
+	<input checked="" type="checkbox"/>		Parking meters May 8 (75 20 5) - share taken to tax swap (30% reduced to 5%) - replacing the 20% share to investment in equip and construction from all earlier runs
+	<input checked="" type="checkbox"/>		DC Parking Garages May 8 (75 20 5 scenario) driver costs to DC drivers, and rebate from revenue drawn from all drivers. Assum same scale of cost impact as meters. DC resi
+	<input checked="" type="checkbox"/>		Parking garages May 8 (75 20 5 scenario) 5% of revenue as tax swap to comm ind sectors, 20% to investment, 90% construction, 10% equipment, with 66% assumed displ
+	<input checked="" type="checkbox"/>		Revenue neutral vehicle excise system (held at no net effect for April 28 run though feebate literature can inform vehicle purchase shifts, fuel use demand reductions, nd ope
+	<input checked="" type="checkbox"/>		Gasoline savings from Excise tax driving more efficient vehicle purchases added 05-03-17
+	<input checked="" type="checkbox"/>		Consumer gas savings from parking garage fees & meter fees, with 1/3 trips avoided, 2/3 to transit at 60% of trip cost
+	<input checked="" type="checkbox"/>		Revised rebates May 8 (75 20 5) for Elec and Gas - rebates adjusted to 75% and 40.93% spread to basic consumer spending (top 33 rows), representing 15% of rebates se
+	<input checked="" type="checkbox"/>		Diverting all 5% of available 25% non-dividend to tax swap for 75/20/5 run May 8.

Emissions Reductions

- ▶ Significant!
- ▶ DC on track to emit 7.5M – 8M tons per year (peak early 2020s)
- ▶ 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)

Final Scenario: Economic Impacts from REMI

Jobs increase – net gain of 500+ new positions

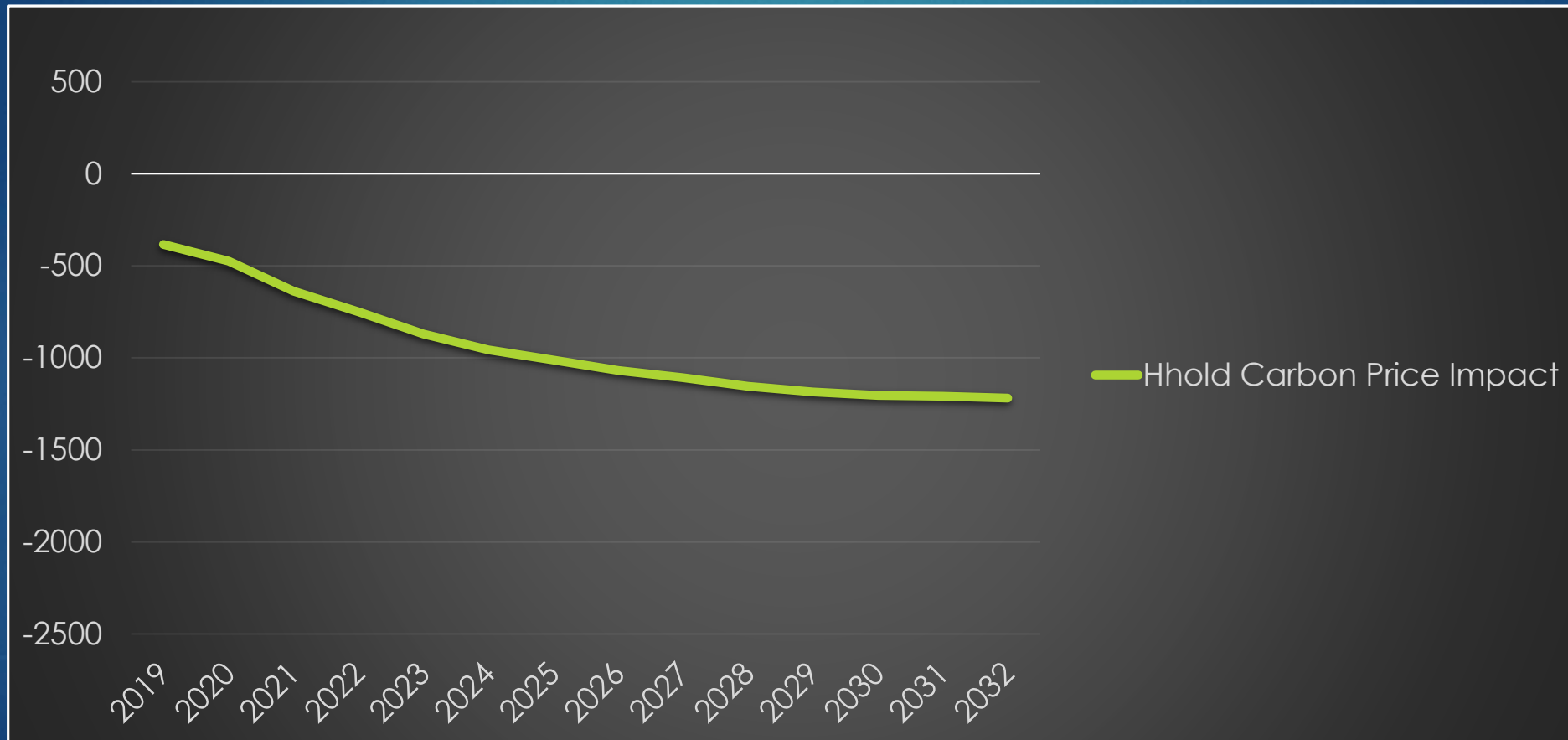
- ▶ Top winners: construction, retail, nightlife, health care
- ▶ Sectors shedding jobs: utilities, consulting/legal/technical services

Net Neutral Overall Effect

- ▶ 500 more jobs: <0.06% of employment – a tiny change
- ▶ GDP, Incomes, Value Added, Output: <0.1% change

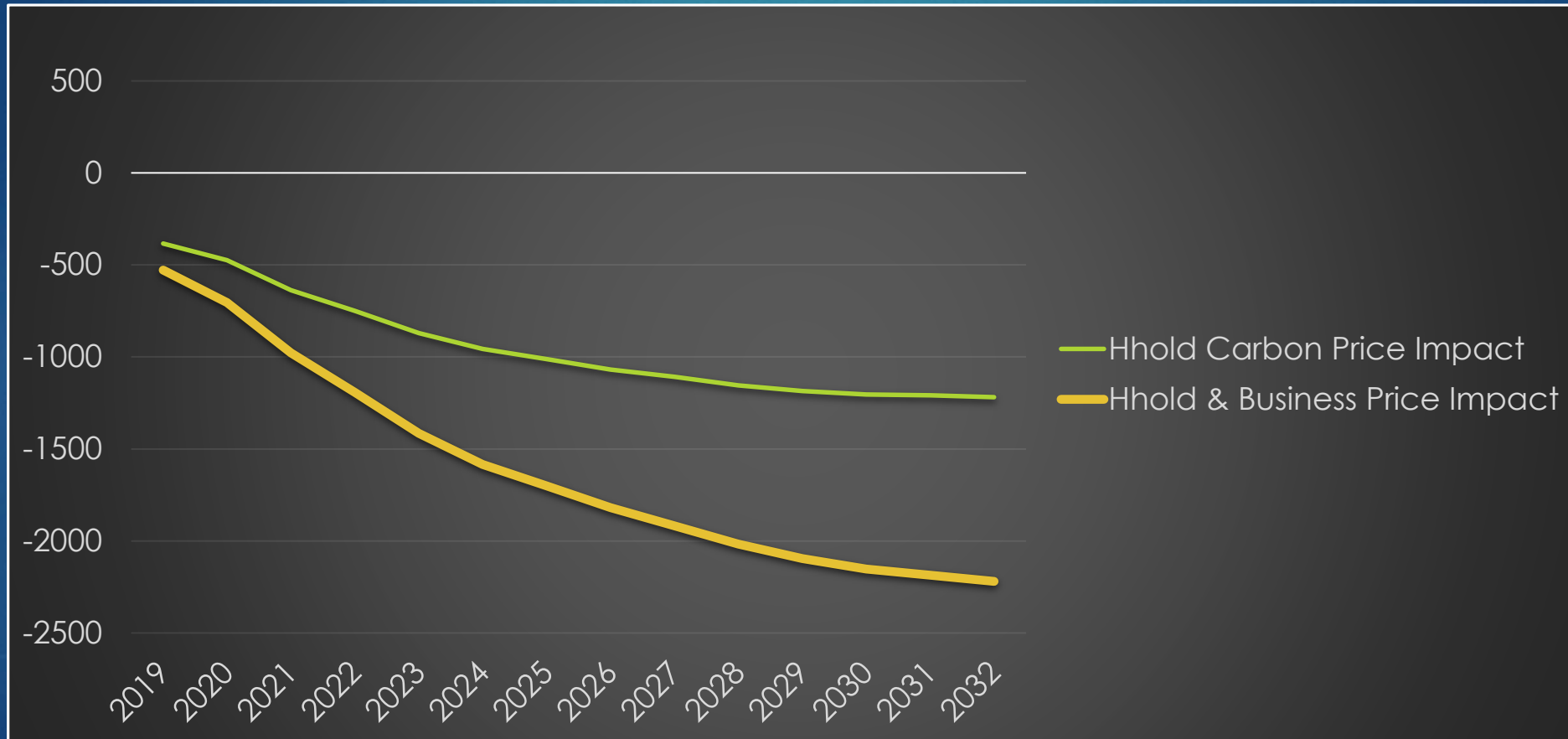
Understanding the Jobs Impact:

1. Isolating Carbon Price



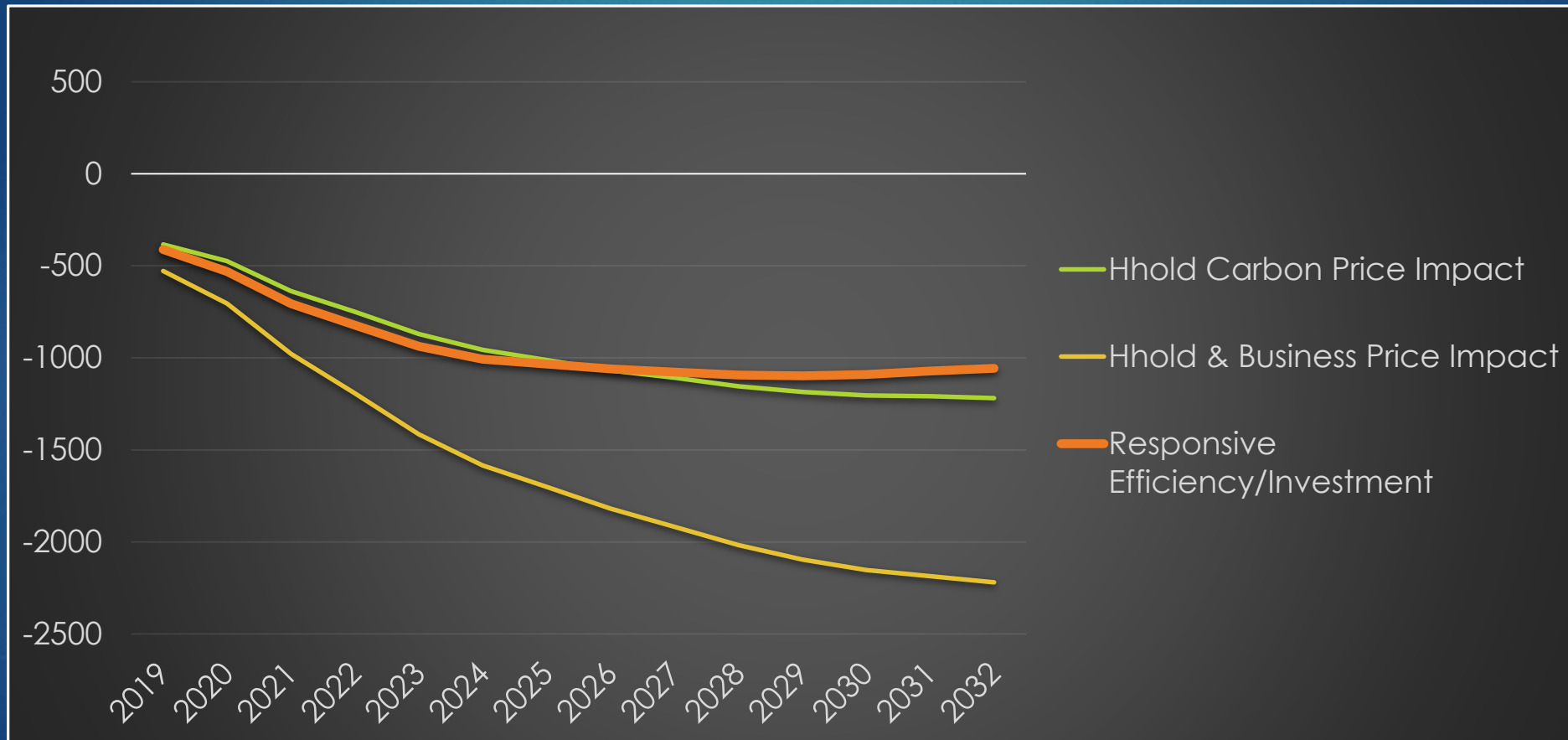
Understanding the Jobs Impact:

2. Isolating Carbon Price



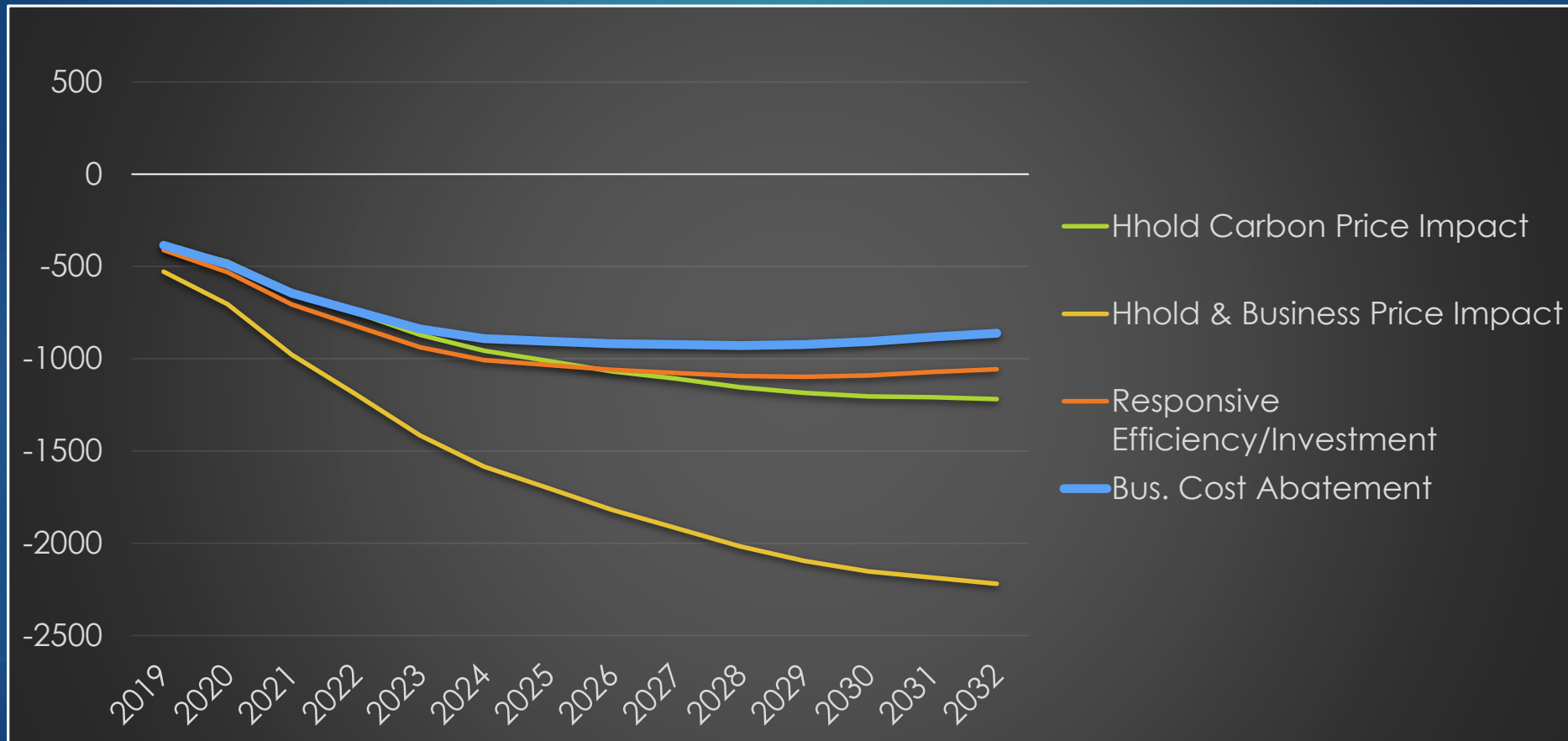
Understanding the Jobs Impact:

3. Families & Businesses Respond



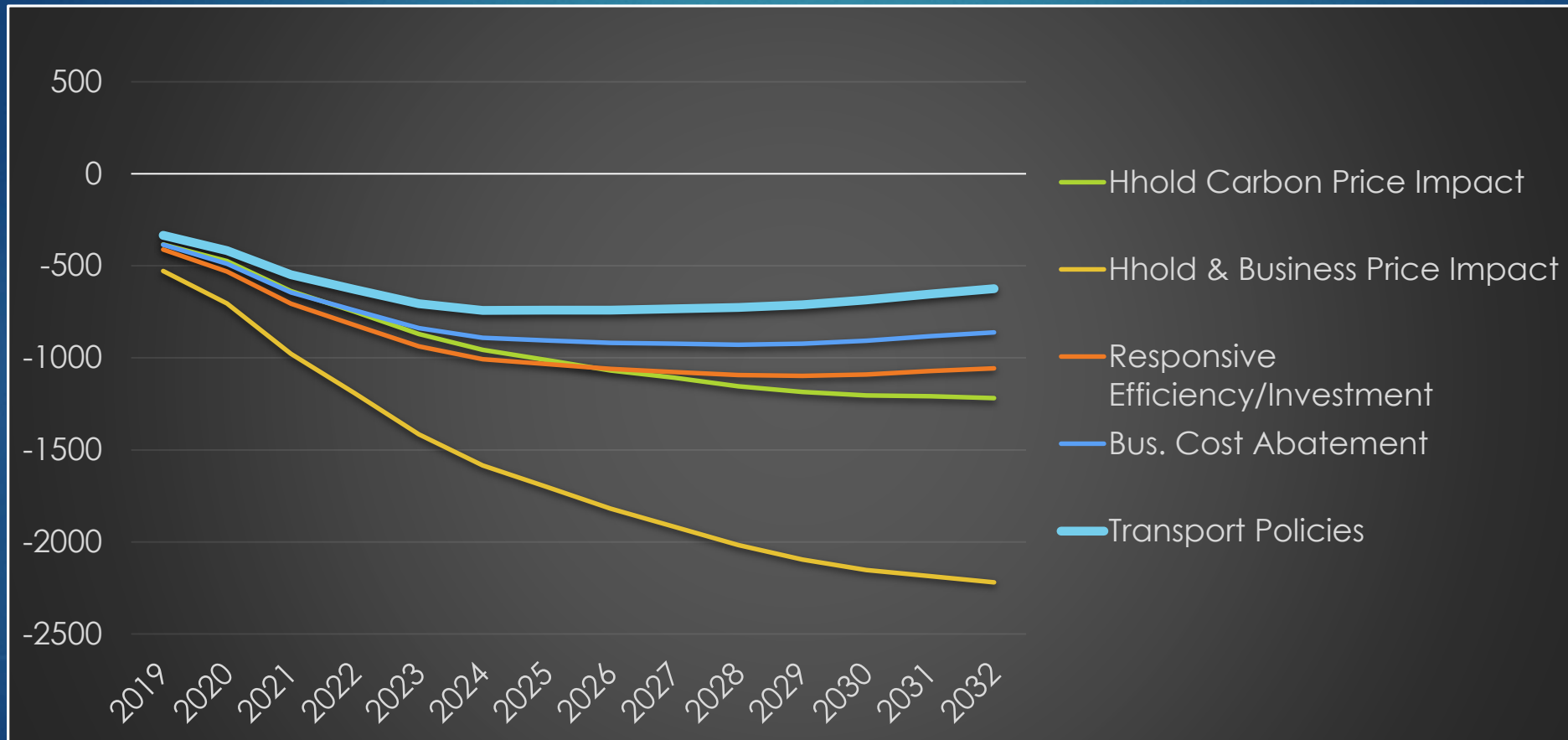
Understanding the Jobs Impact:

4. 5% to Lower Business Costs



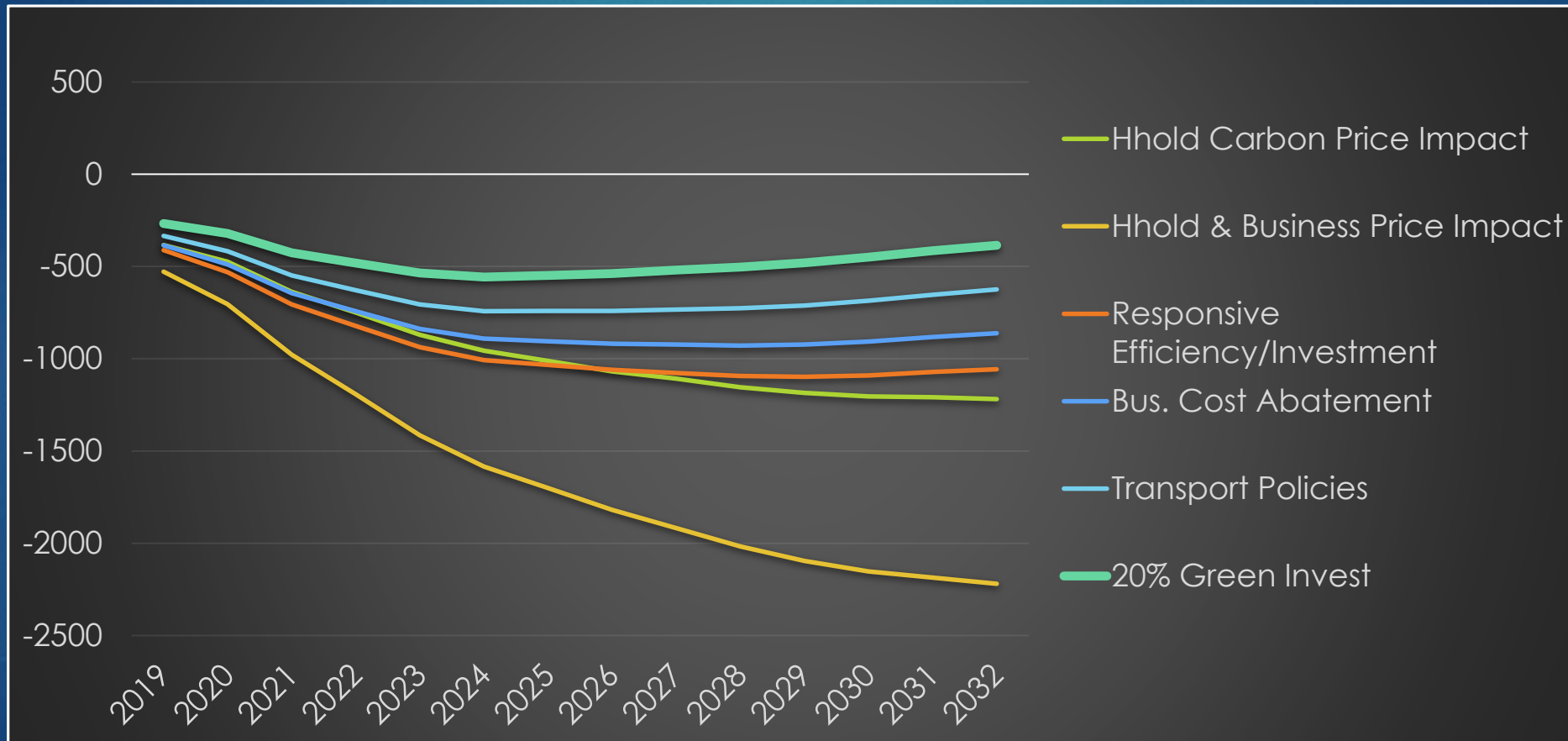
Understanding the Jobs Impact:

5. Adding Transport Component



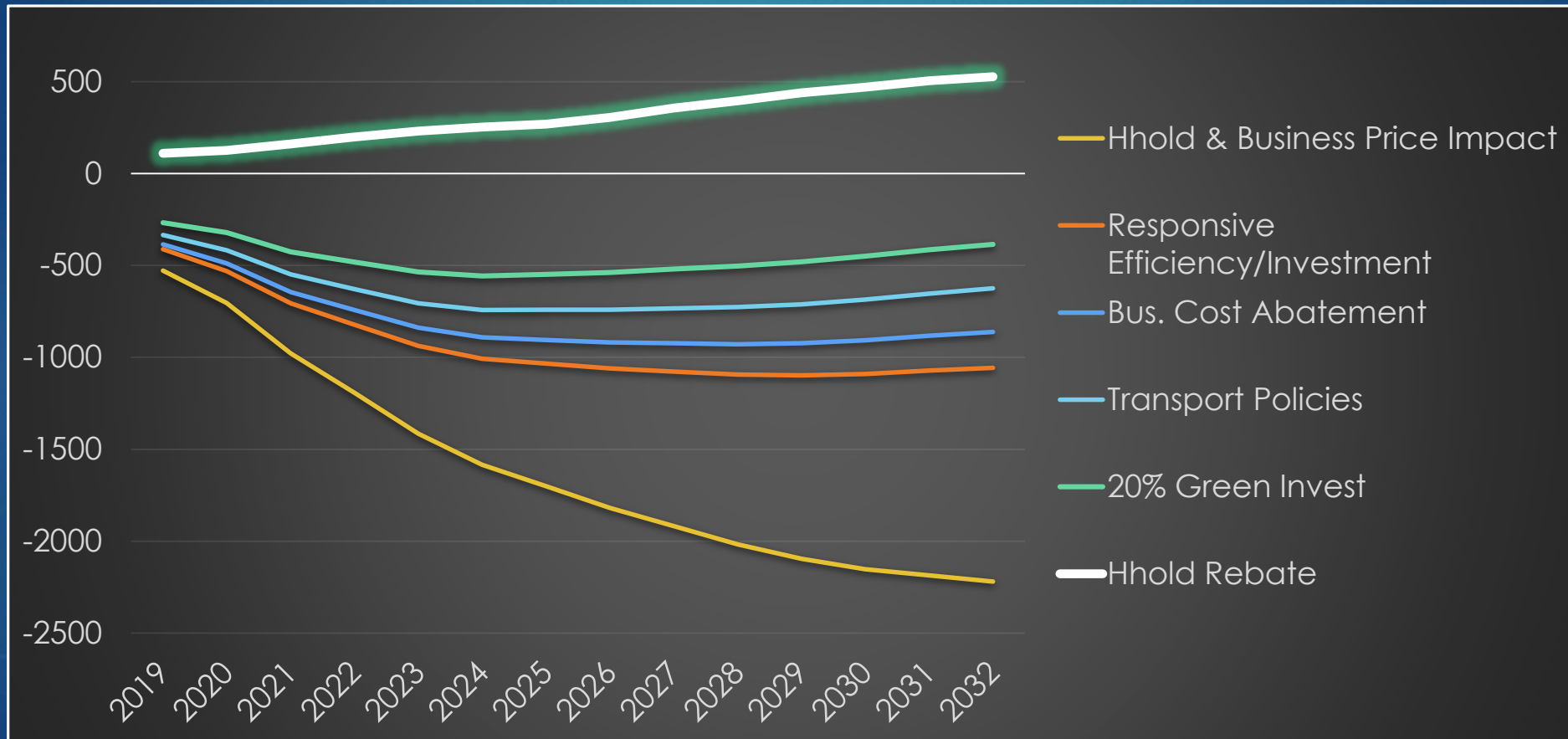
Understanding the Jobs Impact:

6. 20% as Green Investment

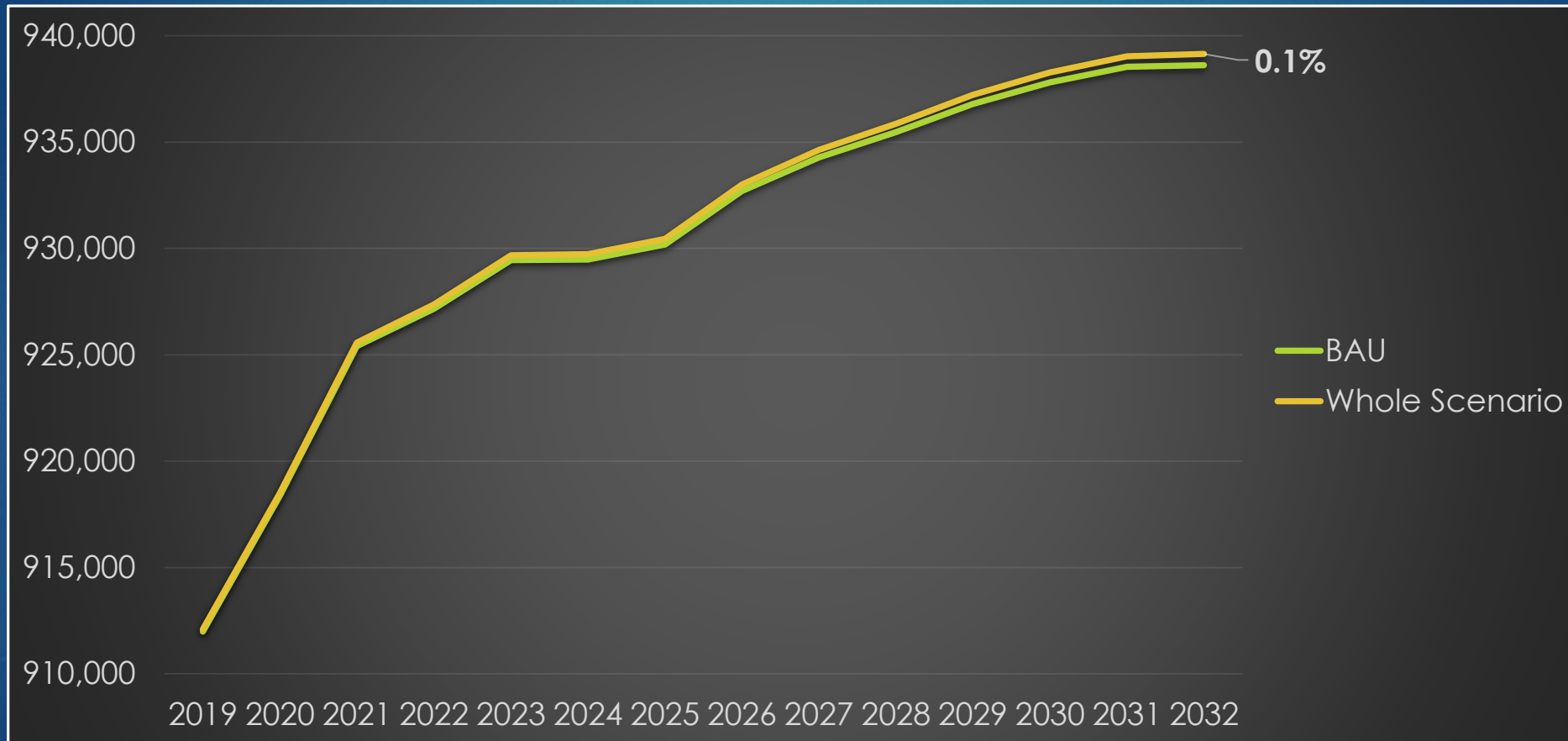


Understanding the Jobs Impact:

7. 75% Rebate to Residents



Understanding the Jobs Impact: Comparing to Baseline



How do Different Sectors Fare?

Looking Beneath the Net Effect

- ▶ Winners (8 key sectors):
 - ▶ Construction
 - ▶ Retail & Consumer-facing industries (Insider trading tip...)
- ▶ Losers (3 key sectors):
 - ▶ Utilities and Fuel Sales
 - ▶ Consultants, technical professional industries
- ▶ No Impact (55+ sectors):
 - ▶ Management, administration, education, tourism, service sectors, arts, finance, internet & cable....

Are these Projections Robust?

What if Assumptions Are Wrong?

- ▶ Responsiveness to Carbon Price
 - ▶ How Elastic?
 - ▶ How Quick a Response?
- ▶ All costs indeed passed to consumers?
- ▶ How much external capital comes in to save the day?
- ▶ Pace of Investment? On time or lagged?
- ▶ Carbon intensity of energy supply! Future clean-energy advances change impact of carbon tax
- ▶ Robust Dynamic: Balance of burdens with stimulus effects

Thank you very much!

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