RHODE ISLAND CENTER FOR FREEDOM & PROSPERITY

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The Effects of a TCI-Style Gas Tax on Motor Fuels in Rhode Island

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January 2021

Rhode Island Center for Freedom & Prosperity | **www.RIFreedom.org** | PO Box 10069 | Cranston, RI 02910

The Beacon Hill Institute conducts research and educational programs to provide timely, concise and readable analyses that help voters, policymakers and opinion leaders understand today's leading public policy issues.

BHI conducted this study on behalf of the Rhode Island Center for Freedom and Prosperity to better inform Rhode Islanders and public-policy decision-makers in the Ocean State about an issue of pressing importance.

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EXECUTIVE SUMMARY

As potentially one of her final acts as governor, Gina Raimondo has committed the State of Rhode Island to join with a handful of other states for a regional Transportation Climate Initiative (TCI), which seeks to impose new costs on the sale of motor fuel as a means of reducing emissions — in short, a gas tax. To help Rhode Islanders and their legislators make informed decisions about this initiative, the Rhode Island Center for Freedom and Prosperity worked with the Beacon Hill Institute (BHI) to estimate the cost of such a tax, using as our starting point legislation submitted as a bill in the General Assembly during a recent session.

Introduced by Senators Sosnowski, McCaffrey, Conley, Euer, and Goldin on March 21, 2019, the Economic and Climate Resilience Act (ECRA) seeks to impose a carbon tax on companies that sell fossil fuels in Rhode Island. Essentially the ECRA would establish a statewide carbon tax on all fossil fuel producing products (i.e., coal, oil, natural gas, propane, petroleum product, and biomass). The tax is designed to serve "as an incentive to reduce carbon (greenhouse gas) emissions from *lessened* use of carbon-based fuels by residents and businesses in Rhode Island."

The ECRA would levy a $15 tax per metric ton of CO2 that would be released by burning the fuel sold during the first year of implementation. In each subsequent fiscal year, the tax would increase by $5 until it reaches $50 per metric ton of CO2. After the $50 limit is hit, the tax would increase or decrease with inflation (U.S. BLS CPI) and remain fixed at $50 in real terms. The legislation is similar to other carbon taxes or cap and trade programs, such as the TCI.

BHI has undertaken the task of evaluating the costs and benefits to the state's economy if a tax such as the proposed carbon tax were imposed on on-road motor fuels (i.e., gasoline and diesel.) We report our results starting in 2022, to allow for the implementation of the legislation. Table 1 displays the results.

The proposed carbon tax would reduce greenhouse gas emissions produced by on-road gasoline and diesel by .04 million metric tons of carbon dioxide equivalent (MMTCO2E) in 2022 and by .08 MMTCO2E in 2026. The tax would generate $57 million in revenue in 2022. **The adverse economic effects of the carbon tax would reduce other tax revenue by $13 million in the first year, resulting in a net rise of $44 million in state tax revenue.** This figure can be considered the "total dynamic change" in tax revenue — that is, the change that takes into account the shrinkage in economic activity brought about by the tax. In 2026, the carbon tax would raise $132 million, other tax revenue would fall by $29 million, and the state would experience a net dynamic gain of $103 million in total tax revenue.

The tax would also, in the first year, reduce business investment by $299 million, disposable income by $216 million, and private employment by 905 jobs. The total cost incurred by the average Rhode Island household

Table 1: The Costs and Benefits of a Rhode Island Carbon Tax

	2022	2023	2024	2025	2026
Motor fuel carbon tax revenue ($, mil.)	57	76	95	114	132
Revenue changes other state taxes ($, mil.)	-13	-16	-19	-24	-29
Total dynamic revenue change ($, mil.)	44	60	76	90	103
Private employment (jobs)	-905	-1,154	-1,399	-1,630	-1,856
Investment ($, mil.)	-299	-460	-620	-720	-816
Disposable income, real ($, mil.)	-216	-281	-350	-421	-495
Total social cost of carbon tax ($, mil.)	-156	-202	-258	-321	-420
Total social benefits of carbon tax ($, mil.)	2	2	3	3	4
Net benefits (-cost) of carbon tax ($, mil.)	-154	-200	-255	-318	-416

would be $526 in 2022. As time passed and the carbon tax rose to $35, the tax would impose far more substantial economic harm. By 2026, investment would fall by $816 million, disposable income by $495 million, and private employment by 1,856 jobs. The cost imposed on the average Rhode Island household would total $1,205.

The total loss of output (measured in real GDP) due to the carbon tax would be $156 million in 2022 and rise to $420 million in 2026. The loss would be 0.3 percent of total Rhode Island real GDP in 2022 and would be 0.8 percent in 2026. This loss represents the total social cost of the carbon tax to Rhode Island. Of course, a carbon tax applied to all energy producing products would have far more severe economic consequences.

BHI used the Dynamic Integrated model of Climate and the Economy (DICE) 2017 model, crafted by William Norhaus of Yale University, to calculate the reduction in the social cost of greenhouse gases for each year of our analysis.[1] When we apply the proposed carbon tax to DICE, we find that the tax would confer benefits of *only* $2 million in 2022, increasing to $4 million in 2026.[2] As a result, the carbon tax would impose a net social cost on Rhode Island of $154 million in 2022, rising to $416 million in 2026.

The legislation would therefore impose severe costs upon the RI economy while the benefits from greenhouse gas reductions will be negligible. Moreover, Rhode Island citizens alone would bear the high costs, while global citizens share in the very minimal benefits.

INTRODUCTION

Introduced by Senators Sosnowski, McCaffrey, Conley, Euer, and Goldin on March 21, 2019, the Economic and Climate Resilience Act (ECRA) seeks to impose a carbon tax on companies who sell fossil fuels. Essentially, the ECRA would establish a statewide carbon tax on all fossil fuel producing products (i.e., coal, oil, natural gas, propane, petroleum product, and biomass). The carbon tax is designed **"as an incentive to reduce carbon (greenhouse gas) emissions from use of carbon-based fuels by residents and businesses in Rhode Island."**

Similar to other carbon tax schemes, the ECRA levies a $15 tax per metric ton of CO2 that would be released by burning fuel sold during the first year of implementation. In each subsequent fiscal year, the tax would increase by $5 up to $50 per metric ton of CO2. After the $50 limit is hit, the tax would increase or decrease with inflation (U.S. BLS Consumer Price Index) and remain fixed at $50 in real terms. **The act would take effect when Rhode Island, Massachusetts, and one or more additional states in RGGI implement a tax of at least $5 per metric ton of CO2 emissions.**[3]

The tax would apply to all petroleum products at their first point of sale for consumption or distribution within the state, except for petroleum products that will have their emissions sequestered and, thus, prevented from entering the atmosphere. Energy suppliers would pay the tax on behalf of their customers based on each kilowatt-hour of electricity used by each customer.[4]

The bill would also create a**n Economic and Climate Resilience Fund to distribute all funds collected** from the tax on petroleum product sales. According to the legislation, "The funds would be disbursed through dividends to all residents and businesses in the state as well as allocated to climate resilience, renewable energy, energy efficiency, and climate adaptation programs that benefit Rhode Islanders, including low-income residents and small businesses."[5] A nine-member oversight committee, with each member representing one of the following interests — small business, large business, labor, environmental justice, the scientific community, low-income citizens, historically marginalized groups, community development organizations, and the transportation sector — would convene to prepare annual reports and recommend changes to the tax and fund distribution.

As stipulated in the bill, 28 percent of the funds would go toward "climate resilience, renewable energy, energy efficiency, climate adaptation, and low carbon transition initiatives in Rhode Island." Approximately 30 percent would be used to provide direct dividends to employers in the state and 40 percent would be used to provide direct dividends to residents in the state. The remaining two percent would be set aside for administration costs.[6]

[1] The latest version of the DICE 2017 model is available online at http://nordhaus.econ.yale.edu/DICE2007.htm. We downloaded the model for the runs reported here on October 20, 2020.

[2] Note that these are social benefits, which to say they include benefits to the entire globe, not just Rhode Island. It counts, as a benefit, the harm avoided by stemming the rise in the seal level in both Singapore and Newport for example.

[3] RI S108 "Economic and Climate Resilience Act

[4] Ibid.

[5] Ibid.

[6] Ibid.

Rhode already faces high energy costs because of limited capacity for fuels such as natural gas. These high costs pose a threat to the state's long-term competitive advantage and its ability to sustain and secure advanced manufacturing capacity. The proposed carbon tax would exacerbate this problem.

Greenhouse gas emission reduction can confer economic benefits by mitigating the adverse effects of climate change. The potential benefits include avoiding crop and livestock losses, property damages from increased flood risk, and other impacts caused by a changing climate.[7] Any serious analysis must consider both the potential benefits and the costs of reducing greenhouse gas emissions. Moreover, such analysis must use reasonable estimates. As pointed out in an open letter opposing the Transportation Climate Initiative (TCI) cosigned by the Center:[8]

> ... the original [memorandum of understanding (MOU)] projected that it would require a 17 cent per gallon increase in order to achieve a 25% reduction in emissions by 2032. Most independent observers found this to be overly generous and one study conducted by Tufts University even found that a 25% reduction would require an increase of 38 cents per gallon to achieve the goal! Yet, the December MOU claims that a 26% reduction can now be achieved with a per gallon cost increase of between just 5 and 9 cents. Given the discrepancies between the independent studies, the initial MOU projections, and the current figures being put forward, states currently considering membership in the TCI compact should be extremely skeptical of numbers that seem designed to alleviate political concerns rather than educate them as to the realities of the program.

CARBON TAXES IN CANADA

In June 2007, the Canadian province of Quebec (Canada's second-largest province) introduced a tax on carbon emissions, the first in Canada.[9] The tax applies to 50 companies operating in Quebec, who use a "significant amount of hydrocarbons."[10] The tax rates differ by the following fuel types: 0.8 cents per liter of gasoline, 0.9 cents for diesel fuel, 0.96 cents for light heating oil, 0.5 cents for propane, and $8.00 per metric ton for coal.[11] The revenue generated by the tax is deposited into the Green Fund, which dispenses funds toward the reduction of greenhouse gas emissions and improvement of public transportation.[12]

The government of British Columbia implemented the first broad-based revenue-neutral carbon tax in North America, effective July 1, 2008.[13] Under the law, the tax applies to 70 percent of provincial greenhouse gas emissions stemming from the purchase and use of fossil fuels, such as gasoline, diesel, natural gas, heating fuel, propane, and coal.[14] The law imposed an initial tax of $10 per ton of carbon dioxide equivalent (CO2E) and increased the tax to $30 per ton in 2012.

The tax was hailed a success for its ability to reduce greenhouse gas emissions. However, the initial decline in greenhouse gas emissions cannot be attributed entirely to the carbon tax itself and likely resulted, in part, from the "Great Recession."[15] **According to a 2016 *Food & Water Watch* report, greenhouse gas emissions resulting from taxed sources increased 4.3 percent from 2009 to 2014, even though carbon tax rates and revenue also increased. Over the same period, the study found non-taxed sources to decrease by 2.1 percent.** British Columbia, in its *Budget 2017 Update,* announced that the carbon tax rate would increase by $5 per ton of CO2E in April 2018 and an additional $5 per year until 2021 when it reached $50 per ton.

British Columbia's annual revenue from the carbon tax was $306 million in fiscal year 2008–2009 and increased to $906 million in FY11–12. Despite the intended revenue-neutrality of British Columbia's carbon tax, the tax rebates have disproportionally benefitted businesses. The *Food & Water Watch* study reports that, as of FY14–15, British Columbia distributed 70 percent of tax rebates to businesses. The report affirmed, **"As the carbon tax rate and revenue increased, British Columbia has failed to ensure that the**

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[7] U.S. Environmental Protection Agency, Environmental Economics, Economics of Climate Change, https://www.epa.gov/environmental-economics/economics-climate-change.

[8] "Open Letter on the Transportation and Climate Initiative." January 18, 2021. http://rifreedom.org/wp-content/uploads/1-18-2021-TCI-Opposition-Letter.pdf

[9] CBC News, "Quebec to collect nation's 1st carbon tax" (2007, June 07). https://www.cbc.ca/news/canada/montreal/quebec-to-collect-nation-s-1st-carbon-tax-1.684888

[10] Klean Industries, "Market News" (2007, June 13). http://www.kleanindustries.com/s/environmental_market_industry_news.asp?ReportID=192052

[11] Ibid.

[12] Ibid.

[13] British Columbia's Carbon Tax (2019, April 15). https://www2.gov.bc.ca/gov/content/environment/climate-change/planning-and-action/carbon-tax British Columbia's Carbon Tax (2019, April 15). https://www2.gov.bc.ca/gov/content/environment/climate-change/planning-and-action/carbon-tax

[14] Ibid.

[15] *Food & Water Watch,* "British Columbia Carbon Tax" (2016, October 1). https://www.foodandwaterwatch.org/sites/default/files/rpt_1609_carbontax_web17011.pdf

tax rebates remain focused on individuals."[16] Revenue from the tax has been used for other governmental purposes over recent years, failing to meet the original goal of adopting a revenue-neutral policy and of reducing the tax burden on individual households and businesses.[17]

In Vancouver — a seaport city located in British Columbia — the carbon tax raises between $175 million and $200 million in annual revenue from vehicle fuel usage. However, it has **failed to achieve its targeted emission reduction goals.**[18] A 2015 Pacific Analytics Inc. study found that the carbon tax generated only relatively insignificant effects on vehicular fuel greenhouse gas emissions in Vancouver. The authors concluded that "the carbon tax at present reduces annual GHG emissions by just under 1%. To put that into context, to reduce vehicular emissions by the provincial goal of 30% would require a carbon tax over $2.00 per litre."[19] The British Columbia carbon tax is aimed at reducing fuel-related carbon emissions. Vancouver exemplifies the tax's inadequacy to reduce sector-specific greenhouse gas emissions (fuel, in this case).

Canada has since implemented a federal revenue-neutral carbon tax.[20] The *Greenhouse Gas Pollution Pricing Act* (S.C. 2018, c12, s 186) imposes carbon pricing at the federal level, effective June 21, 2018.[21] The act levies a tax of $20 per ton of greenhouse gas emissions in Canadian provinces that will increase by $10 per ton until reaching $50 in 2022.[22] The act applies to provinces whose current jurisdictional carbon pricing systems are insufficient in meeting federal requirements (carbon taxes less than the minimum requirement of $20 per ton of greenhouse gas emissions).[23]

[16] Ibid.

[17] Nicholas Institute for Environmental Policy Issues, "British Columbia's Revenue-Neutral Carbon Tax: A Review of the Latest 'Grand Experiment' in Environmental Policy" (2015, October 1). https://nicholasinstitute.duke.edu/environment/publications/british-columbia%E2%80%99s-revenue-neutral-carbon-tax-review-latest-%E2%80%9Cgrand-experiment%E2%80%9D

[18] Pacific Analytics Inc., "The Impacts of the Carbon Tax on Vehicle Fuels in Metro Vancouver" (2015, March 1). http://pacificanalytics.ca/sites/default/files/reports/The%20Impacts%20of%20the%20Carbon%20Tax%20on%20Vehicle%20Fuel%20Usage%20in%20Metro%20Vancouver.pdf

[19] Ibid.

[20] Greenhouse Gas Pollution Pricing Act, SC 2018, c 12, s 186, http://canlii.ca/t/53920

[21] Ibid.

[22] Ibid.

[23] Ibid.

REVENUE NEUTRAL CARBON TAX IN AUSTRALIA

In 2012, as part of the enactment of the Clean Energy Act of 2011, Australian Prime Minister Gillard's Labor Government implemented a broad-based carbon tax.[24] The partial revenue-neutral policy required over 50 percent of the annual carbon tax revenue to be recycled back to individual households through income tax breaks and rebates. It directed 40 percent to government programs assisting business sectors that shoulder the larger burden of tax incidence, and the remaining to "transitional" and governmental measures, such as government administrative costs.[25] The tax started at "AUD [Australian dollars] 23.00 per metric ton CO2E in FY 2012–2013, rose to AUD 24.15 in FY 2013–2014 and AUD 25.40 in FY 2014–2015 before a scheduled gradual transition to a market-based floating carbon price in 2015".[26] The top 350 polluters — businesses whose CO2 emissions exceed 25,000 per ton and represent 60 percent of Australia's total greenhouse gas pollution — faced the tax, whereas in British Columbia the tax is applied to all end users.[27]

Greenhouse gas emissions fell by 1.4 percent in the second year of the Clean Energy Act of 2011. However, greenhouse gas emissions had been falling in Australia from the peak in 2008 as a result of "winding down of parts of Australia's manufacturing base and energy efficiency initiatives."[28] Australia's Department of the Environment reported that the tax increased the cost of electricity for the average family by 10 percent, increased the average cost of living of households by AUD 9.90 per week and the Consumer Price Index (CPI) by 0.7 percent.[29] **In July 2014, Prime Minister Abbott's government repealed the Clean Energy Act of 2011, thereby removing the Australian federal carbon tax.**[30]

[24] Centre for Public Impact, "Case Study: The Carbon Tax in Australia" (2017, May 5). https://www.centreforpublicimpact.org/case-study/carbon-tax-australia

[25] Ibid.

[26] Ibid.

[27] Ibid.

[28] La Paz Group, "Australian Emissions Drop with New Carbon Tax" (2014, December 27). https://lapazgroup.net/2014/12/27/australian-emissions-drop-with-new-carbon-tax/

[29] Shultz-Stephonson Task Force on Energy Policy, "Revenue-Neutral Carbon Taxes in the Real World" (2012, December 21). https://www.hoover.org/sites/default/files/research/docs/117649691-revenue-neutral-carbon-taxes-in-the-real-world-insights-from-british-columbia-and-australia.pdf

[30] Ibid.

HISTORY OF CARBON TAXES IN THE U.S.

In 1993, President Clinton proposed a budget including a tax on British Thermal Units (BTU).[31] Under the proposed budget, all energy sources such as coal, natural gas, liquefied petroleum gases, gasoline, nuclear-generated electricity, hydro-electricity, and imported electricity were subject to a base tax of 25.7 cents per million BTU.[32] The budget called for a tax of 34.2 cents per million BTU on refined petroleum products, in addition to the base tax of 25.7 cents per million BTU.[33] The proposed BTU tax received significant backlash, and though the law initially passed in the House of Representatives, it was overwhelmingly rejected in the Senate.[34]

On March 20, 2015, Initiative Measure No. 732 (I-732) introducing a statewide carbon tax was placed on the ballot in Washington state.[35] Under I-732, the policy would levy a $15 per ton tax on CO2E in the first year, increasing to $25 per ton in the second year and subsequently increasing 3.5 percent per year, while adjusting for inflation.[36] The measure was designed to be revenue-neutral, through an annual rebate of up to $1,500 to low-income households, through the repeal of the business and occupation tax for manufacturers, and through a reduction in the state sales tax by one percentage point.[37] The initiative failed to pass on the 2016 ballot, as 59.3 percent of voters opposed the tax. Again in 2018, Initiative Measure No. 1631 (I-1631), an act nearly approximating I-732's carbon tax was opposed by 56.3 percent of voters.[38]

RHODE ISLAND'S CURRENT CLIMATE POLICIES

In January 2009, Rhode Island entered into the Regional Greenhouse Gas Initiative (RGGI).[39] RGGI is a carbon dioxide cap-and-trade agreement between nine Northeastern states.[40] RGGI, Inc. is the entity responsible for managing the goals of the law. RGGI imposes a limit on the amount of CO2 emitted by all of the regulated electric power plants in the region. Each state agrees to issue a fixed amount of allowances corresponding to this limit, proportional to the number of power plants in the state.

As members of RGGI, Rode Island and the participating states agreed to eliminate 10 percent of power sector greenhouse gas emissions by 2018.

In 2014, the Rhode Island legislature passed the Resilient Rhode Island Act of 2014. This legislation established the Executive Climate Change Coordinating Council (EC4), which is tasked with "developing and tracking the implementation of a plan to achieve greenhouse gas emissions reductions below 1990 levels of: 10 percent by 2020; 45 percent by 2035; and 80 percent by 2050."[41] These benchmarks were also set by the legislation. The act also created an advisory board and a science and technical advisory board to assist the EC4 with creating, implementing, and tracking the emissions reductions plans.

The EC4 has developed and released several plans since its creation in 2014. These plans include the Rhode Island Greenhouse Gas Emissions Reduction Plan (2016), the Deeper Decarbonization in the Ocean State plan (2019), the Economic and Climate Resilience Act (2019), and the Heating Sector Transformation in Rhode Island Plan (2020).[42] Each of these plans aims to achieve the carbon emissions reduction targets set out in the 2014 legislation through different methods.

As of October 2020, the EC4 is in the process of developing additional plans to ensure Rhode Island meets its aggressive goal of reducing greenhouse gas emissions by 80 percent by 2050. The State of Rhode Island is taking dramatic government action to reduce greenhouse gas measures. If the EC4 and leaders find that more must be taken to meet the set reductions target, new plans will likely be approved and implemented.

[31] Carbon Tax Center, "History" (n.d.). https://www.carbontax.org/history
[32] Ibid.
[33] Ibid.
[34] Ibid.
[35] Initiative Measure No. 732, https://www.sos.wa.gov/_assets/elections/initiatives/finaltext_779.pdf.
[36] Ibid.
[37] Tax Foundation, "Washington Voters to Consider a Carbon Tax—Again" (2018, September 13). https://taxfoundation.org/washington-consider-carbon-tax
[38] Ibid.
[39] See RGGI Inc., https://www.rggi.org/
[40] Ibid.
[41] State of Rhode Island Office of Energy Resources (Accessed October 29, 2020). http://www.energy.ri.gov/policies-programs/ri-energy-laws/resilient-rhode-island-act-2014.php
[42] Rhode Island Carbon Pricing Study (May 19, 2020). http://www.energy.ri.gov/documents/archived-reports/RI%20Carbon%20Pricing%20Study%20Update%20-%20Cadmus%20Webinar%20Presentation%20May%2019%202020.pdf

RHODE ISLAND MOTOR FUEL CARBON EMISSIONS

A Rhode Island carbon tax would be levied on the production of goods and services that produce greenhouse gas emissions. The Rhode Island economy produces greenhouse gas emissions when fossil fuels are burned in the production process. As a result, **the transportation, electricity generation, residential, commercial heating, and industrial sectors** produce the vast majority of the greenhouse gas emissions in Rhode Island. In our analysis, we observe the effects of a carbon tax on emissions produced from on-road gasoline and diesel fuel. Table 2 displays Rhode Island greenhouse gas emissions from on-road gasoline and diesel fuel from selected years from 2014 through 2018.[43] In Table 2, we calculate gross emissions by adding the total emissions from both motor fuels.

The data in Table 2 show a trend. While emissions from motor fuels shown in the table have been trending slightly upwards, they are down over 8 percent from peak levels in 2004. The data in Table 2 establishes the baseline GHG emissions from on-road gasoline and diesel on which apply our analysis of the Rhode Island carbon tax.

THE FISCAL AND ECONOMIC EFFECTS OF AN RI CARBON TAX

A proposed Rhode Island carbon tax would impose a $15 per metric ton (MT) of CO2E beginning in the first year of implementation and increase the tax by $5 per year until it reaches a cap of $50 per MT of CO2E. Thereafter, the bill calls for the tax to increase or decrease with inflation (U.S. BLS CPI) and remain fixed at $50 in real terms. In our analysis, we consider the period 2022 to 2026, to the allow for the implementation of the tax. (For details, see the Appendix.) Our analysis captures the initial imposition of a carbon tax of $20 per MTCO2E in 2022, then rising $5 a year until it reaches $35 per MTCO2E in 2026 (the last year of our analysis).

We project Rhode Island emissions that are produced from on road motor fuels through 2026 using the compound annual growth rate (CAGR) from 2008 to 2018. Table 3 contains the results.

We project that baseline emissions will grow to 3.91 MMTCO2E by 2022 and fall to 3.78 MMTCO2E by 2026. If we applied the proposed carbon tax rates to the total emissions for each year, we would arrive at a static estimate of the tax revenue generated by the carbon tax each year. However, the law of demand states that if the price of a product increases, the quantity demanded (or consumed), will decrease, which is the point of the carbon tax.

We account for this by calculating the percentage increase in the price of both on-road gasoline and diesel, calculating the responsiveness of each product to price, and applying the result to the emissions. This allows us to calculate the reduction in emissions resulting from the increase in the price of each product due to the carbon tax. We then apply the carbon tax rate to the emissions from both products to calculate the total carbon tax revenue for each year. (The Appendix contains the details of these calculations.)

The Rhode Island carbon tax would apply to energy produced by burning fossil fuels. However, this analysis focuses on the emissions produced from on-road motor fuels. Energy products — in specific, on-road gasoline and diesel — have very low responses, or elasticities, to prices changes. As a result, the proposed carbon tax would have a limited impact on emissions reductions in Rhode Island. Table 4 displays the results.

[43] Mobile Combustion Source Summary, Environmental Protection Agency, https://www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool

Table 2: Rhode Island GHG Emissions for Selected Years by On-Road Motor Fuel (MMTCO2E)

	2004	2014	2015	2016	2017	2018
Gasoline	3.21	2.54	2.59	2.71	2.71	2.73
Diesel	0.96	1.14	1.14	1.04	1.04	1.09
Gross emissions	4.17	3.68	3.63	3.75	3.75	3.82

Note: MMTCO2E = million metric tons of CO2 equivalent.

Table 3: Rhode Island Baseline GHG Emissions Projections by On-Road Motor Fuel (MMTCO2E)

	2022	2023	2024	2025	2026
Gasoline	2.79	2.66	2.65	2.64	2.63
Diesel	1.12	1.13	1.13	1.14	1.15
Gross emissions	3.91	3.79	3.78	3.78	3.78

Note: MMTCO2E = million metric tons of CO2 equivalent.

In 2022, the proposed carbon tax would reduce emissions from gasoline and diesel in Rhode Island by 0.04 MMT, or 0.9 percent. However, as the proposed carbon tax increases, the emissions in Rhode Island would decrease by 0.08 MMT in 2026, or by 2 percent. We apply the carbon tax to the lower emissions to estimate the revenue that the carbon tax would generate. We estimate that the proposed carbon tax would generate $57 million in tax revenue in 2022 and increase to $132 million in 2026.

To estimate the economic effects of the proposed carbon tax, BHI turns to its Computable General Equilibrium (CGE) model. The purpose of the BHI model, called Rhode Island State Tax Analysis Modeling Program (RI-STAMP), is to identify the economic effects of tax changes on a state's economy.[44] Using the STAMP model, **we find that the imposition of a carbon tax on motor fuels would produce a less-competitive business environment, resulting in a slower-growing economy that produces lower employment, disposable income, and investment. While the revenue generated under a carbon tax could be used to create new jobs, any new jobs would be created at the expense of the private sector.** Typically, taxes such as a carbon tax or gasoline tax create an "oppurtunity cost." For example, construction jobs would be directed toward projects such as building an electric vehicle charging station rather than the expansion or renovation of a building.

BHI modified its RI-STAMP model to accommodate the proposed carbon tax on motor fuels. First, we introduced the carbon tax and Economic and Climate Resilience Fund. Second, we allocated the carbon tax to STAMP's 27 industrial sectors and allocated the Economic and Climate Resilience Fund's revenue to industries, households, and governments based on employment or population of each sector relative to the total. (The Appendix contains the details of this procedure.)

Table 4 shows that the proposed carbon tax would reduce investment by $299 million, disposable income by $216 million, and private employment by 905 jobs in 2022. The total cost incurred by the average Rhode Island household would be $526 in 2022. The total cost of the carbon tax in real GDP would be $156 million while raising $57 in carbon tax revenue in 2022.

However, the adverse economic effects of the proposed carbon tax would reduce other tax revenue, such as personal and corporate income taxes. Revenue from these sources

[44] For a description of the model see www.beaconhill.org.

Table 4: Fiscal & Economic Cost of a Carbon Tax on On-Road Motor Fuels

	2022	2023	2024	2025	2026
Dynamic carbon tax revenue ($, mil.)	57	76	95	114	132
Revenue changes other state taxes ($, mil.)	-13	-16	-19	-24	-29
Total Dynamic Revenue Change ($, mil.)	44	60	76	90	103
Private Employment (jobs)	-905	-1,154	-1,399	-1,630	-1,856
Investment ($, mil.)	-299	-460	-620	-720	-816
Disposable Income, real ($, mil.)	-216	-281	-350	-421	-495
Total social cost of carbon tax ($, mil.)	-156	-202	-258	-321	-420

would decrease by $13 million in 2022, resulting in a net increase in revenue of only $44 million in 2022.

As time passes and the carbon tax increases to $35, the economic effects of the carbon tax would become more harmful. By 2026, investment would fall by $816 million, disposable income by $495 million, and private employment by 1,856 jobs. The cost imposed on the average Rhode Island household would total $1,205. The total cost of the carbon tax in real GDP would be $420 million in 2026.

In 2026, the carbon tax, when applied to on-road emssions from gasoline and diesel, would raise $132 million in tax revenue. Other tax revenue would fall by $29 million. In total, the state would gain $103 million in tax revenue.

THE COSTS AND BENEFITS OF THE PROPOSED CARBON TAX

A Rhode Island carbon tax would also confer benefits to the global community in the form of reduced greenhouse gas emissions. However, the Rhode Island emissions subject to the proposed carbon tax are but a small fraction of global emissions. Nonetheless, the reduction in Rhode Island greenhouse gas emissions would provide an economic benefit against the baseline case of no emissions reduction.

To analyze the economic and global temperature effects of greenhouse gas emission reduction policies, BHI utilized the 2017 Dynamic Integrated model of Climate and the Economy (DICE).[45] As the name of the model indicates, the DICE 2017 model integrates an economic model with a climate model. A thorough description of the DICE 2017 model, as well as results related to different policy guidelines, like the Kyoto Protocol or the Stern Review, is available in Nordhaus (2008).[46] We use the DICE 2017 model to calculate the optimal social cost of carbon and, in turn, the social benefits of carbon reductions resulting from the proposed carbon tax if applied to on-road gasoline and diesel in Rhode Island.

BHI used the DICE model to calculate the optimal social cost of carbon for each year of our analysis. We applied the social cost of carbon from the DICE model to our estimate of the reduction in CO2E from on-road gasoline and diesel due to the proposed carbon tax. Table 5 displays the results.

BHI projects that the carbon tax would reduce emissions by 0.04 MMT of CO2E by 2022 and 0.08 MMT of CO2E in 2026. The DICE model projects the social cost of carbon at $41.24 per metric ton of CO2E in 2022, increasing to $47.56 per metric ton of CO2E in 2026. As a result, the proposed carbon tax, when applied to emissions from on-road motor fuels, would provide $2 million in social benefits in 2022 and $4 million in social benefit in 2026.

When comparing the costs of the carbon tax, with the benefits, we find that the carbon tax would produce a net cost of $154 million in 2022, rising to $416 million in 2026.

CONCLUSION

In the past, Rhode Island lawmakers have been aggressive in enacting policies to combat climate change. Now lawmakers are considering a flurry of new policies to reduce green-

[45] The latest version of the DICE 2017 model is available online at http://nordhaus.econ.yale.edu/DICE2007.htm. We downloaded the model for the runs reported here on April 1, 2019.

[46] Nordhaus, William, A Question of Balance: Weighing the Options on Global Warming Policies, 1. ed., New Haven, CT: Yale University Press, May 2008.

Table 5: The Benefits and Costs to Society of a Carbon Tax on On-Road Motor Fuels in Rhode Island

	2022	2023	2024	2025	2026
Carbon tax emissions change (MMTCO2E)	0.04	0.05	0.06	0.07	0.08
Avoided cost of carbon per MTCO2E	41.24	42.74	44.28	45.89	47.56
Total social benefits of CO2E reduction ($, mil.)	2	2	3	3	4
Total social cost of carbon tax ($, mil.)	-156	-202	-258	-321	-420
Net benefits (-cost) of carbon tax ($, mil.)	-154	-200	-255	-318	-416

house gas emissions, including both a statewide carbon tax and also the state's participation in TCI.

Lawmakers, including Senators Sosnowski, McCaffrey, Conley, Euer, and Goldin, filed bills to enact a carbon tax in Rhode Island. While carbon taxes are a tool favored by economists to address climate change, they are not without costs and limits.

Any proposed carbon tax in Rhode Island would have negligible effects on the trajectory of global emissions. Currently, total Rhode Island greenhouse gas emissions subject to the proposed carbon taxes stand at 11.02 MMTCO2E, compared to global emissions of 49.4 gigatons of CO2E, or 0.02 percent. For example, the reductions in 2026 of 0.08 MMTCO2E would only reduce global emissions by 0.00016 percent (although this number will likely be smaller given the upward trend in global GHG emissions.)

Even this analysis may understate the harm. In a December brief by the Caesar Rodney Institute's Center for Energy & Environment, Director David T. Stevenson points out that, despite more-fuel-efficient vehicles, Rhode Island's CO2 emissions increased 4.3% from 2017 to 2018, as a result of economic and population expansion.[47] With consideration of increasing demand, "setting a goal to achieve reductions therefore "means even in the first year of allowance auctions there will be a significant shortfall of available allowances, and that means high allowance costs, fuel shortages, and possibly even lines at gas stations."

As a result of the poorly considered spate of legislation and regulation purporting to help the environment, the Rhode Island economy would suffer. The legislature's carbon tax would cost thousands of jobs, over one-billion dollars in investment and hundreds of millions of dollars in lower incomes and real GDP by 2026, all with little benefit to the planet and would only compound the harm of the regional TCI as well as any laws or policies implemented nationally.

APPENDIX

BHI used its multisector Rhode Island STAMP model to estimate the economic cost of a proposed carbon tax, specifically on both on-road gasoline and diesel, on the state economy. The existing model provided fields in which we could enter changes in the state income, corporate, and sales tax. We needed to modify the model by (1) adding the carbon tax, (2) accounting for the Economic and Climate Resilience Fund, and (3) allocating the carbon tax revenue to the 27 industry sectors, 13 government sectors, and seven household sectors. We allocated the revenue based on the number of employees in the industry and government sectors and population in the household sectors relative to the sum of all workers and population in all three sectors. As a result, the industry sectors received 40 percent of the revenue, the government sectors received 10 percent, and households received 50 percent.

BHI next estimated the reduction in greenhouse gas emission that would result from the imposition of the carbon tax on motor fuels. To accomplish this, BHI (1) estimated the price elasticities of demand for the different on-road motor fuels, (2) obtained or calculated the price of the on-road motor fuels for the time period, and (3) estimated the price change for each on-road motor fuels that would result from the carbon tax.

BHI utilized data on on-road gasoline and diesel and consumption from the U.S. Department of Energy's Energy Information Administration (EIA) for New England to calculate price elasticities of demand for gasoline and diesel.[48] We calculated price elasticities of demand for each type of motor fuel. We used a log, log model to calculate the elasticities using the following equation:

$$\log(\text{consumption}) = \beta + \log(\text{price}) + \varepsilon$$

where β is the intercept and ε is the error term. Table 6 displays the results.

Table 6: Elasticities of Demand for Gasoline and Diesel in Rhode Island

	Elasticity
Diesel	-0.63
Gasoline	-0.20

We use gasoline diesel price data from the Rhode Island Office of Energy Resources.[49] We use the five-year average of gasoline and diesel prices as our estimate for future prices.

[47] David T. Stevenson. "RE: TCI emission assumptions wrong." *Inside Energy.* 12/24/20.

[48] U.S. Department of Energy, Energy Information Administration, Rhode Island State Profile and Energy Estimates, More Data & Analysis in Rhode Island by Source, (accessed October 2020), https://www.eia.gov/state/search/#?1=79&2=220&r=false.

[49] State of Rhode Island Office of Energy Resources, http://www.energy.ri.gov/energy-prices/

The EIA provides carbon dioxide emissions coefficients by fuel per unit of volume and per million BTU. We converted the emissions coefficients into metric tons for both on-road gasoline and diesel to match the measure used in the EIA price data. For example, the EIA data estimates that a gallon of gasoline produces 8.89 kilograms of CO2. We converted the 8.89 kilograms into metric tons by dividing 8.89 by 1,000 to get the tons of CO2 contained in a gallon of gasoline, or 0.00889 metric tons per gallon.

We calculated the price change that would result from the carbon tax by multiplying the carbon tax rate by the CO2 emissions coefficient. For example, we multiplied the carbon tax of $15 for 2022 by the coefficient for gasoline (0.009) to arrive at a price increase of $0.135 per gallon. We then divided the price increase into our estimated price of the fossil fuel for the corresponding year to get the percentage change in price. For gasoline, we divided $0.135 by $2.38 to get a 5.61 percent increase in the price of gasoline due to the carbon tax for 2022. We repeat this process for diesel fuel.

The EIA provides data on emissions by fossil fuel and sector. We used this data to estimate the reduction in greenhouse gas emissions for on-road gasoline and diesel under the carbon tax. We assumed that the emissions reduction would fall in line with the reduction in consumption. Thus, we multiplied the elasticity by the percentage change in price under the carbon tax, and then multiplied that result by the pre-carbon tax emissions to get our estimate of the reduction in emissions due to the carbon tax.[50] For example, we multiplied the increase in gasoline price (5.61%) by the elasticity for gasoline (-0.197) and the emissions from on-road gasoline in Rhode Island (2.68 MMT of CO2E) to estimate that the carbon tax of $15 per MT in 2022 would reduce emissions by 0.0296 MMTCO2E. We repeat the process for on-road diesel fuel.

Next, we calculated the revenue that would be generated by the proposed carbon tax on motor fuels. We subtracted our estimate of the emissions reduction from the total emissions and multiplied the result by the applicable carbon tax for that year. We used the resulting revenue figures as inputs to the STAMP model.

[50] U.S. Department of Energy, Energy Information Administration, Environment, State Carbon Dioxide Emissions Data, (Accessed October 2020), https://www.eia.gov/environment/emissions/state/.

RHODE ISLAND CENTER FOR
FREEDOM & PROSPERITY

About the Center

The Rhode Island Center for Freedom and Prosperity, a nonpartisan, 501(c)(3) nonprofit public policy think tank, is the state's leading free-enterprise research and advocacy organization. The Center works to make a profound, positive impact on the lives of every family and business in the state through the vigorous exchange of market-based ideas and reform solutions aimed at restoring economic competitiveness, educational opportunities, and ultimately hope for a more prosperous future.

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