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The Road to Electrification
Navigating the Fiscal Impacts of Rhode Island's Electric Vehicle Transition

Ibrahim Tahir, Katharine Ryan,
Shahzeb Naeem, Adil Ashraf Mayo

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INTRODUCTIONS

Ibrahim Tahir

M.P.A.
C.A.S. Sustainable Enterprise
ietahir@syr.edu

Katharine Ryan

M.P.A.
ktryan@syr.edu

Adil Ashraf Mayo

M.P.A.
aamayo@syr.edu

Shahzeb Naeem

M.P.A.
shnaeem@syr.edu

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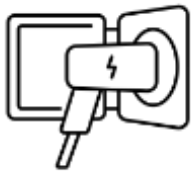
THE BOTTOM-LINE UP FRONT

Why do we care about EVs

We are currently in a transition phase where we're moving away from ICE vehicles and towards the electrification of our country's vehicles from our nation's four door sedans to our 18-wheel trucks. In Q1 of 2023 320,000 electric vehicles were sold which is 60% more electric vehicles were sold as compared to Q1 2022. It's expected that by the end of fiscal year 23 1.5 million electric vehicles will be sold.

How will Rhode Island address the revenue gap resulting from electric vehicle adoption

Rhode Island depends on a fuel (highest in the nation) and lottery tax to fund road maintenance and infrastructure. With the increase in electric vehicles, how will this impact fuel and lottery revenue.



Expanding EV Charging Stations

With the transition to electric vehicles, the demand for charging stations will continue to rise. A timely and organized effort to implement charging stations across Rhode Island will be essential to supporting the projected demand.

Best Practices

California, Oregon, Utah, and Washington are early leaders in EV regulatory and incentive policies. We look to the successes and lessons learned from these states to base our policy recommendations for the State of Rhode Island.

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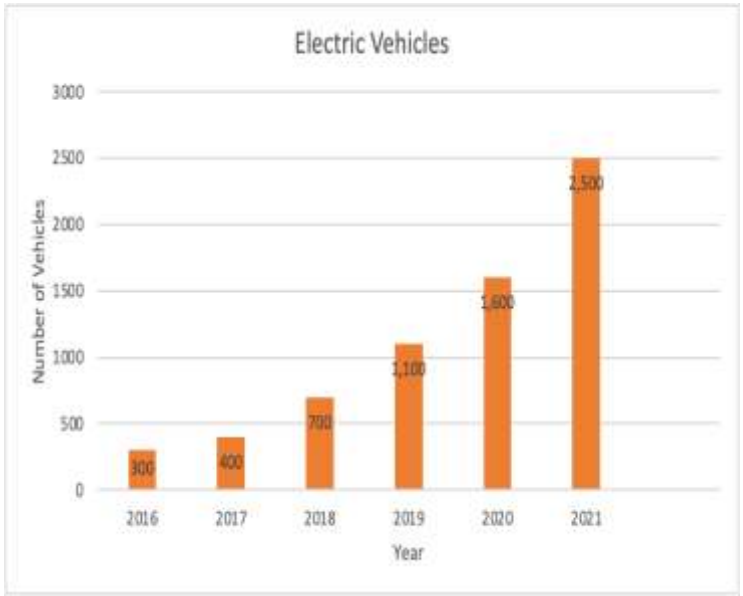
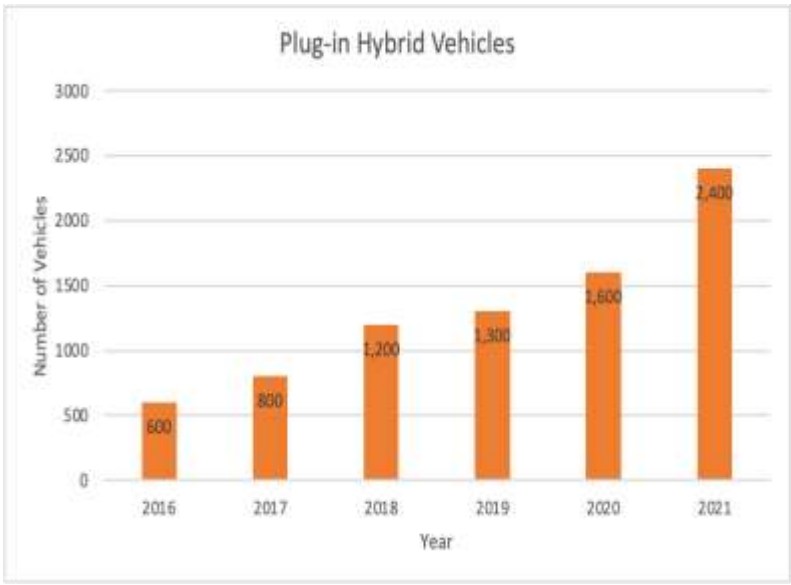
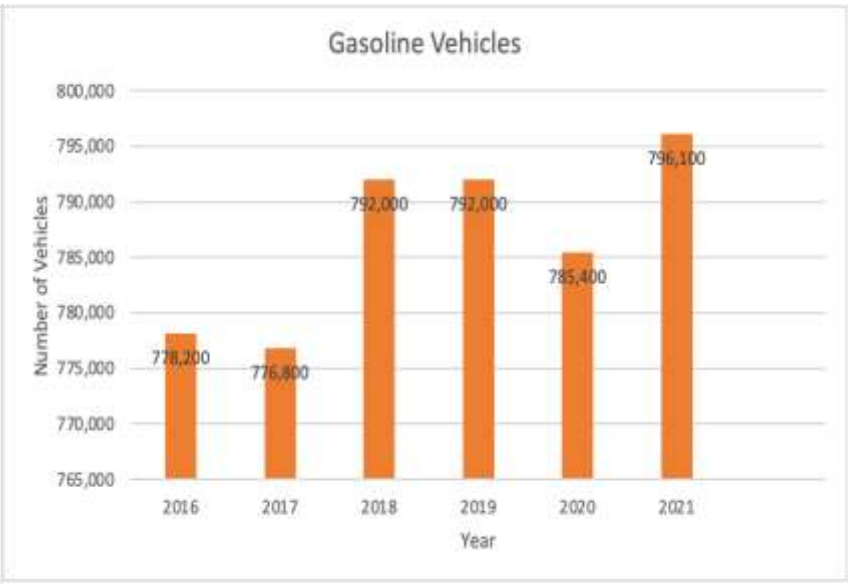
BY THE NUMBERS

Figure 1. Registered Vehicle Statistics

As of December 2021, Rhode Island was ranked among the top ten states in the nation for charging ports per capita







In 2021, the total number of EVs was 2,500

In 2021, the total number of plug-in hybrids was 2,400

In 2021, 796,100 or 91% of vehicles registered in Rhode Island ran on gasoline

Source: Alternative Fuels Data Center: TransAtlas (energy.gov) (US Department of Energy)

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METHODOLOGY

What are the current issues?

- 9 out of 10 vehicles registered in the state of Rhode Island run on petroleum
- What will the costs of road infrastructure be due to the increase in weight in electric vehicles

What priorities are we focusing on in this presentation

- Examining the impact on costs and expenditures related to the electric vehicle transition in the state
- Proposing practices that Rhode Island should adopt in comparison to other states

What is our methodology

- Primary interviews with Rhode Island departments and secondary research online
- Spreadsheet model using Excel formula and @Risk
- Visualizations and analyses on the implications of our numbers

Source: Wachs, M., King, H., & Agrawal, A. W. (2019). The Impact of ZEV adoption on California transportation revenue.

INFLATION REDUCTION ACT AND STATE INCENTIVES

Figure 2. Summary of the Inflation Reduction Act and Rhode Island State Incentives

Federal

Commercial Electric Vehicle Tax Credit Provided As Part of the Inflation Reduction Act

In 2022, President Joe Biden signed the Inflation Reduction Act which provided a one-time credit of up to $7,500 for certain new electric vehicles and plug-in hybrids. Additionally, pre-owned electric vehicles and plug-in hybrids are eligible for a credit of up to $4,500

State

The State of Rhode Island provides a one-time tax credit through the Drive^{EV} Program

In June 2022, Governor McKee launched the Drive^{EV} program which offers incentives for the purchase or leasing of new electric vehicles. Under the program, buyers of new battery electric vehicles can receive up to $2,500, while those purchasing new plug-in hybrid electric vehicles can receive up to $1,500. The program also provides rebates of up to $1,500 for the purchase or lease of used battery electric vehicles, and $750 for used plug-in hybrids.

Implications

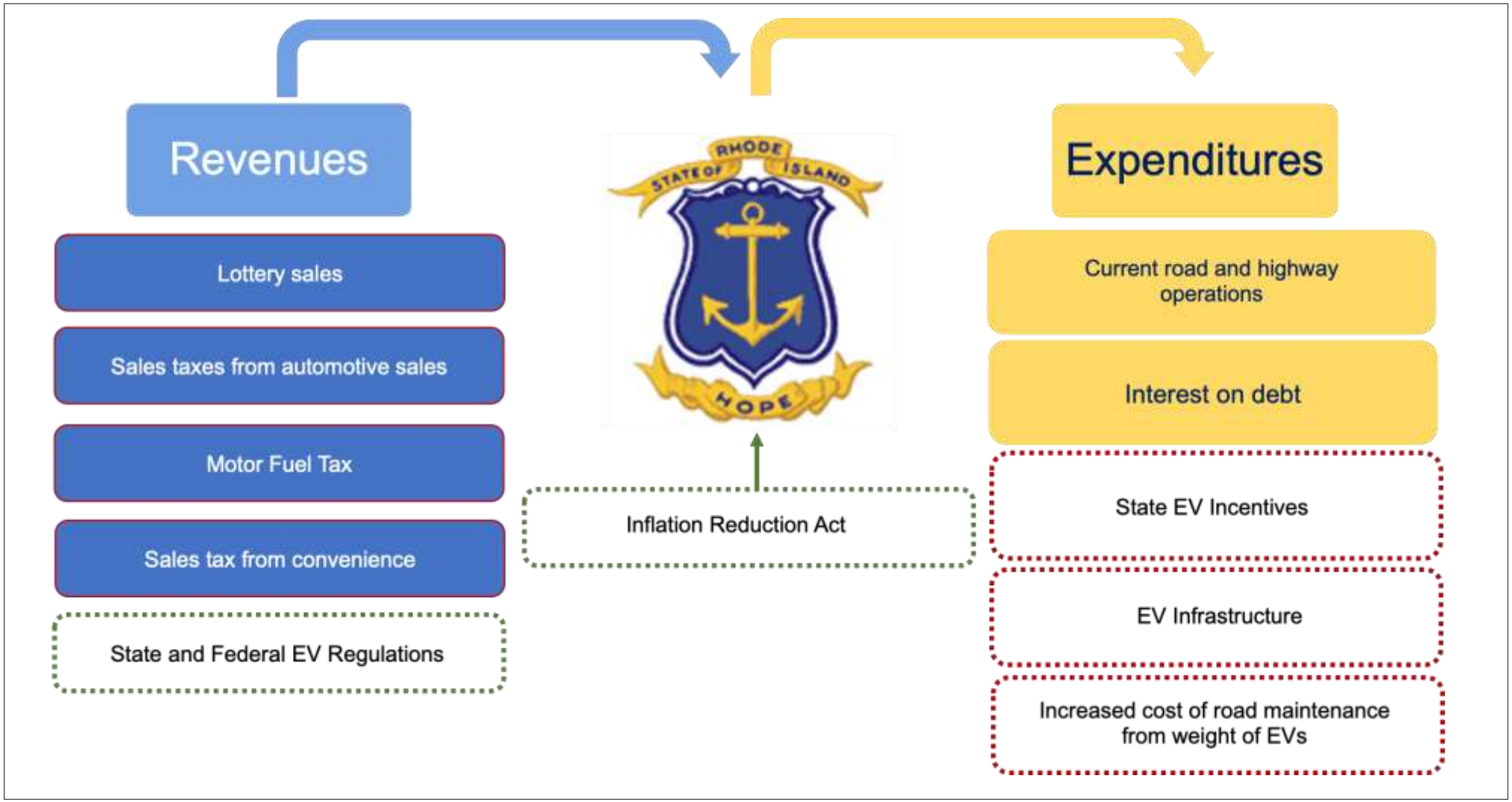
These incentives have an impact on consumers in the market for electric vehicles

Generally, the cheaper the price of a vehicle the more attractive it becomes to consumers.

This also opens the door for people who are in different certain income brackets, who might not have been able to afford an electric vehicle more obtainable.

Source: *Tax incentives*. www.fueleconomy.gov - the official government source for fuel economy information. (n.d.). *Drive EV*.

Figure 3. Schematic Diagram of State Revenues and Expenditures for Transportation Funding



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MODEL SUMMARY

Figure 4. Model Summary

Revenues/Costs/Years	2022	2025	2030	2035
Motor Fuel Tax	$116.6M	$103.9M	$85.9M	$72.0M
Lottery Tax	$265.3M	$275.0M	$273.4M	$275.0M
SUT on sale of Automotive Parts, Accessories, and Tires	$10.5M	$11.2M	$6.1M	$5.1M
SUT from Convenience Stores	$9.2M	$10.2M	$11.5M	$13.0M
Total Revenues	**$403.4M**	**$402.3M**	**$378.0M**	**$365.7M**
Additional Charging Station Cost	$6.3M	$1.4M	$2.8M	$6.0M
Annual Road Maintenance Costs	$10.6M	$10.7M	$10.8M	$11.2M
State Rebates	$2.2M	$1.8M	$3.9M	$8.1M
Total Expenditures	**$19.1M**	**$13.9M**	**$17.6M**	**$25.3M**
Total Impact	$384.3M	$388.4M	$360.5M	$340.4M
Expected Impact	$413.5M	$443.0M	$496.9M	$557.3M
Total Losses	**-$29.3M**	**-$54.6M**	**-$136.4M**	**-$216.9M**

Expected “losses” will grow 6x between 2022 to 2035.

Motor Fuel Tax revenue is expected to fall by 38% or $44.7M.

Losses in lottery tax revenue is mitigated by growth in gas stations with convenience stores.

Inputs	Value/State
EV Growth Rate	16.5%
SUT per Convenience Store with Gas Station Growth	2.5%
Gas Tax Projection	Mean Scenario
Cost to Maintain Roads	$782
Total Lane Miles	13520
Cost Per Charging Station	$21,000
EVs Served Per Charging Station	11
Offered State Rebate	$2,500
Gas Station with Convenience Store Growth Rate	0.6%
GDP Ratio - Rhode Island to US	0.3%
US Consumer Spending Growth Rate	2.3%

▼**Figure 5.** Selected Assumptions

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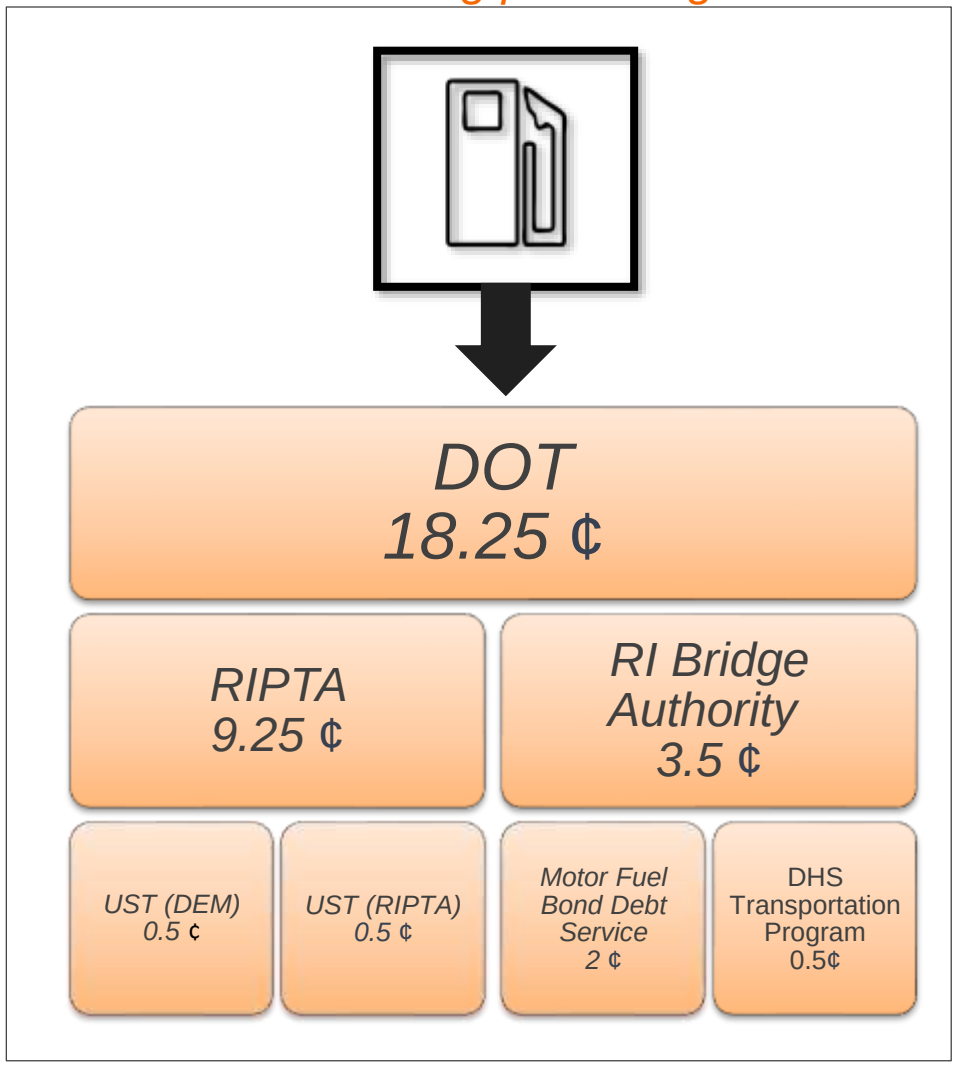
REVENUE STREAMS

Rhode Island's Motor Fuel Tax of $0.35 per gallon is distributed based on the following percentage shares:



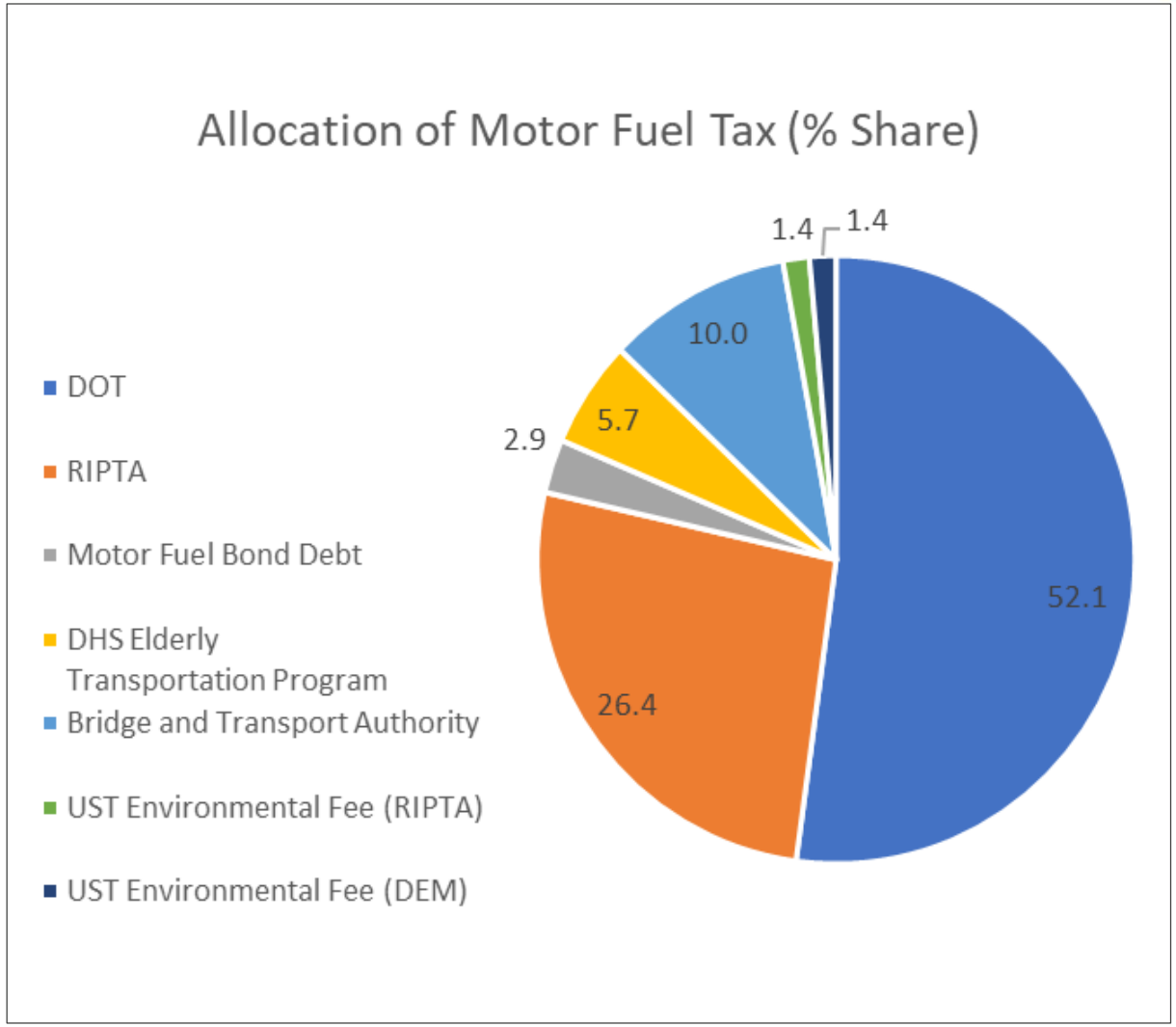


Figure 6. Allocation of Motor Fuel Tax (% Share)

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REVENUE STREAMS

Based on our assumptions, we looked at revenue projection for the following components:

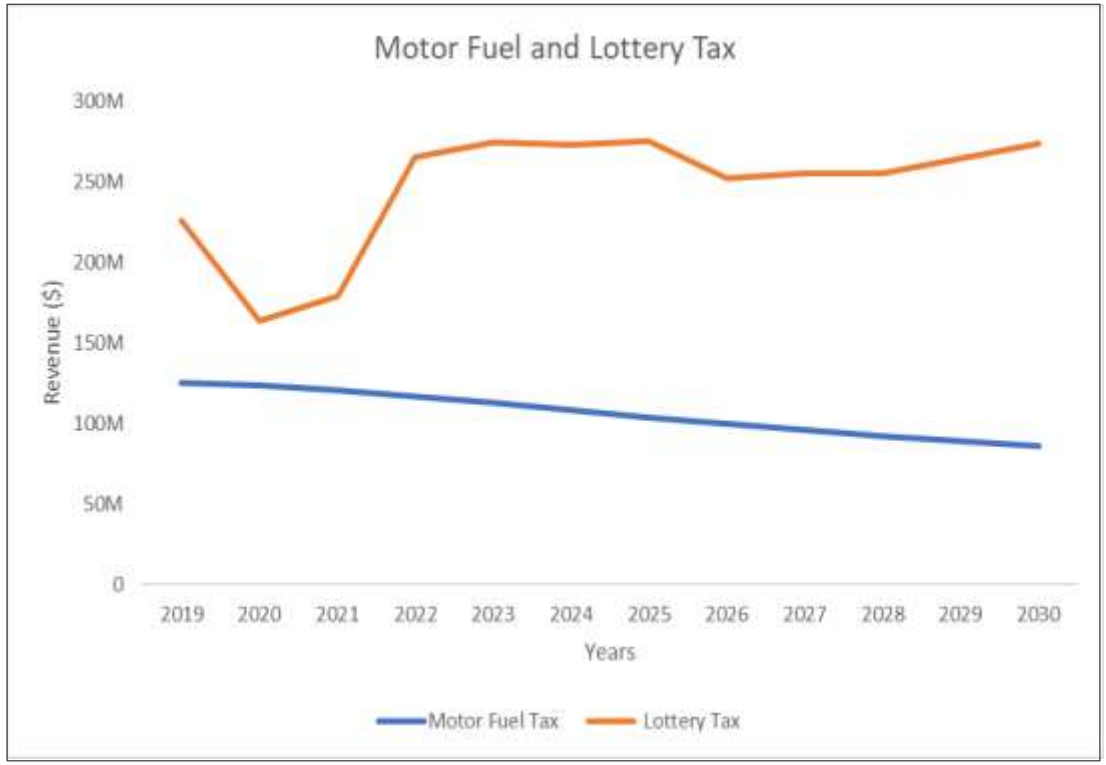

Figure 7. Revenue projections for Motor Fuel and Lottery Tax

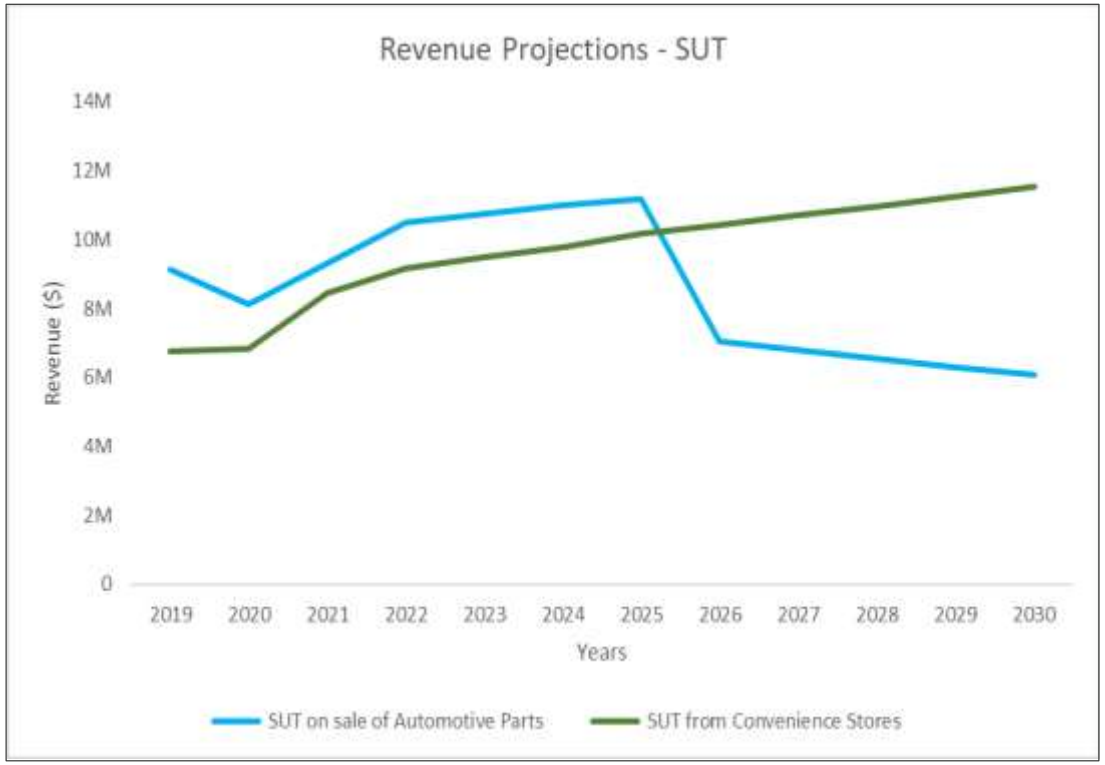

Figure 8. Revenue projections for SUT

Source: Office of Management and Budget (OMB), State of Rhode Island:

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REVENUE STREAMS

Our key take-aways from analyzing revenue streams are as follows:

1. Based on EIA's estimates and gasoline scenarios, motor fuel tax is expected to decline by 30% between the years 2022 - 2030

2. Despite a plan to phase out gas stations, lottery tax revenue is expected to increase by 24% between the years 2022 – 2030 due to a growth in the number of gas stations with convenience stores.

3. SUT on gas stations with convenience stores is expected to steadily increase till 2030 and onwards while SUT from the sale of auto parts, accessories, and tires will decline.

4. Due to an eventual decline in ICE Vehicles and a rise in EVs, RI will face a decline in SUT on sale of automotive parts, accessories and tires

Source: Office of Management and Budget (OMB), State of Rhode Island:

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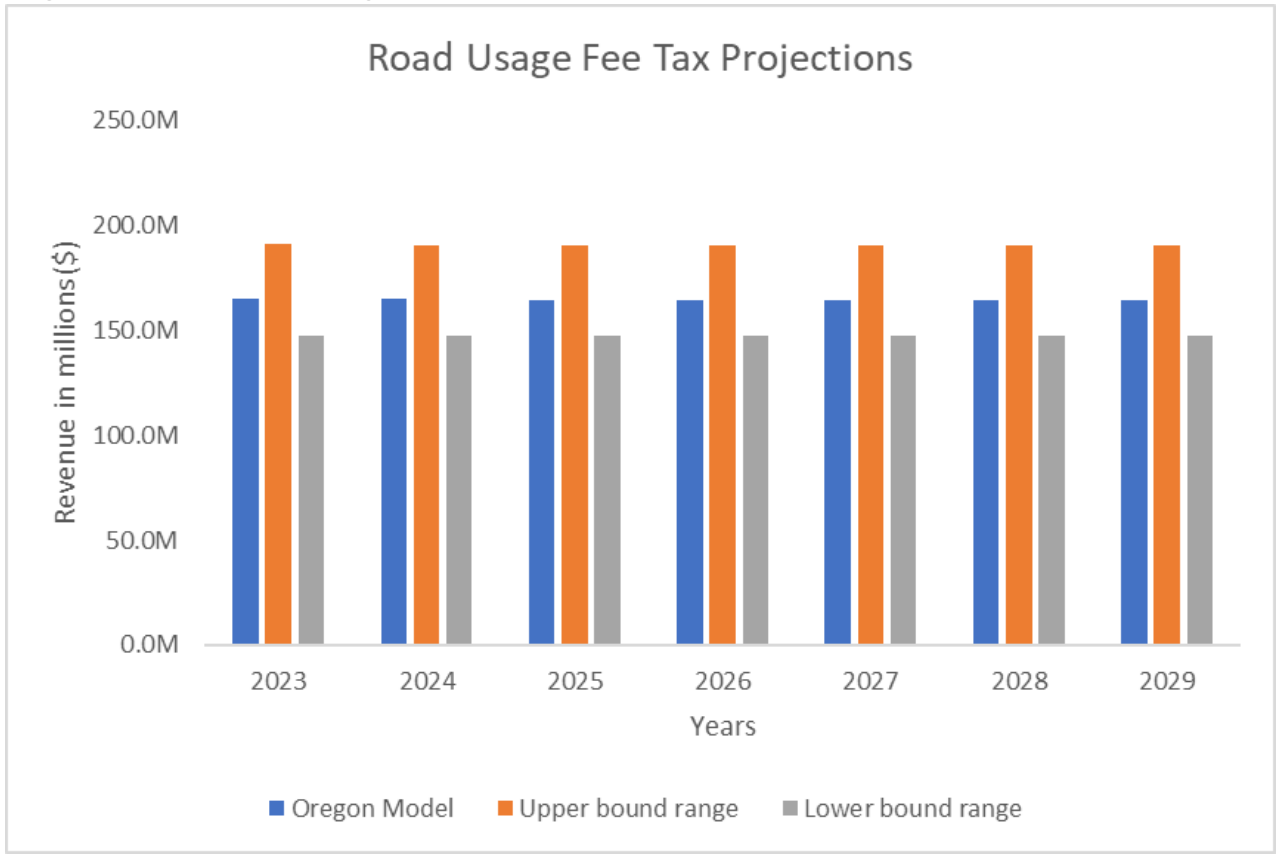
SCENARIO EVALUATION:
REGISTRATION FEES, PER MILE TAX, GROWTH RATE PROJECTION OF EVs

To mitigate the expected loss of Motor Fuel Tax revenue, RI can pilot a Road Usage Fee (RUF) to assess the feasibility of RUF as a replacement to the Motor Fuel Tax

Figure 9. Road Usage Fee Tax Scenario Evaluation



Scenario	Cents per Mile	Average Revenue
Oregon Model	1.9	$ 164 Million
Upper bound range	1.7	$ 190 Million
Lower bound Range	2.2	$ 147 Million

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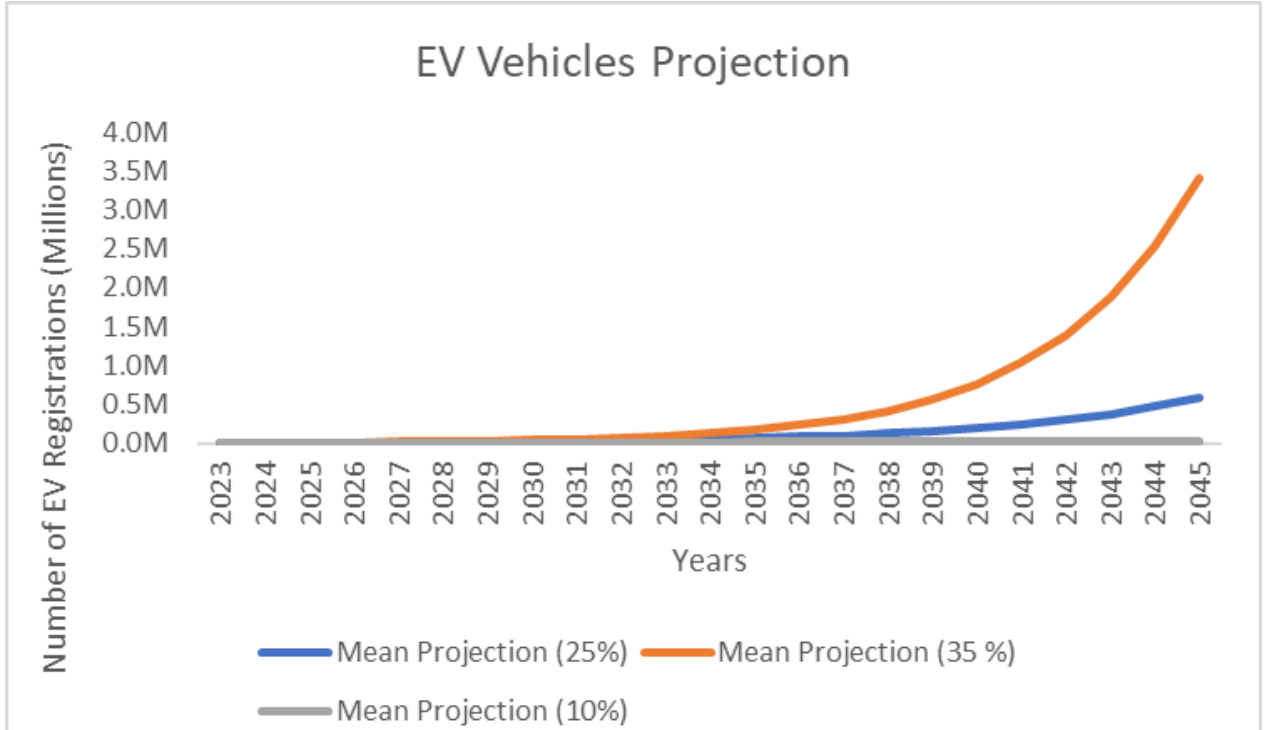
SCENARIO EVALUATION:
REGISTRATION FEES, PER MILE TAX, GROWTH RATE PROJECTION OF EVs

To achieve a minimum of 10% EVs in Rhode Island's total automobiles by 2030, Rhode Island needs an annual increase of 35% in EV registrations.

Figure 10. Projections for EV Registrations in Rhode Island based on Historical Data



Scenario	EV Registrations (Year 2030)	% of Total Automobiles
10% Annual increase	7,348	2%
25% Annual increase	20,432	7%
35% Annual increase	37,819	13%

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SCENARIO EVALUATION A:
MODEL PARAMETERS

Scenarios	Assumptions	Revenue Outcomes	Target (2030)
10% Annual increase in EV Registration	• Low growth rate of Electric Vehicle Sales • $100 per EV Registration	Revenue from EV Registration annually will be **$0.75 million** in 2030	**By 2030, more than 13% of all automobiles will be EVs based on a 35% annual increase in EV registrations**
25% Annual increase in EV Registration	• Moderate growth rate of Electric Vehicle Sales • $100 per EV Registration	Revenue from EV Registration annually will be **$2 million** by 2030	**This means that from 2022 to 2030, RI needs to annually register 3,500 EVs on average**
35% Annual Increase in EV Registration	• High growth rate of Electric Vehicle Sales • $100 per EV Registration	Revenue from EV Registration annually will be **$3.7 million** by 2030	

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SCENARIO EVALUATION

Additionally, we looked at cost components related to the EV transition based on the following:

Dimensions	Description and Assumptions
Cost of Charging Stations and State Rebates 	▪ $21,000 is the cost of installation of Level II charging ports ▪ Rebates based on the number of EV registrations ▪ Cost of charging stations might reduce in the future due to better technology ▪ EVs served per charging station
Annual Road Maintenance Cost 	▪ Cost to maintain a mile of moderated road calculated ▪ Total annual cost of road maintenance ▪ Weightage of EVs and its impact on road expenditure (our hypothesis is that EVs will increase wear and tear of a road)
Total Impact 	▪ Difference between total revenue and total costs

Source: OMB, Rhode Island, 2023

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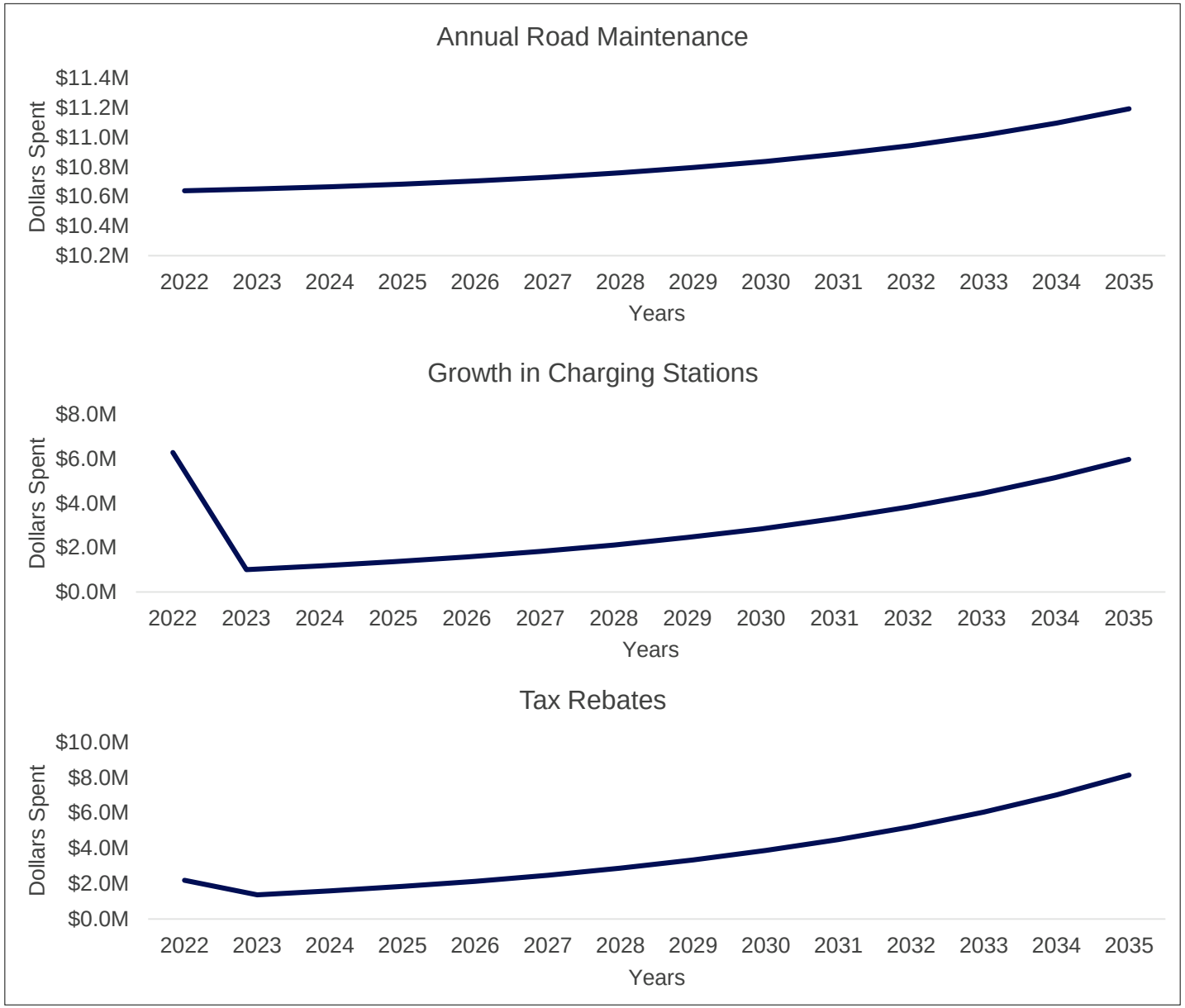
SCENARIO EVALUATION:
COST BREAKDOWN AND PROJECTIONS



- Maintenance costs are expected to increase by 5.6% between 2022 and 2035.
- Charging stations keep up with EVs which represent 9% of total automobiles by 2035 at a 16% annual average growth from 2022.
- The $2.5K Rhode Island EV rebate balloons to $8M in expenditure by 2035.

Figure 11.
Evaluation of Expected Costs during Rhode Island's EV Transition

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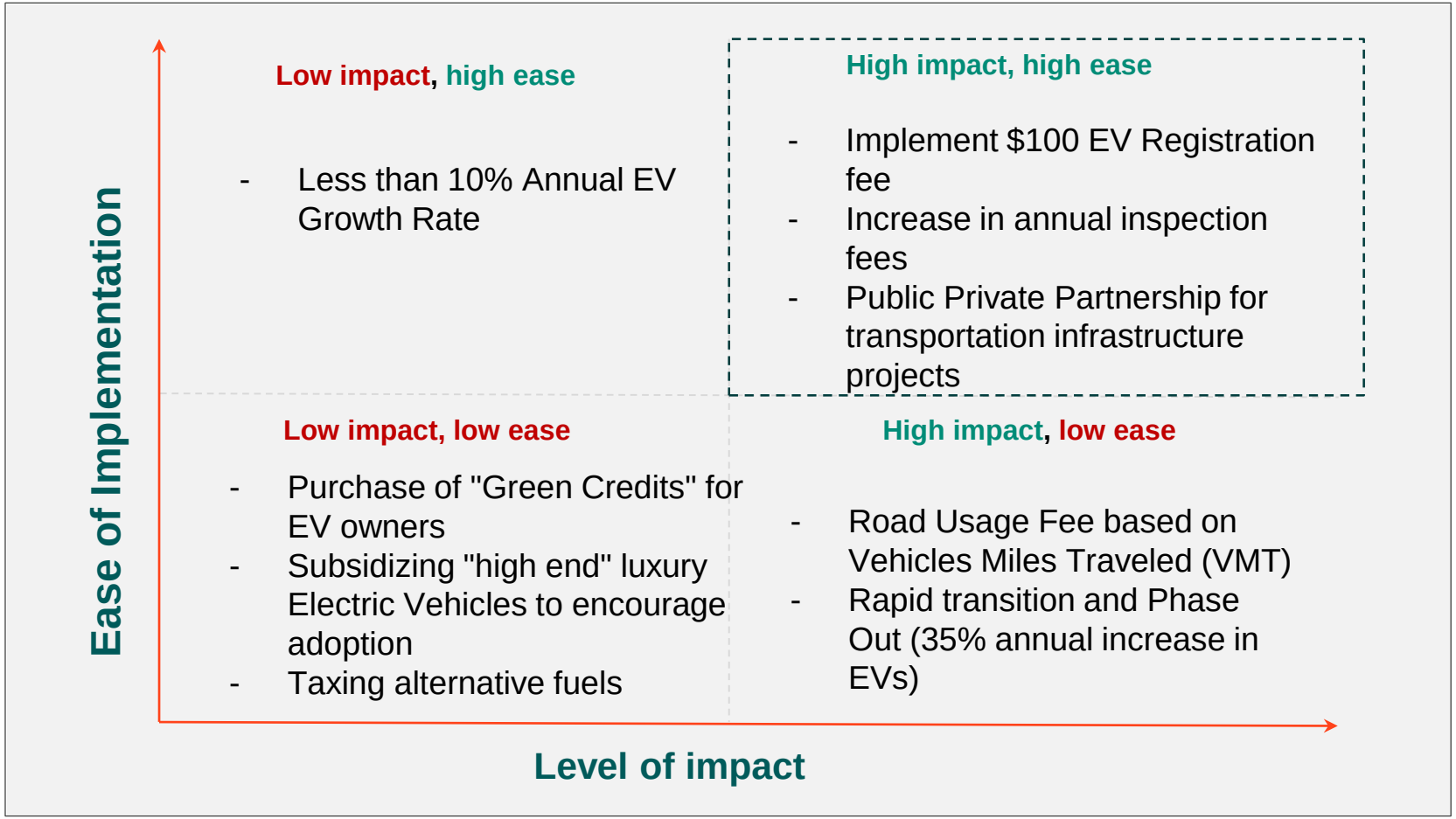
SCENARIO EVALUATION

Our analysis revealed that Rhode Island should focus on the following scenarios going forward.

Figure 12. Scenario Based Approach to EV Regulations and Incentives

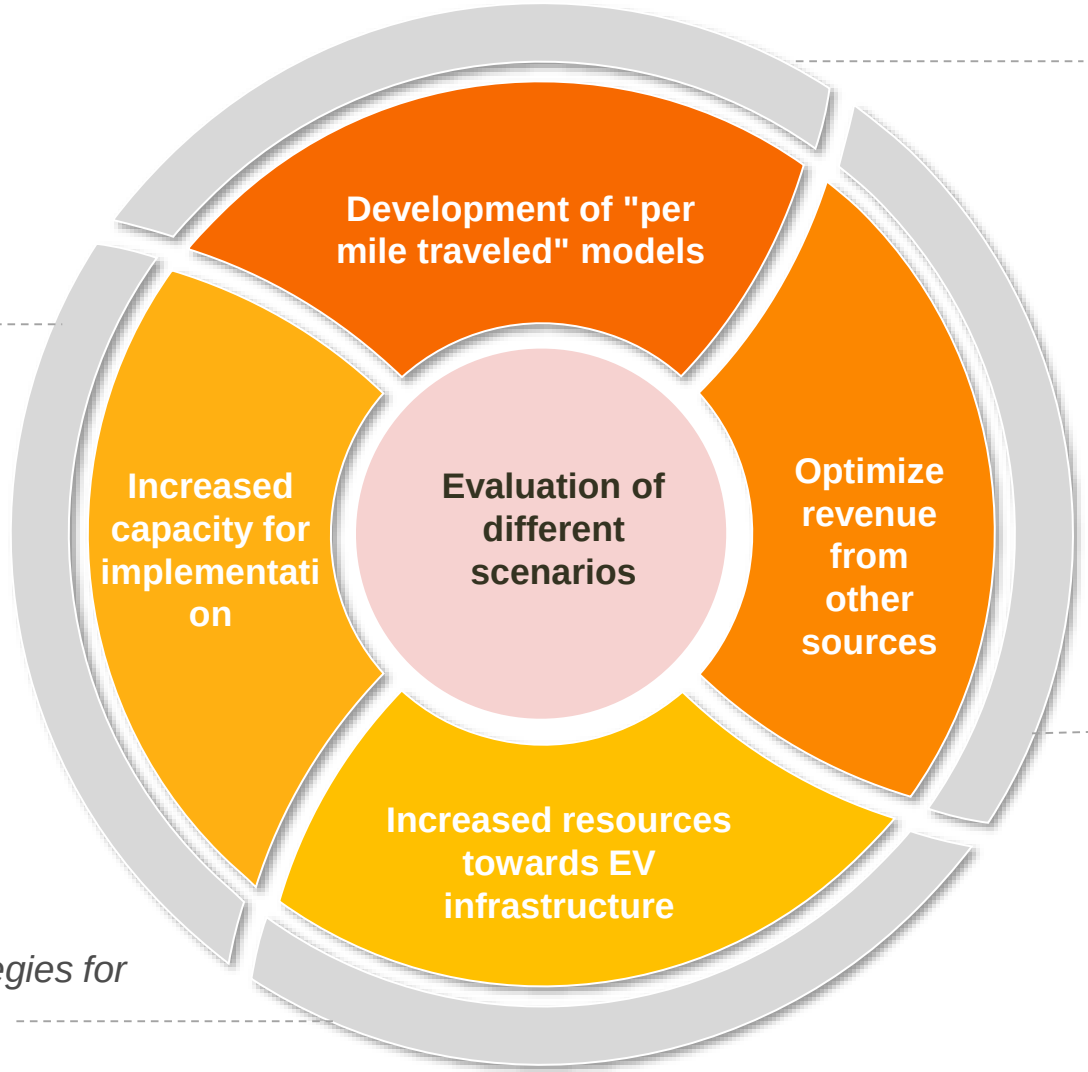


Source: Dr. Wilcoxen, 2023

SCENARIO EVALUATION

Figure 10. Schematic Diagram of EV Transition Scenario Evaluation

Non-exhaustive



Develop models for different tax rates in order to replace tax per gallon into tax per mile (for example 1.2 cents per mile traveled)

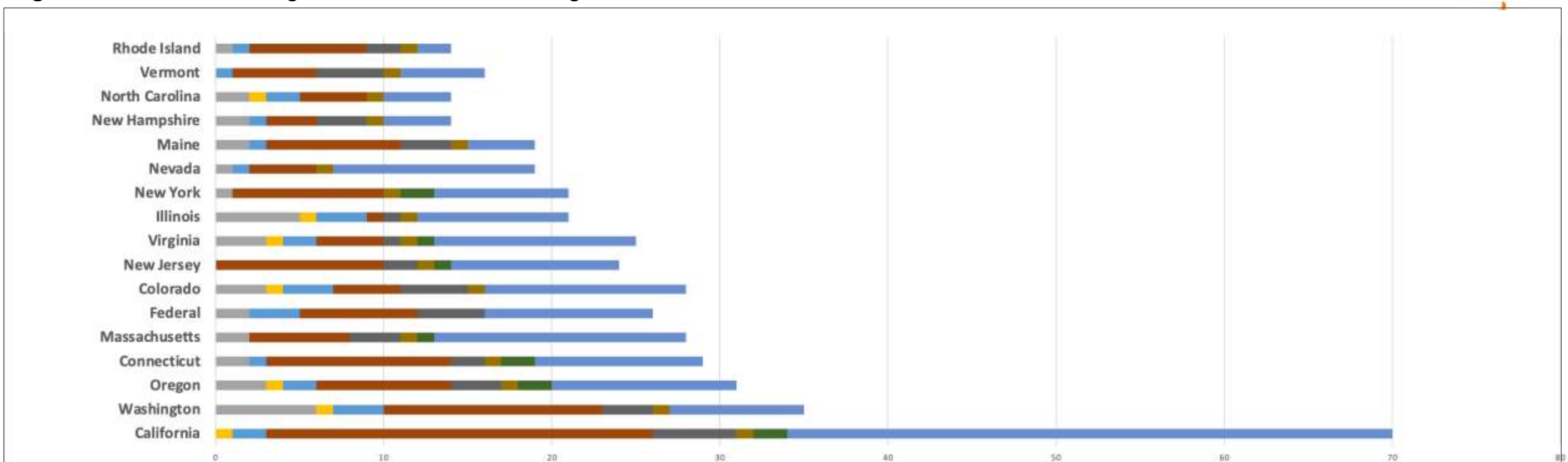
Identify existing needs and requirements for EV deployment for the state of Rhode Island while controlling expenditure

Lottery tax, Inspection Fees, Car registration fees amongst others. ***By 2035, RI will have a gap of $50 million in revenue losses due to gasoline displacement***

Deployment strategies for EV infrastructure

Source: Dr. Wilcoxen, 2023 and Rhode Island Electrifying Transportation Guide, 2021

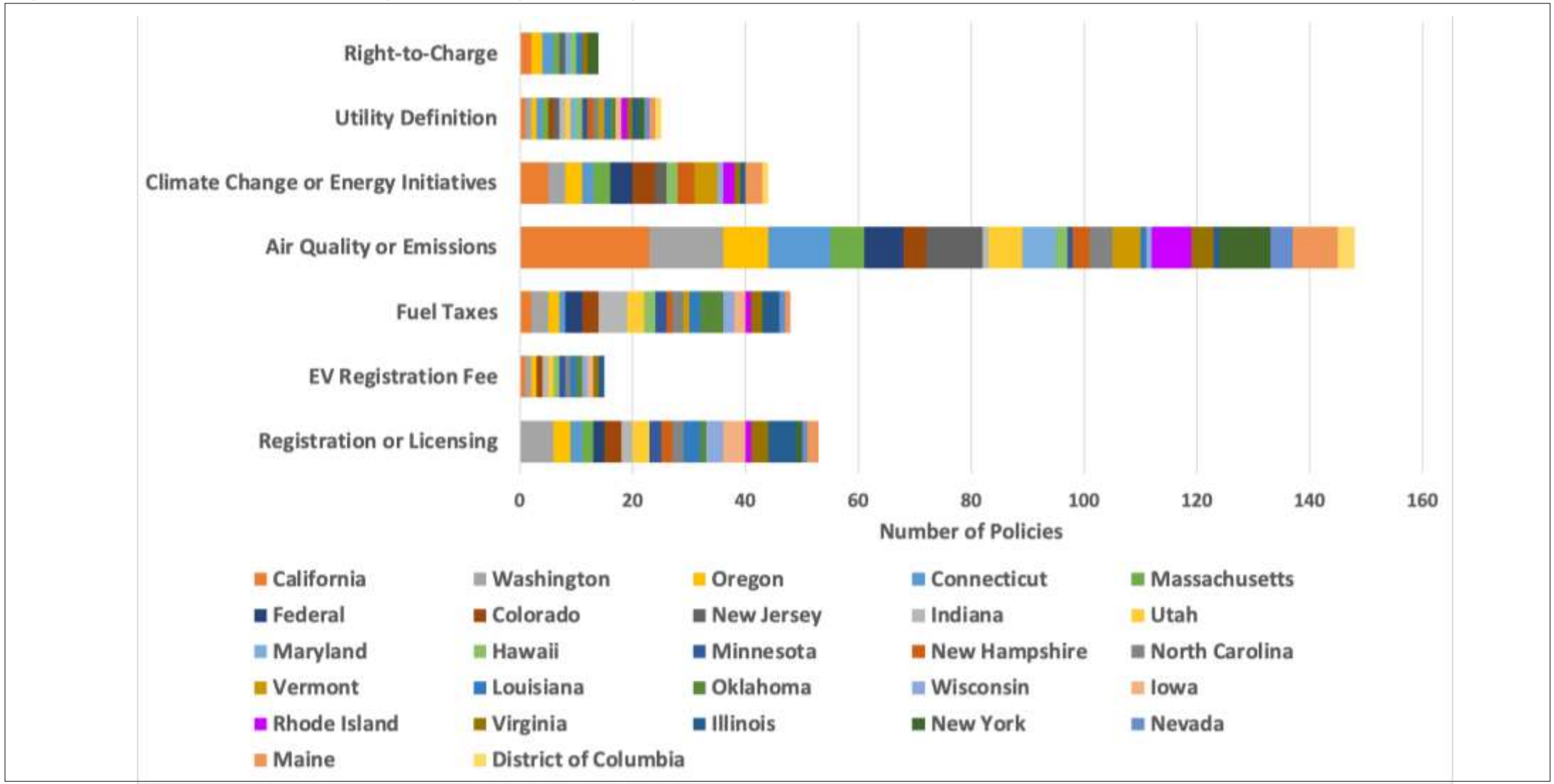
Figure 13. States Leading with Electric Vehicle Regulations in 2023



	California	Washington	Oregon	Connecticut	Massachusetts	Federal	Colorado	New Jersey	Virginia	Illinois	New York	Nevada	Maine	New Hampshire	North Carolina	Vermont	Rhode Island
Registration or Licensing	0	6	3	2	2	2	3	0	3	5	1	1	2	2	2	0	1
EV Registration Fee	1	1	1	0	0	0	1	0	1	1	0	0	0	0	1	0	0
Fuel Taxes	2	3	2	1	0	3	3	0	2	3	0	1	1	1	2	1	1
Air Quality or Emissions	23	13	8	11	6	7	4	10	4	1	9	4	8	3	4	5	7
Climate Change or Energy Initiatives	5	3	3	2	3	4	4	2	1	1	0	0	3	3	0	4	2
Utility Definition	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Right-to-Charge	2	0	2	2	1	0	0	1	1	0	2	0	0	0	0	0	0
Other	36	8	11	10	15	10	12	10	12	9	8	12	4	4	4	5	2

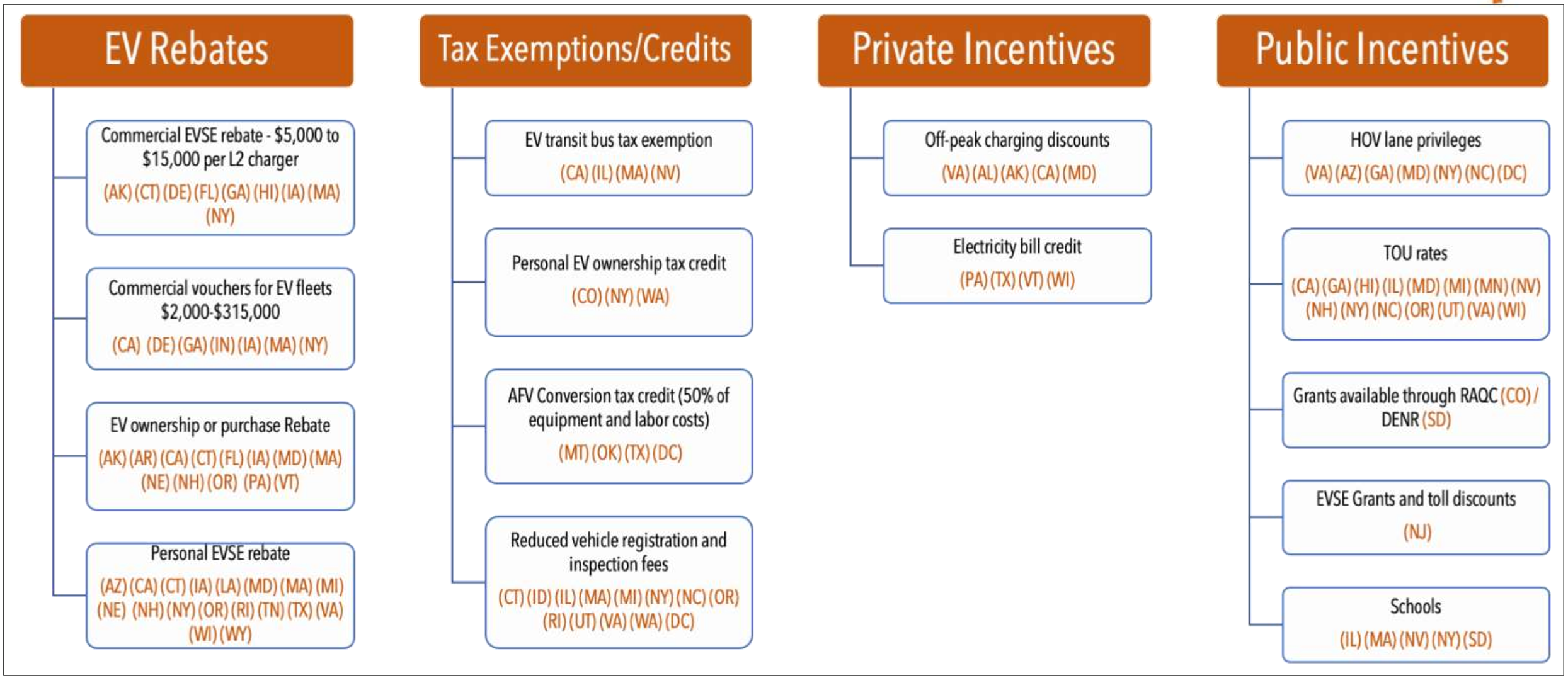
Source: Alternative Fuels Data Center, April 2023

Figure 14. Electric Vehicle Regulations by Leading States in 2023



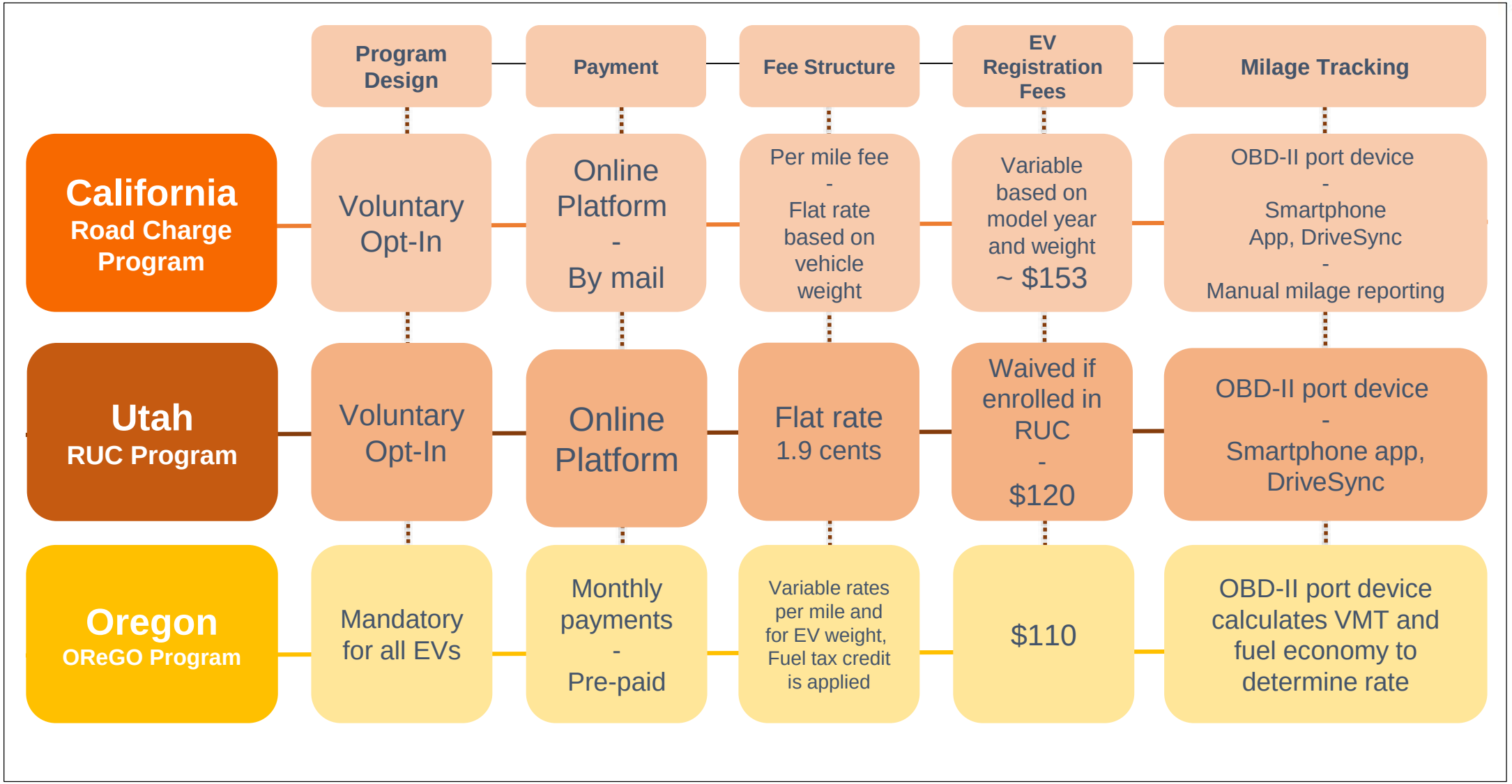
Source: Alternative Fuels Data Center, April 2023

Figure 15. Popular EV Adoption Incentive Programs Across the United States



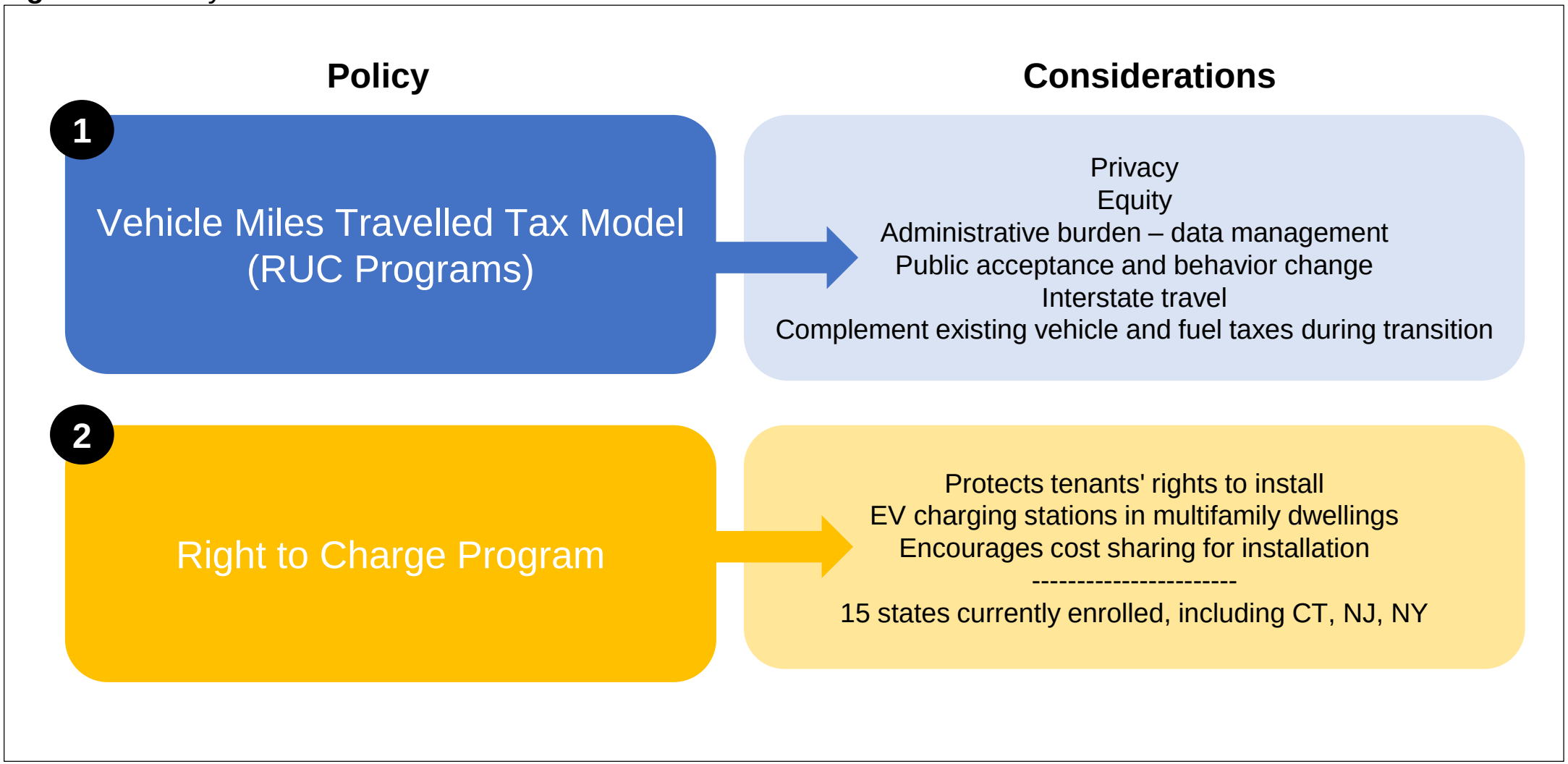
Source: NCSL, 2022

Figure 16. First Examples of Road Usage Charge (RUC) Programs Across the United States



BEST PRACTICES:
RECOMMENDATIONS FOR RI

Figure 17. Policy Recommendations for the State of Rhode Island Based on our Evaluation



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CONCLUSIONS

KEY TAKEAWAYS

1. Piloting a VMT Tax model is an optimal solution to reduce loss of revenue
2. Federal incentives will be paramount to EV infrastructure transition
3. Phase out of gasoline stations, revenues from convenience stores, and the motor fuel tax will be dependent upon state policies and regulations

MOVING FORWARD

A. Data package and model to be finalized by May 1st

B. Adjusting model and recommendations to reflect goals of RI following discussion

C. Considering additional model parameters such as:

   i. Total lifetime fee of RI drivers

   ii. Property tax

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Lithium Battery Disposal

	Criteria	Description
1	**Lifespan**	Lithium Ion Batteries have a lifespan of anywhere between 10 and 20 years. These batteries contain metals and other harmful toxic materials. Therefore, they need to be disposed of in a manner that's safe to the public and environment
2	**EV's on the road**	For EV's still on the road the entity removing the battery will be In charge of ensuring that the battery is reused, repurposed, or recycled. The entity selling the battery back will make sure that the used battery is being properly managed.
3	**End of life EVs**	For EV's reaching the end of their life the company in charge of dismantling will ensure it's repurposed, refurbished or recycled
4	**Battery disposal plan**	The state creates it's own battery disposal plan, which would allow the state to keep the battery and reuse it for it's own purposes

Source: Offie of Management and Budget (OMB), State of Rhode Island:

Questions

Special Thanks:

Senator Louis DiPalma
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Debra Jarrow, RI DOT
Peter Alviti, RI DOT
Kenneth White, RI DOT
John Igliozzi, RI DOT
Cynthia Parker, RI DOT
Joseph Codega, RI OMB
Brian Daniels, RI OMB
Walter Craddock, RI DMV
Sara Canabarro, Administrator Clean Transportations Programs
Matthew Moretta, Electrification Program Manager
Dr. Jay S. Golden Ph.D

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