CAMBRIDGE SYSTEMATICS

Road Usage Fee Revenue Potential and Equity Implications

Road Usage Fee Study - Phase 1 Report

prepared for

New Hampshire DOT

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Table of Contents

Executive Summary

Overview

This study, undertaken by the New Hampshire Department of Transportation (DOT), is the first phase of a deployment plan for a proposed Road Usage Fee (RUF) in the State of New Hampshire that would be levied in conjunction with the registration of the vehicle. The RUF would be based on the U.S. Environmental Protection Agency (EPA) fuel economy rating of the vehicle, with vehicles with higher miles per gallon (MPG) ratings paying a larger fee. The proposed RUF schedule is designed for simplicity and is shown in Table ES.1. The fee is set so that owners of vehicles with ratings over 20 MPG would pay approximately the same fee plus gas tax as the gas tax paid for a vehicle rated at 20 MPG and driven about 12,000 miles a year. Trucks and other vehicles that are not assigned an MPG(e) rating by the EPA would be subject to a default annual fee of $10 for gasoline or diesel vehicles, or $125 for electric or alternative fuel vehicles.

Table ES.1 Proposed New Hampshire Road Usage Fees

MPG Range	Fee
20 or less	$10.00
greater than 20 to 30	$25.00
greater than 30 to 40	$50.00
greater than 40 to 50	$75.00
greater than 50	$100.00
no gasoline	$125.00

Source: New Hampshire Legislature, 2020 Session, Draft House Bill 1649 (No. 20-2230.0)

The objective of the fee is to prevent a further erosion of revenue into the state Highway Trust Fund as vehicle fuel efficiencies increase over time and to spread the burden of highway investment and maintenance more equitably across vehicle owners. This study aims to comprehensively evaluate the potential impacts and implementation of a Road Usage Fee in New Hampshire.

Methodology

The following methods were used:

- Data on light-duty vehicles registered in New Hampshire in 2018 were obtained from the Department of Safety, Division of Motor Vehicles (DMV). These were matched with EPA MPG ratings as closely as possible using the vehicle make, model, and other information contained in the vehicle identification number (VIN). This was used to obtain an understanding of the current distribution of vehicles by MPG rating in the New Hampshire fleet.

- The distribution of vehicles by MPG was used to estimate the revenues that would be taken in through the RUF.

- The future distribution of vehicles by MPG was projected through 2030, consistent with national projections for increasing fuel economy due to Federal standards and economic factors. This future distribution was used to project future motor fuel tax revenues and revenues under the proposed RUF.

- Sensitivity tests were conducted to examine the fuel tax and RUF revenue effects of alternative vehicle-miles traveled (VMT) projections, MPG projections, and electric vehicle (EV) market penetration.

- The potential incidence of both current motor fuel taxes and the RUF was examined by income group, driver geography (rural/urban and resident vs. visitor), and VMT per vehicle to consider the potential equity implications of a shift towards a RUF.

- Survey and focus group data was collected to obtain an initial understanding of New Hampshire residents' potential view of a RUF.

- Discussions were held with NH DMV staff to understand the practical implications of implementing a RUF.
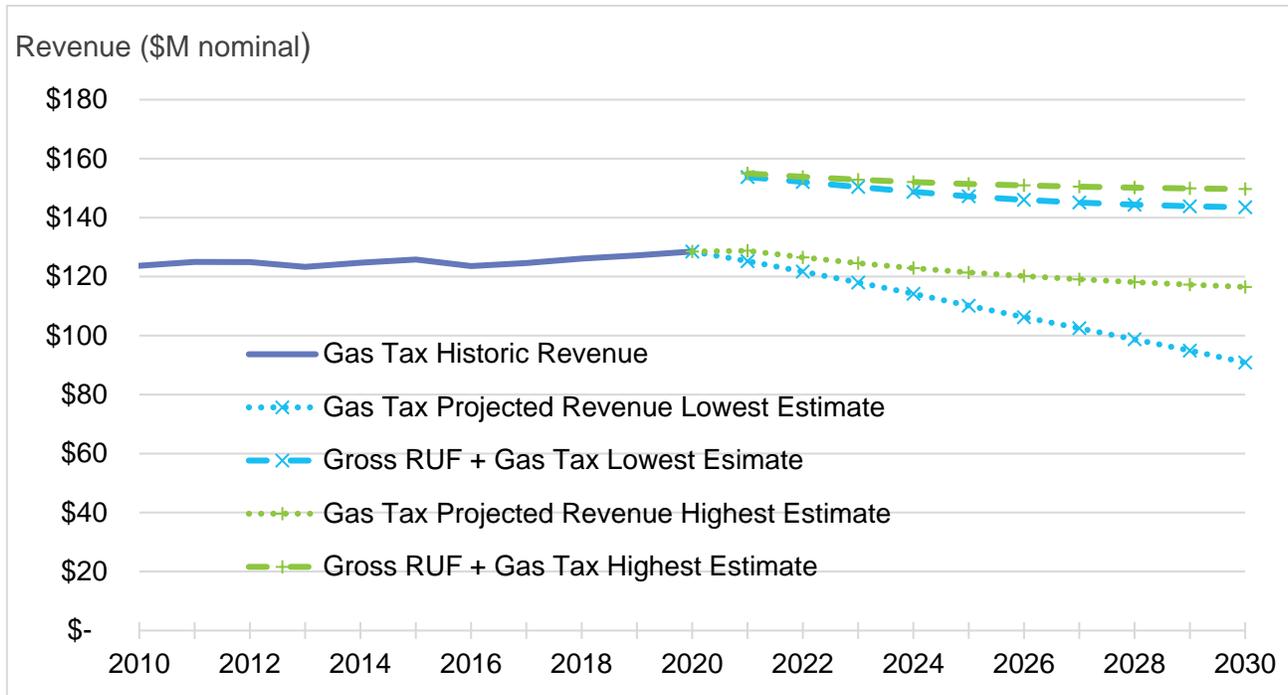
MPG of the New Hampshire Light-Duty Fleet

Based on vehicles registered by model year in 2018, the mean MPG rating of vehicles registered in New Hampshire increased slowly (from 16 to 19) from model years 1984 to 2004, increasing more quickly since then as a result of economic forces, technology advancements, and the imposition of more stringent corporate average fuel economy (CAFE) standards. The average MPG for vehicles in the latest registered model years, 2016 – 2018, is about 25. The overall fleet average fuel economy is 22.5 MPG in 2018. This is projected to increase to 30.3 MPG in 2030 if Federal fuel economy standards continue to be implemented.

Revenue Trends and Projections

In fiscal year 2019, New Hampshire collected $128 million in unrestricted motor fuel tax revenue. While New Hampshire's highway revenue has remained relatively steady over the past decade, the state's vehicle fleet is projected to become increasingly efficient. Gas tax revenue from light duty vehicles appears likely to decline over the next decade, with a decline by 2030 likely to be in the range of 10 to 30 percent from current levels. Diesel tax revenue is also likely to decline by around 20 percent, considering the flat trend in truck VMT and expected increasing truck fuel efficiency due to Federal standards. Projections for expected 2030 motor fuel tax revenue range from $91 to $117 million depending on various uncertainties.

The proposed Road Usage Fee would collect about $27 million starting as early as 2021, with revenues growing to between $32 and $53 million in 2030. The fee would increase net transportation revenues in the short term, and at least stabilize nominal revenue in the long term, with a combined fuel tax plus RUF of $141 million in the baseline scenario. Net projected fuel tax plus RUF revenue in 2030 in all modeled scenarios is projected to be about 10 to 15 percent higher than 2018 levels of motor fuel tax revenue alone in nominal terms (Figure ES.1). These combined revenue projections were found to be robust under different scenarios for fleet changes in fuel efficiency and different levels of adoption for electric vehicles.
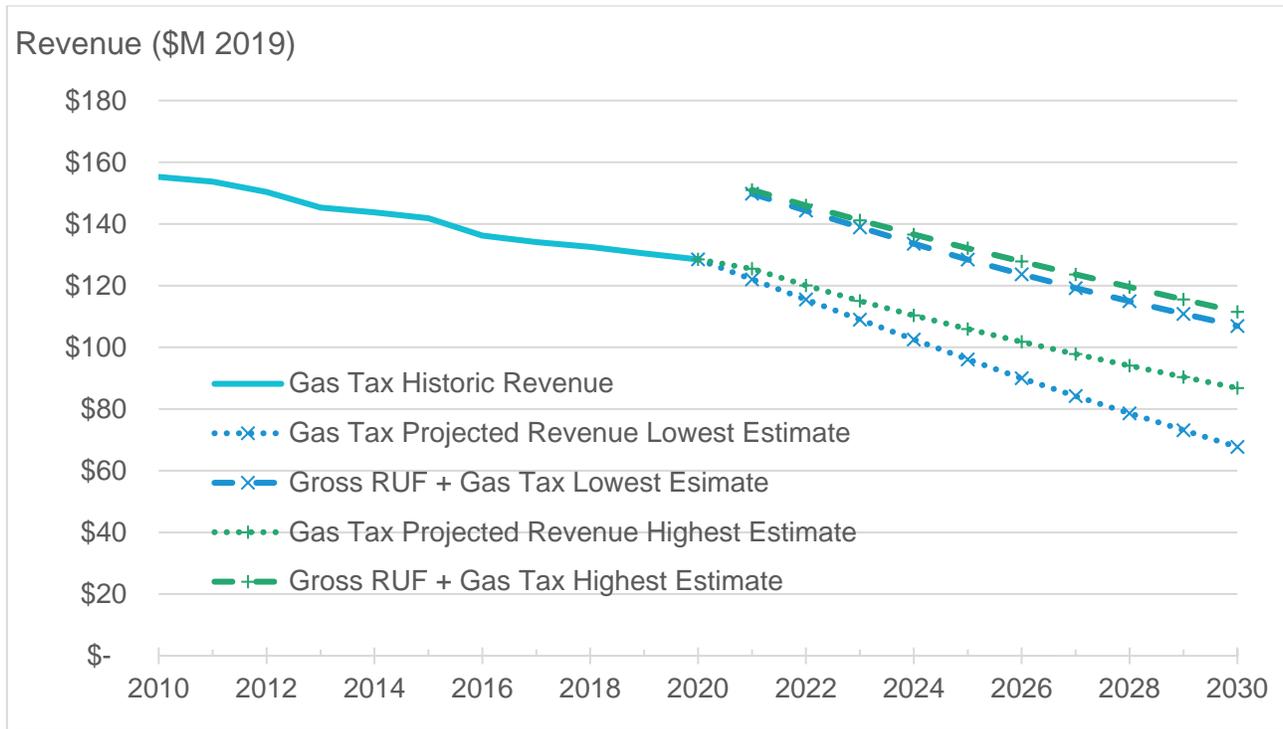
Figure ES.1 Historical and Projected Unrestricted Highway Fund Revenue

Revenue ($M nominal)

(Chart showing historical and projected revenue from 2010 to 2030)

Legend:
- Gas Tax Historic Revenue
- Gas Tax Projected Revenue Lowest Estimate
- Gross RUF + Gas Tax Lowest Esimate
- Gas Tax Projected Revenue Highest Estimate
- Gross RUF + Gas Tax Highest Estimate

Note: Estimate is for the fiscal year, which starts six months before the calendar year. 2020 revenue estimate is based on first six months of fiscal year 2020 receipts. Revenue is in current year dollars. "Highest estimate" scenario assumes that new vehicle fuel efficiency is frozen at 2020 levels in the future and electric vehicle adoption is modest. "Lowest estimate" scenario assumes improvements in fuel efficiency consistent with national forecasts based on Federal model year 2017-2025 light duty vehicle standards, as well as strong market penetration of electric vehicles in 2025 and beyond. Both scenarios assume continuation of current levels of VMT per capita.

Figure ES.1 is not adjusted for inflation, and thus does not account for the decline in purchasing power of the dollar over time. In Figure ES.2, these figures are adjusted for inflation based on the New Hampshire Construction Cost Index, which shows an average annual inflation rate of 2.55 percent over the past 10 years. When accounting for inflation, unrestricted revenues between 2010 and 2020 declined by 21 percent. Assuming the same rate of inflation in the next decade, revenues are projected to decrease by another 32 to 47 percent from 2020 levels by 2030. Even with the implementation of the RUF, total unrestricted revenue in real terms is expected to be about 15 percent lower in 2030 than in 2020.

Figure ES.2 Historical and Projected Unrestricted Highway Fund Revenue in 2019 Dollars

Revenue ($M 2019)

Legend:
- Gas Tax Historic Revenue
- Gas Tax Projected Revenue Lowest Estimate
- Gross RUF + Gas Tax Lowest Esimate
- Gas Tax Projected Revenue Highest Estimate
- Gross RUF + Gas Tax Highest Estimate

Equity Implications

Overall the additional cost of the RUF would be relatively small, adding about $21 per vehicle to the bill of the average New Hampshire resident. In comparison, at today's fuel prices, the typical New Hampshire driver pays somewhere between $600 a year (for a 50 MPG vehicle) to over $1,400 a year (for a 20 MPG vehicle) in total fuel costs, including taxes. The state motor fuel tax makes up only a small fraction of this amount – ranging from about $50 at 50 MPG to $125 at 20 MPG.

Even with the RUF, owners of high-MPG vehicles would still pay a much smaller amount in annual fuel and RUF costs than owners of low-MPG vehicles (Figure ES.3). There would be modest shifts in the incidence of costs paid across various driver and household groups within the state (by rural vs. urban, income group, and vehicle age), but these shifts would be small given the overall relatively low level of motor fuel taxes paid and the RUF value.

An estimated 15 percent of VMT in New Hampshire is taken by visitors, contributing an estimated $19 million to unrestricted fuel tax revenues. With the implementation of the RUF, visitors will contribute a smaller proportion of the overall unrestricted revenues to the Highway Fund. This assumes that vehicle efficiencies increase, reducing the traditional gas tax paid by visitors, while they would not pay the RUF.

Figure ES.3 Annual Fuel + RUF Cost at Various MPG Levels and 12,000 mi/year
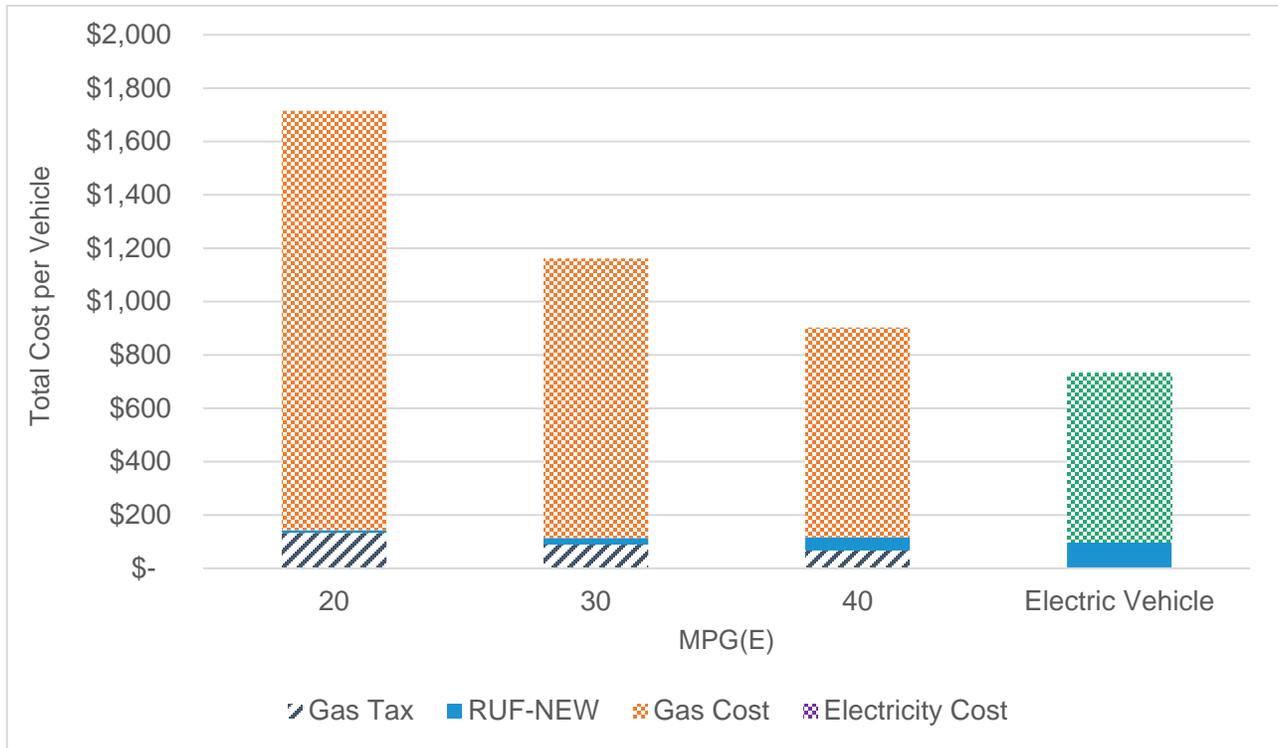

Public Opinion

Questions on the fall 2019 Granite State Poll regarding transportation funding in general, and the RUF concept in particular, suggest that the public recognizes the need to invest in transportation and is divided on the best options for such funding. A large majority of residents (81 percent) want the state to maintain or increase its investment in transportation (Figure ES.4), but no potential funding source garners support from a majority. However, a RUF is viewed at least as favorably as increasing the gas tax (with about half of residents opposing each), and both of these options have more support than a user fee based on the number of miles a person drives in a year or increasing vehicle registration fees. Focus groups with New Hampshire residents also confirmed that residents view the current gasoline tax as "fair", since it is proportional to distance driven, but also see the need for making funding for roads more balanced by increasing the amount that high mileage and electric vehicles would pay.

Figure ES.4 Residents' Opinions on Investment in Transportation

The state invests money to maintain today's roads, bridges, and to expand and improve transportation where needed. How do you feel about the state's current level of investment in its transportation system?
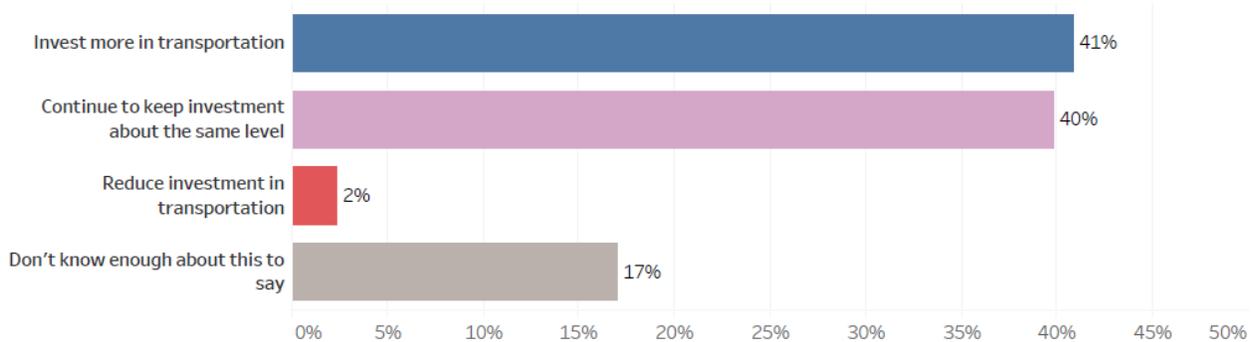
The survey and focus groups both confirmed that residents have limited knowledge of how transportation is currently funded. The state will need to lead efforts to inform the public on current and projected transportation funding and the need for a Road Usage Fee to supplement the gas tax.

Implementation Options and Feasibility Considerations

Preliminary discussions of implementation issues and options were held with staff of the New Hampshire DOT and DMV. Currently, registration is conducted and fees are assessed at both the state and municipal (city/town) level. There is agreement on the need to minimize any additional burden on city/town clerks. To implement the proposed RUF, the following next steps are recommended:

- The state legislature should require that the EPA combined city/highway MPG rating be listed on the title of new vehicles sold in New Hampshire.

- The state legislature should clarify the treatment of vehicles that do not have an MPG rating, e.g., defaulting to $10 for gasoline and diesel vehicles, and to $125 for alternative fuel and electric vehicles.

- The DMV should add a field for EPA combined city/highway MPG to the state's registration database and assign an MPG rating to all existing light-duty vehicles included in the database.

- The DMV's vendor will need to assign an MPG rating to vehicles whose registration is transferred from other states after the program is implemented. A workflow for providing vehicle information to the vendor and returning the MPG rating to the database will need to be determined.

- Additional outreach will be needed to educate the public on the need for the fee and its impacts, as well as to municipal clerks to discuss any implementation issues and identify training needs.

1.0 Introduction

This project is the first phase of a deployment plan for a proposed Road Usage Fee (RUF) in the State of New Hampshire that would be levied in conjunction with the registration of the vehicle. The RUF would be based on the U.S. Environmental Protection Agency (EPA) fuel economy rating of the vehicle, with vehicles with higher miles per gallon (MPG) ratings paying a larger fee. The objective of the fee is to prevent a further erosion of revenue into the state Highway Trust Fund as vehicle fuel efficiencies increase over time and to spread the burden of highway investment and maintenance more equitably across vehicle owners. This study aims to comprehensively evaluate the potential impacts and implementation of a Road Usage Fee in New Hampshire and includes the following sections:

- Section 2.0 provides a description of the purpose and proposed structure of a potential RUF.

- Section 3.0 describes the process of matching each vehicle registered in New Hampshire with a corresponding MPG value.

- Section 4.0 details the estimated revenue potential from a new RUF and compares it with existing fuel tax revenue and a baseline forecast of revenue through 2030.

- Section 5.0 explores uncertainly associated with key factors influencing these projections and develops a range of future revenue projections.

- Section 6.0 evaluates the equity implications of the proposed new fee.

- Section 7.0 analyzes public opinion of both current state transportation funding mechanisms and a proposed RUF using both statewide polling and smaller, in-depth focus groups.

- Section 8.0 proposes a number of options for implementing a RUF scheme with a focus on ease of implementation at the town clerk level.

- Section 9.0 summarizes major conclusions from this study.

Appendices to this document include:

- Appendix A: Detail on VIN MPG Matching Procedure

- Appendix B: Granite State Poll Report

- Appendix C: NH Transportation Funding/RUF Focus Group Report

2.0 Road Usage Fee Structure

As the fuel efficiency of vehicles in New Hampshire improves and as alternative fuel vehicles like electric vehicles (EVs) become increasingly popular, maintaining adequate funding levels for New Hampshire's transportation system will become increasingly challenging. The current system of statewide transportation funding is principally reliant on motor fuel taxes, but an increasingly efficient vehicle fleet makes such a model less tenable. A Road Usage Fee could stabilize transportation revenues by assessing an annual fee on registered vehicles corresponding to their fuel efficiency. The proposed Road Usage Fee in this report would be assessed to all light-duty vehicles registered in the state of New Hampshire, based on the EPA combined city/highway MPG rating of the vehicle, at the time of initial registration or annual renewal of registration. In order to account for lost fuel tax revenue from more efficient vehicles, vehicles with higher MPG ratings would be assessed higher fees. The proposed schedule for the RUF is presented in Table 2.1. This schedule is designed so that a vehicle driven 12,000 miles a year pays nearly the same combined fee and gas tax as a 20 MPG vehicle.

Table 2.1 Proposed New Hampshire Road Usage Fees

MPG Range	Fee
20 or less	$10.00
greater than 20 to 30	$25.00
greater than 30 to 40	$50.00
greater than 40 to 50	$75.00
greater than 50	$100.00
no gasoline	$125.00

While the fee schedule would apply to all vehicles registered in New Hampshire, only light duty vehicles, defined as all vehicles with a gross vehicle weight rating (GVWR) of 8,500 lbs,, are assigned an MPG rating by the U.S. EPA. This category of vehicles includes cars as well as nearly all sport utility vehicles (SUVs), minivans, and smaller pickup trucks often used to carry passengers. Larger trucks, buses, and motorcycles would pay the fee for the "no gasoline" bin if they are electric vehicles or use some other alternative fuel; otherwise they would pay the minimum default fee of $10.

Once the RUF program begins, light duty vehicles currently registered in New Hampshire would be assigned an MPG rating and be required to pay the RUF annually. Vehicles registered in the future would also be assigned an MPG rating at the time of initial registration and assessed the RUF annually. Section 8.0 contains more details on potential methods of implementing the RUF.

3.0 Historical and Projected Fuel Efficiency of New Hampshire Light Duty Vehicles

In order to understand the potential utility and impact of a RUF in New Hampshire, the current fuel economy distribution of the state's vehicle fleet must be estimated. Matching each registered vehicle to an MPG value from the EPA's fuel economy database allows us to both estimate revenues from a future RUF program while also understanding approximately how much New Hampshire drivers of different types of vehicles pay on average. After all light-duty vehicles registered in the state were assigned an MPG rating, the vehicles were sorted into MPG bins. Bin-wise storage allowed us to calculate both potential RUF revenue and theoretical fuel tax revenues.

3.1 Match VINs from NH DMV Database with MPG

In July 2019, the New Hampshire Department of Safety, Division of Motor Vehicles (DMV) shared a database of 1,266,037 vehicles registered in New Hampshire in 2018 with the project team. Using this dataset, team member Eastern Research Group (ERG) was able to assign an MPG or MPG(e)[1] value from EPA's fuel economy database to nearly 90 percent of the records, with the majority of unmatched records belonging to heavy-duty vehicles not initially screened from the database. Due to significant discrepancies between the coding of vehicle model names in New Hampshire's database and the EPA fuel economy database, ERG used a vehicle information number (VIN) decoder for intermediate processing to produce more standard model names, as well as vehicle displacement. VINs are a unique identifying code, comprised of numbers and letters, that is assigned to individual automobiles. Based on VIN input, the decoder program produced vehicle make, model name, body type, and engine displacement.

Attempts to assign an MPG value from the EPA fuel economy data to the NH registration data proceeded over five rounds, each with a unique match criterion. In each round, records were matched by vehicle make, model, model year; displacement was also included in most rounds. Some rounds required exact matches, while some allowed matching within tolerances of displacement and model year. Model name could be matched exactly or as a substring within a longer model name. The vast majority of registration records that remain unmatched to fuel economy records were for heavy-duty vehicles that are not included in the fuel economy dataset because they exceed the CAFE program threshold of 8,500 lb. GVWR. Appendix A provides more details on the process for matching registered vehicles with MPG ratings.

In many cases, the MPG value matched with the vehicle is not the exact MPG rating of the vehicle itself. MPG values vary by a variety of vehicle characteristics, including not only make, model, and engine displacement, but also transmission type, driveline (two- vs. four-wheel drive), and other trim features that may affect fuel economy (e.g., turbo vs. non-turbo, body style, hybrid drivetrain). Not all of these features are captured in the information in the VIN or otherwise in the DMV database. In this matching process, the records for manual transmission choices were removed from the EPA dataset, since the vast majority of vehicles are now sold with automatic transmissions. When there remained more than one fuel economy match, the harmonic mean of the multiple fuel economy records for a given combination of make, model, and displacement was used for the matched MPG value. This may weigh the impact of certain low-volume

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[1] MPG(e) is the EPA's rated MPG equivalent for electric vehicles and for plug-in hybrid EVs. As used in this report, refers to either MPG or MPG(e) depending upon the vehicle's fuel type. Vehicles rated at over 60 MPG(e) were assumed to be all-electric.

models higher (e.g., turbo/sport or hybrid models) and overall, there may be some underestimation of the number of higher-MPG vehicles in the current analysis, as discussed in Appendix A.

3.2   MPG Bin Construction

Once a value for each vehicle in the DMV database was assigned a discrete MPG value, these values were then rounded to the nearest whole number. Rounding the MPG values allowed us to create "bins" of vehicles by MPG rating. Bins were created for each model year of vehicle in the dataset. The harmonic mean of MPGs for each model year in the dataset was also calculated. Using all of the vehicles in the dataset, the percentage of the fleet that falls within each MPG bin was calculated.

Once individual bins were created, larger bins of increments of 10 MPG (e.g., 20-30, 30-40) could be created to model the impact of the proposed fee The number of vehicles in each bin is multiplied by the proposed fee amounts for each MPG category in order to calculate revenue raised by the fee using the 2018 distribution of vehicles.

3.3   Future MPG Projections

To determine the future impact of a Road Usage Fee we projected the MPG distribution of New Hampshire's vehicle fleet through 2030, using the 2018 distribution as a starting point. For a baseline scenario, we used a schedule of future fuel economy based on the U.S. Department of Energy's 2019 Annual Energy Outlook (AEO) Reference Case light duty vehicle MPG projections to create MPG increments for each year. The New Hampshire fleetwide MPG projection was inflated to match the forecast increase in U.S. average light-duty stock MPG from the 2019 AEO Reference Case. This increment was used to adjust the percentage of each individual MPG bin's composition within the fleet in each year. Once a baseline future distribution of MPG values was created, both the future impact of RUF and future fuel tax revenues could be projected.

Figure 3.1 shows how the mean MPG(e) of newly registered New Hampshire vehicles has changed over the past 35 years. While new vehicle fuel economy increased slowly (from 16 to 19) from model years 1984 to 2004, there has been a notable increase in fuel economy of new vehicles since then, consistent with the imposition of more stringent corporate average fuel economy (CAFE) standards, and also responding to the higher fuel prices seen in the 2006+ timeframe. The figure also shows our projected increase from an average fleetwide fuel economy of 22.5 MPG(e) in 2018 to 30.3 MPG(e) in 2030 based on national fuel economy projections. Figure 3.2 shows the distribution of registered vehicles by combined MPG rating in 2018, and Figure 3.3 shows our projection of the fuel economy distribution of the New Hampshire light duty vehicle fleet in 2030.

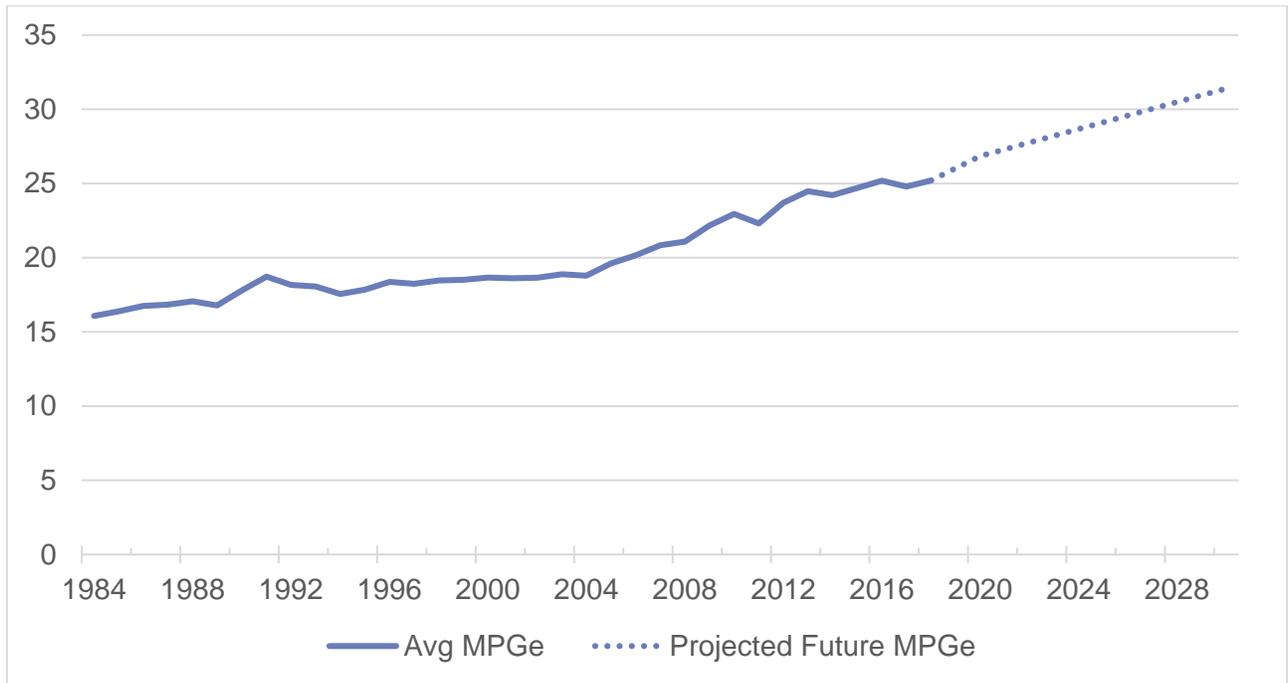**Figure 3.1 Mean MPG(e) of New Registered Vehicles in New Hampshire by Model Year**

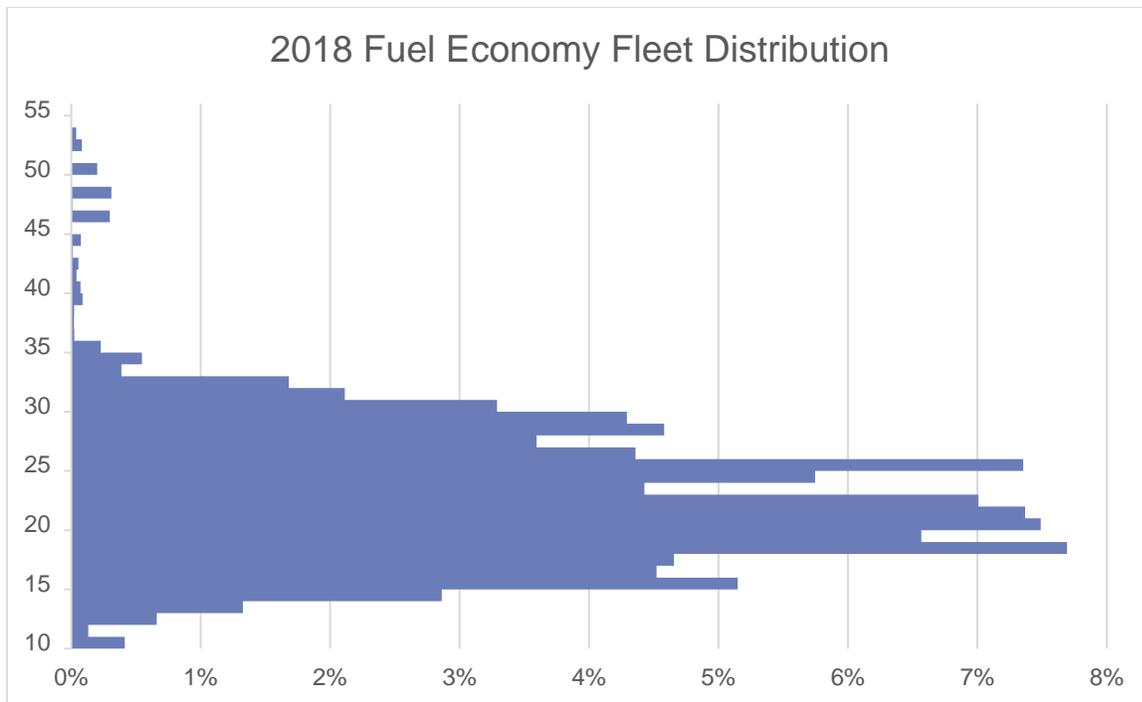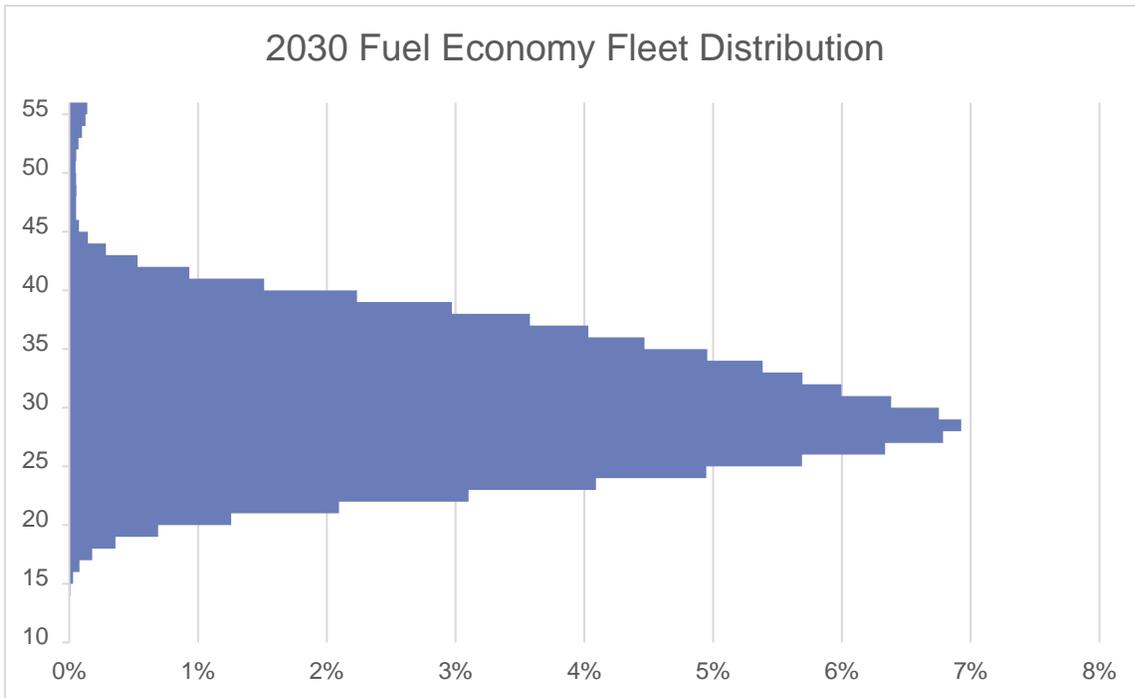**Figure 3.2 Distribution of MPG(e) in 2018**

**Figure 3.3 Modeled Distribution of MPG(e) in 2030**

4.0 Projection of Future Revenues from Existing Motor Fuel Taxes and Road Usage Fee

After assigning each vehicle in the DMV database a discrete MPG rating, the project team created projections of future revenue based on the projected change in number of vehicles by MPG rating, assuming motor fuel tax rates stayed unchanged. Using this methodology, the research team created a baseline fuel tax revenue projection for 2019 through 2030. Separately, RUF values were calculated started in 2021 (the first year for feasible implementation of the program). Once each vehicle in the database was matched to a corresponding MPG value, gas tax revenue was estimated by summing the value of fuel tax that each vehicle would pay based on its assigned MPG and average miles travelled per year.

The New Hampshire motor fuel tax on both gasoline and diesel fuel is set at $0.22 per gallon as of 2019[2], generating a total of $184.9 million in Fiscal Year 2018. Of this amount, 15 cents is designated as unrestricted revenue, for a total of $126.1 million collected as unrestricted revenue in FY 2018. Figure 4.1 shows the division of New Hampshire's gas tax revenue between unrestricted funds and the restricted Highway Betterment and SB367 Capital Investment Accounts. This analysis considers only unrestricted revenue.

Figure 4.1 New Hampshire Gas Tax Revenue (2018)

■ **Unrestricted Gas Tax Revenue** ■ **Highway Betterment** ■ **SB367 Capital Investment**
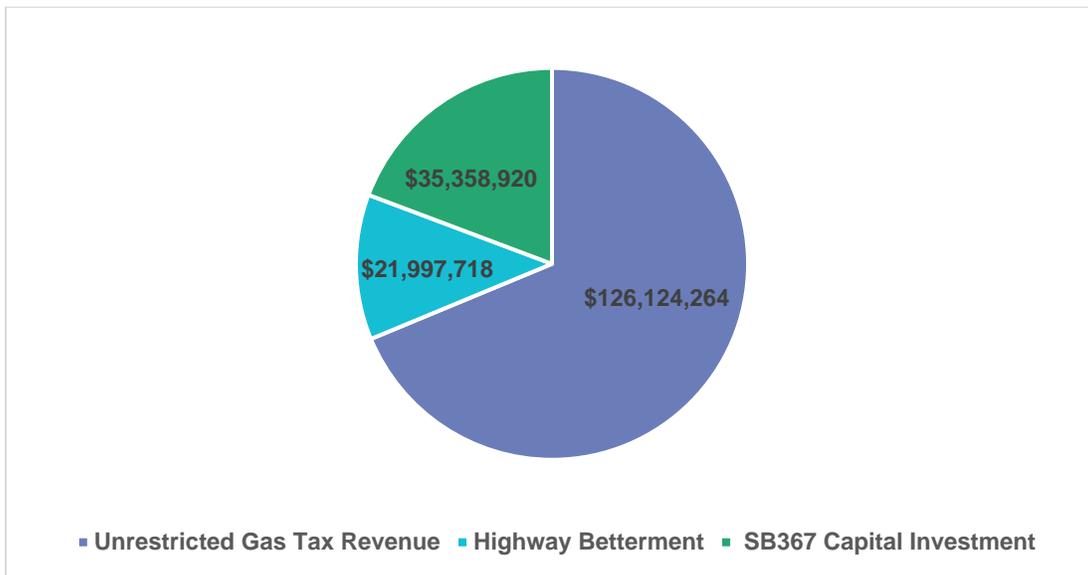
For each future year, the unrestricted fuel tax of $0.15 per gallon was multiplied by the number of vehicles in each MPG bin, along with a set VMT per vehicle value, derived from the Argonne National Laboratory's VISION model. (VISION estimates potential energy use, oil use and carbon emission impacts of advanced light- and heavy-duty vehicle technologies and alternative fuels.) The VISION estimate for nationwide VMT per vehicle is 11,132 annual miles per vehicle. The change in the number of total vehicles in each year was calculated using an assumed growth rate of 0.2 percent per year, mirroring statewide population growth projections from the New Hampshire Office of Strategic Initiatives.

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[2] The United States federal excise tax on gasoline is 18.4 cents per gallon and 24.4 cents per gallon for diesel fuel, but federal fuel taxes were not included for the purposes of evaluating projected New Hampshire transportation revenues.

After conducting our initial projection of future revenues, we found that the estimated amount based on the MPG distribution was about 25 percent lower than unrestricted fuel tax revenue actually collected (about $93 million in 2018 in our projections vs. $126 million collected in FY2018). We did not expect our estimate to provide an exact match, for the following reasons:

- Our estimate does not include revenue from fuel used by trucks and buses.[3]

- Although EPA has adjusted its MPG ratings over time to more closely reflect real-world MPG, the rated values may still differ from the actual fuel economy observed by New Hampshire drivers.

- The average miles driven per vehicle per year was estimated from national sources, lacking a good state-specific source. It is possible that New Hampshire drivers drive more or less than the national average. Also, it is possible that lower-MPG vehicles are driven, on average, more (or fewer) miles in a year than higher-MPG vehicles.

- Some motor fuel is purchased in New Hampshire by drivers of vehicles registered elsewhere. Conversely, New Hampshire drivers may purchase some of their fuel in other states. The balance may not be exactly one-to-one.

- Our estimate is based on *calendar year* 2018 vehicle registrations, as compared to *fiscal year* 2018 motor fuel tax receipts.

To provide a picture of the unrestricted revenue trend, we adjusted total revenue estimates from our model to match unrestricted motor fuel tax receipts in 2018. We expect that our projected trend in motor fuel tax receipts should mirror the trend in unrestricted tax receipts.

After we developed our initial estimates based on FY 2018 revenue, revenue estimates for FY 2019 and the first half of FY 2020 (through December 2019) became available. These estimates showed nearly constant revenue trends - $127.8 million in FY 2019 and $66.4 million in the first half of FY 2020. We adjusted our projections to delay the expected decline in revenue based on national fuel economy projections to start in 2021 rather than 2019. In part the constant revenue intake may reflect a shift of consumer preferences towards larger vehicles, especially SUVs, meaning that the fuel efficiency of new vehicles is not increasing at the rate projected. The decline could be further delayed if this shift towards purchasing SUVs instead of passenger cars continues.

Historical unrestricted highway fund revenue from 2010 through 2019, and projected revenues under the baseline "national MPG projections" forecast, are shown in Figure 4.2. While revenue has remained relatively steady since 2010, an increasingly efficient fleet portends a drop-off in revenue beginning after 2020 if no RUF program is established. However, with the addition of the RUF beginning in 2021, the sum of unrestricted highway motor fuel tax and RUF revenues (shown with the green dashed line) would exceed non-RUF levels by about $30 million, a gap that is projected to continue and slightly increase as the rate of gas tax decrease accelerates. In this scenario, the gas tax + RUF will produce about $15 million more in 2030 than the gas tax alone generated in 2018. While total unrestricted revenue would be about 10 percent

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[3] Diesel tax revenue (the main fuel source for trucks) made up about 14 percent of total gasoline plus diesel tax revenue in FY 2019. Although most light duty vehicles run on gasoline, and most trucks run on diesel, it is not possible to determine what fraction of each fuel sold is used in light vs. heavy duty vehicles. National projections show the fuel efficiency of trucks increasing by about 20 percent between 2018 and 2030 and state trends show truck VMT holding roughly level over the past two decades (see Section 5.1); if these trends continue fuel tax revenue from trucks would decline by about 20 percent in nominal terms, and more in real terms.

higher than 2020 levels in nominal dollars, when adjusted for inflation at a rate of 2.55 percent per year, real revenue would actually decline by nearly 30 percent even with the RUF included.

Figure 4.2 Historical and Projected Unrestricted Highway Fund Revenue: Baseline or "National MPG Projections" Scenario
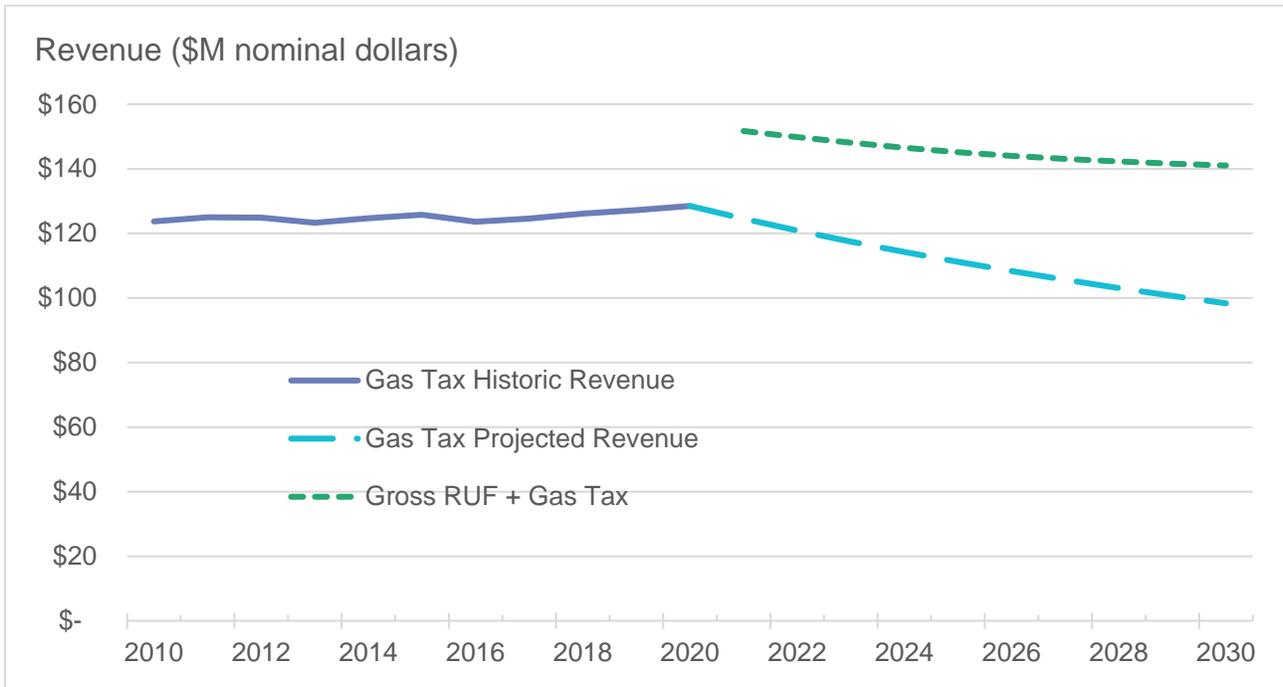
5.0 Uncertainty/Sensitivity Analysis

While the revenue estimates shown in Section 4.0 provide a baseline projection for future fuel tax revenues in New Hampshire, there are numerous contingencies that could shift this revenue trend. We first looked at nationwide forecasts for VMT, fuel economy, and vehicle sales to establish context, while also examining New Hampshire-specific VMT and fuel economy data to determine the degree to which nationwide trends correspond to conditions within New Hampshire. For the purposes of the baseline projection, a static estimate of VMT per vehicle was used to calculate the annual tax paid by vehicles in each MPG bin. Furthermore, the MPG distribution was projected based on a nationwide trend from the 2019 AEO. In this section, we alter the baseline assumptions to account for contingencies like a differing rate of change for fuel economy in New Hampshire, variable VMT/vehicle, different projections for future EV market penetration, and the potential for a rollback of CAFE standards.

5.1 Context for New Hampshire Trends

Figure 5.1 compares how national projections of light duty VMT growth have evolved over the past decade by comparing three projection years from the AEO – 2010, 2014, and 2019. Light duty VMT forecasts were revised significantly downward sometime between the 2010 and 2014 forecast, reflecting a shift from past trends of continuously increasing VMT. Observed data from this timeframe shows that the more conservative forecasts were warranted and, in fact, perhaps not conservative enough as VMT was slower to recover from the recession than anticipated. The 2019 AEO is showing slightly more VMT in the near term but a slightly lower rate of growth in the long term compared to the 2014 forecast. (National light duty VMT is forecasted to grow by 13 percent between 2018 and 2040.)

Figure 5.1 U.S. Light Duty Passenger Car/Truck VMT Projections
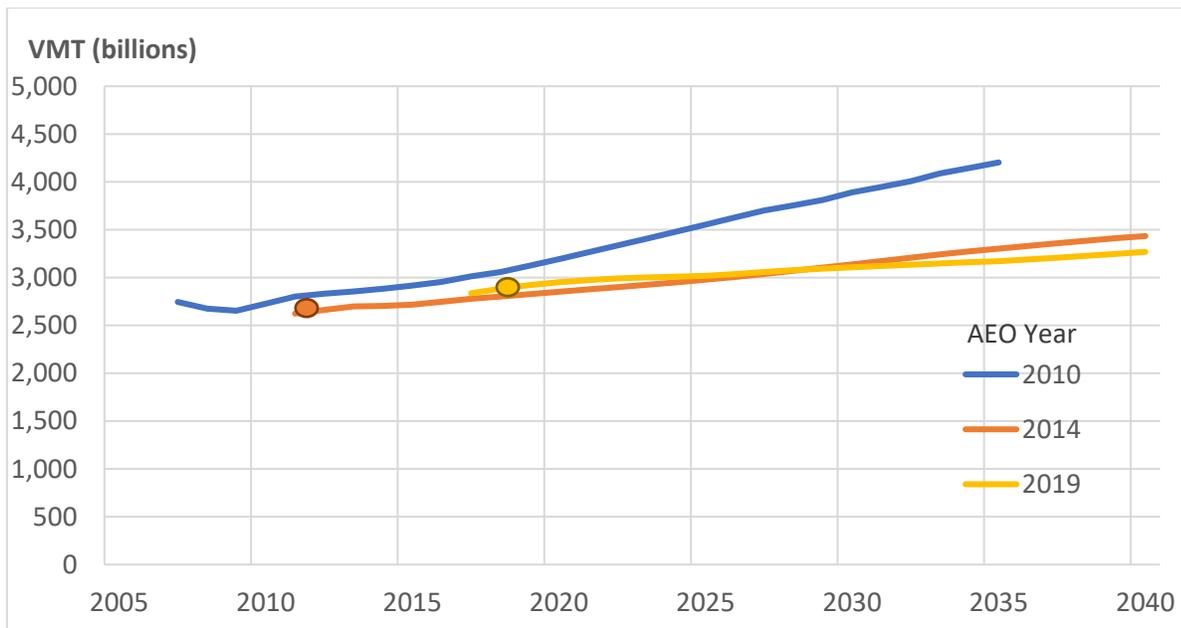
Source: AEO Reference Case 2010, 2014, and 2019. Dots are latest year of "observed" data in the AEO case.

Figure 5.2 shows total light-duty VMT and VMT per capita in New Hampshire since 2000. Light-duty VMT is currently about the same level as in 2004; it decreased slightly between 2008 and 2015 but rebounded to 2004 levels by 2017. VMT per capita has also remained generally flat since 2000. As shown in Figure 5.3, New Hampshire and U.S. VMT per capita were nearly identical in 2000 but have diverged slightly, with New Hampshire VMT per capita remaining flat and U.S. VMT per capita declining slightly. This relatively flat trend is a change compared to conditions observed before 2000 when VMT per capita had been increasing for decades.

Figure 5.2 New Hampshire Light Duty VMT and VMT Per Capita, 2000-2017
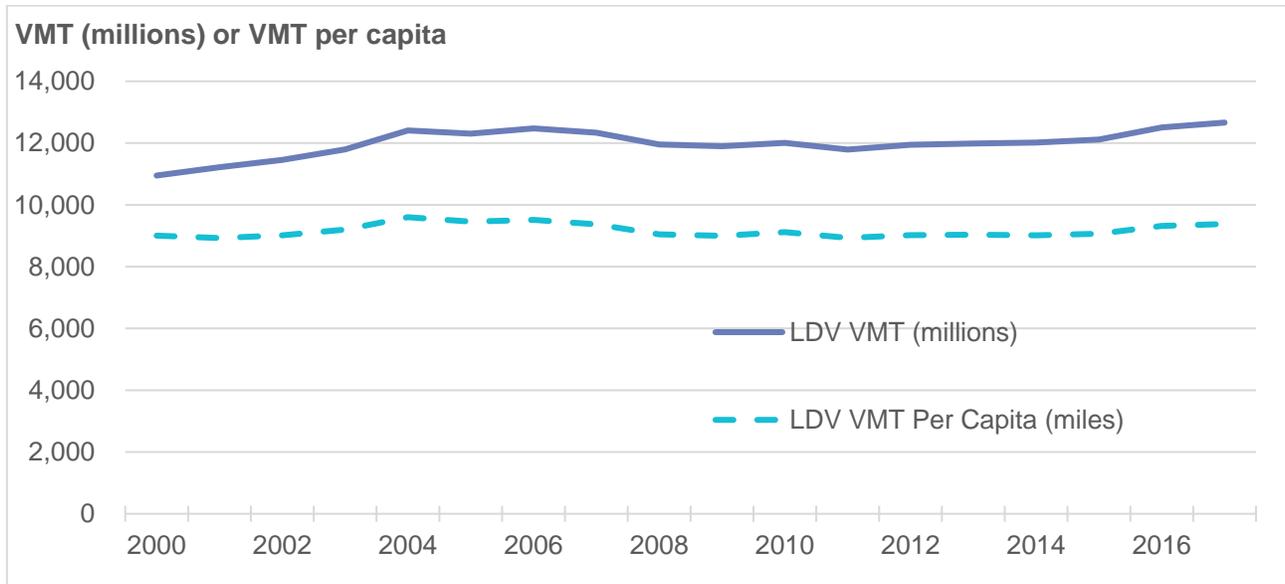
Source: FHWA Highway Statistics 2017 and American Community Survey; analysis by Cambridge Systematics

Figure 5.3 New Hampshire vs. U.S. Light-Duty VMT Per Capita
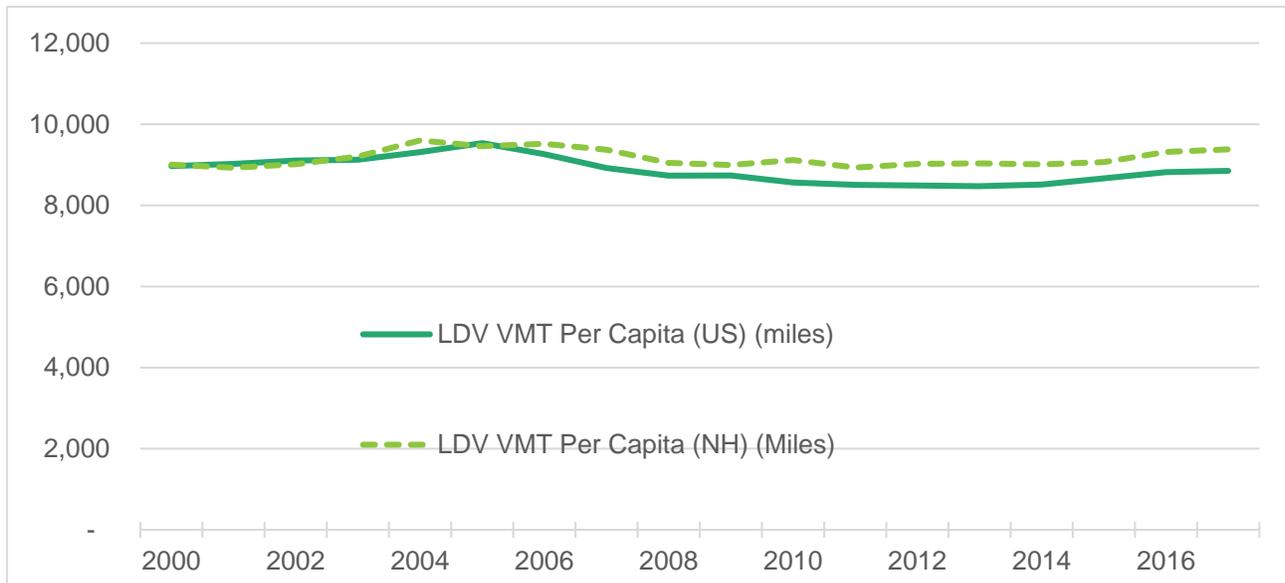
Source: FHWA Highway Statistics 2017 and American Community Survey; analysis by Cambridge Systematics

While larger trucks will not be MPG-rated, it is important to understand trends in travel of heavier vehicles as well as lighter vehicles since those trends will also affect motor fuel tax revenues. The 2019 AEO projects national truck VMT to grow by 33 percent between 2018 and 2040, as shown in Figure 5.4 – a slightly lower rate of growth compared to earlier projections, but still a higher growth rate than for light-duty vehicles.

Figure 5.4 U.S. Freight Truck VMT Projections
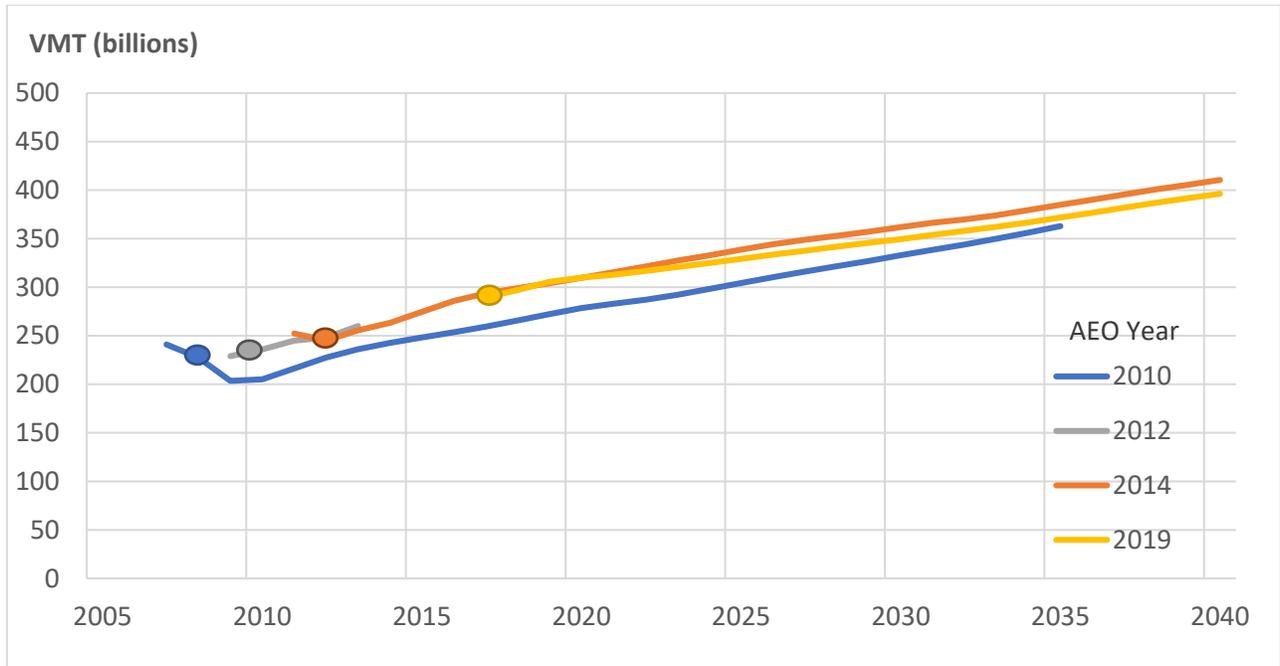
Source: AEO Reference Case 2010, 2012, 2014, and 2019. Dots are latest year of "observed" data in the AEO case.

In contrast with national trends, truck VMT in New Hampshire has actually declined in the wake of the Great Recession, although truck traffic has rebounded somewhat since 2011, as shown in Figure 5.5.

Figure 5.5 New Hampshire Truck VMT
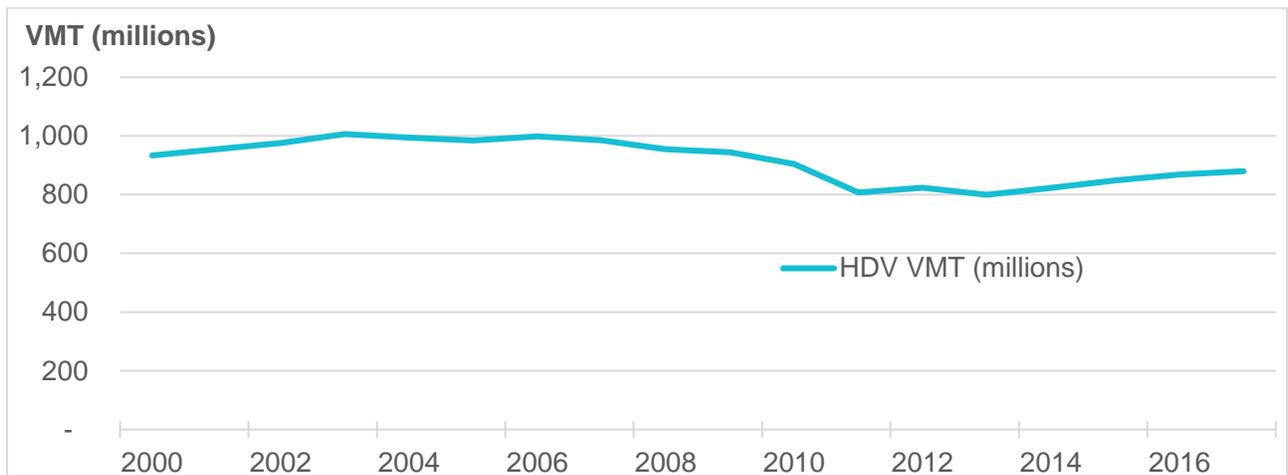
Source: FHWA Highway Statistics 2017, analysis by Cambridge Systematics

While fuel economy of LDVs and trucks has increased slowly, the AEO projects a higher rate of increase due to enhanced 2017-2025 LDV and HDV Phase 2 standards, as shown in Figure 5.6 for light-duty vehicles.

Figure 5.6 AEO Reference Case - New Car MPG Projections
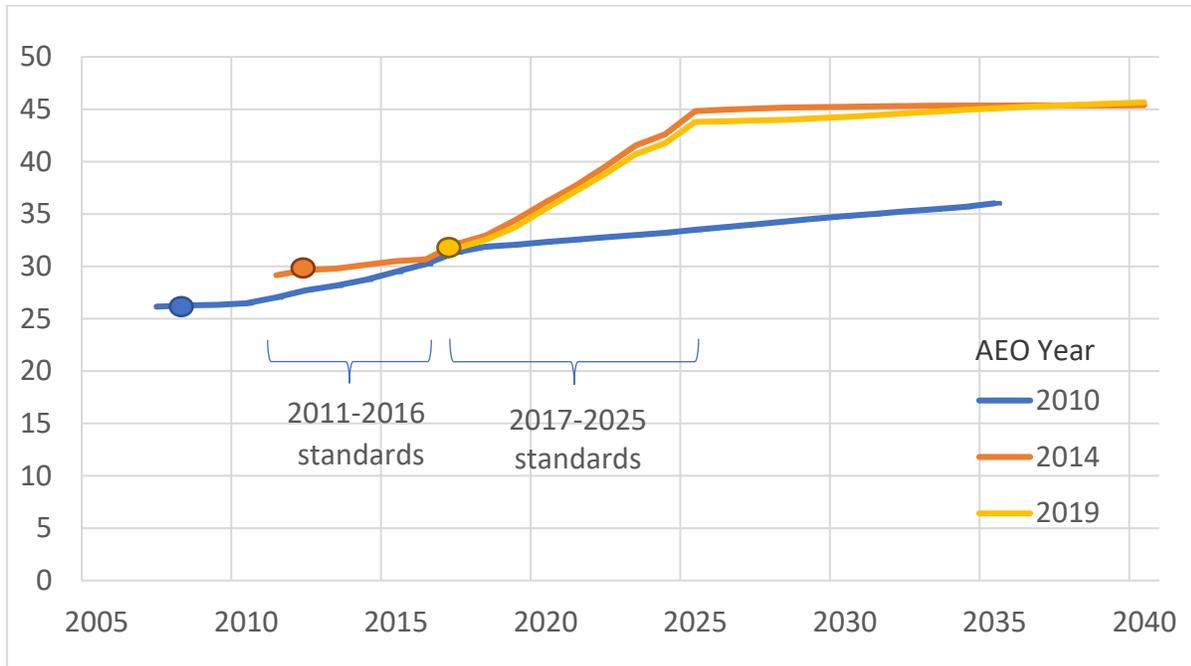
Source: AEO Reference Case 2010, 2014, and 2019. Dots are latest year of "observed" data in the AEO case.

While fuel consumption in New Hampshire has been almost flat since 2000, it seems likely that this trend will bend downward, assuming the fuel economy standards continue to be implemented and vehicle manufacturers supply vehicles with the mix forecast in the U.S. DOE's models to meet these standards. Because the standards are footprint-based, consumer trends towards larger or smaller vehicles (which could be driven by fuel prices, the economy, or other factors) could alter future MPG levels somewhat from projected levels.

5.2 Alternative MPG Projections: Continuation of Recent New Hampshire Gas Mileage Trends

The estimates in the baseline scenario show a steady increase in fuel economy (and resulting decline in revenues). However, in the past 10 years transportation revenues in New Hampshire have been relatively stable. As an alternative to our baseline projection, we considered a scenario with diminished fuel efficiency gains, extrapolating the statewide new vehicle MPG trend from 2010-2018 through 2030. Projected revenues under this scenario are shown in Figure 5.7.

Beginning with an average MPG of 22.5 in 2018, this "trend" scenario shows a more modest fuel efficiency growth rate, increasing to an average fleet MPG(e) of only 26 in 2030, which leads to a more gradual decline in gas tax revenue. This continues a trend of the recent rate of MPG increase observed in the NH vehicle fleet and does not factor in more aggressive fuel economy standards that could change the rate of increase.

Figure 5.7 Unrestricted Highway Fund Revenue from Under Low MPG Growth Scenario
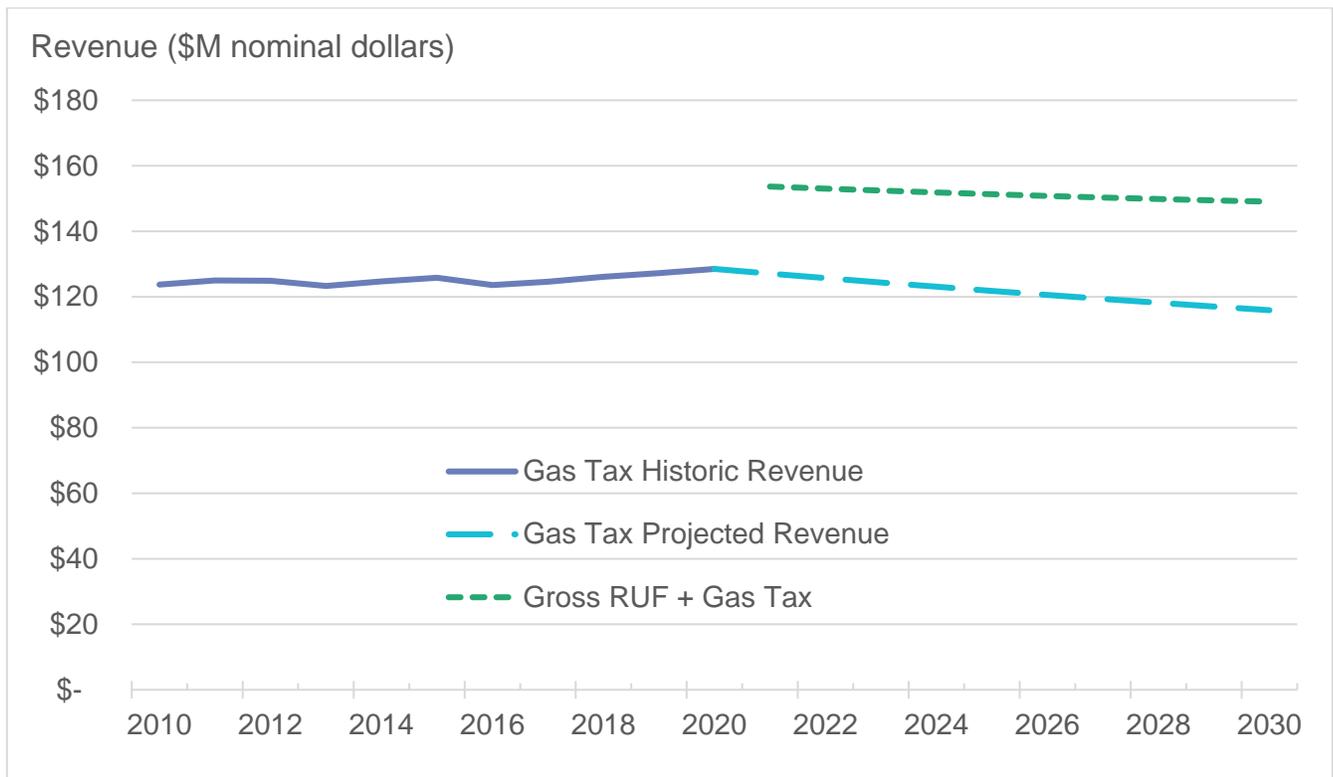
As shown in Figure 3.1, the MPG of vehicles in New Hampshire has been slowly but steadily increasing since 2004. Figure 5.8 compares what unrestricted revenue would have been if the light duty vehicle fleet had remained at the average 2004 MPG. Revenue (in nominal dollars) would have been about 25 percent higher than it is today, reflecting the 25 percent improvement in fuel efficiency since then.

Figure 5.8 Comparison of 2018 NH Gas Tax Revenue and Estimated Revenue with MPG Remaining at 2004 Levels

Revenue ($M nominal)

- $126.1 — 2018 Actual Unrestricted Revenue
- $169.2 — 2018 Unrestricted Revenue with statewide MPG at 2004 levels
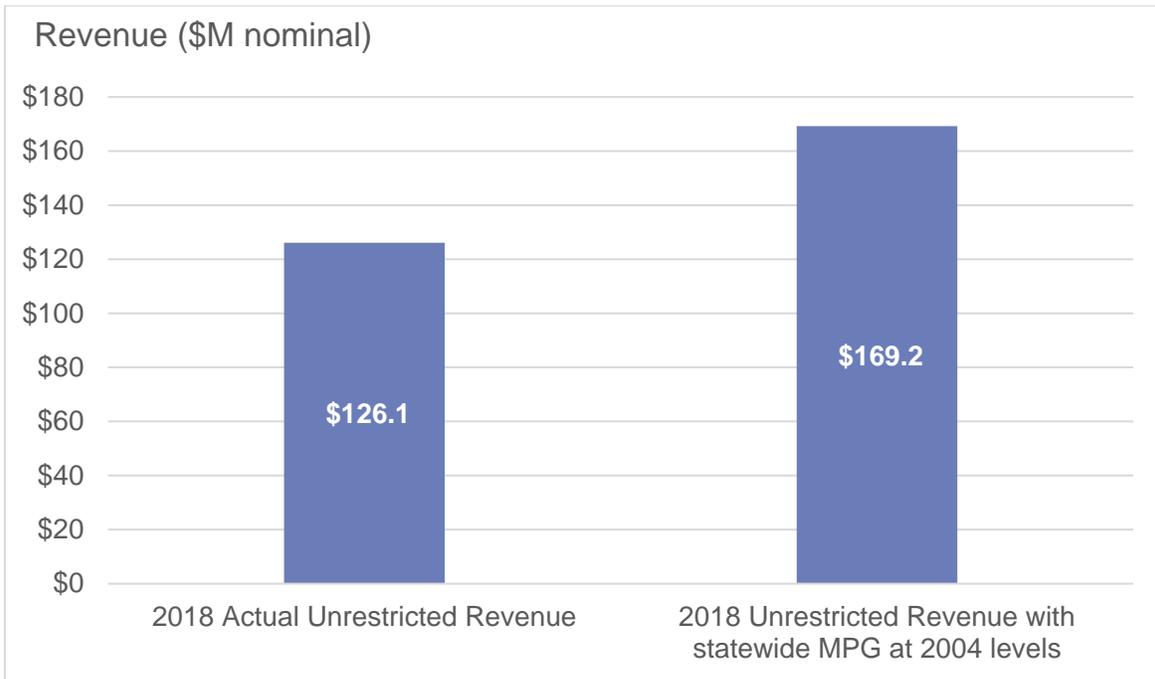
5.3 Alternate VMT per Vehicle Scenario

The baseline scenario uses a static assumption for VMT per vehicle across the 2018-2030 timeframe, which does not account for possible changes in VMT per capita. In order to test the impact of higher than expected VMT growth, we created a scenario assuming 7 percent growth in VMT per vehicle between 2018 and 2030. In this scenario, VMT/vehicle would grow from 11,136 in 2018 to just under 12,000 in 2030. Under this scenario, the drop off in revenue is more modest due to higher estimated fuel consumption, falling to only $100 million in 2030, in comparison to $95 million in the baseline scenario (Figure 5.9).

Figure 5.9 Unrestricted Highway Fund Revenue Under Alternate VMT Scenario

Revenue ($M nominal dollars)

Legend:
- Gas Tax Historic Revenue
- Gas Tax Projected Revenue
- Gross RUF + Gas Tax
- Gas Tax Projected Revenue Alt VMT/VEH
- Gross RUF + Gas Tax Alt VMT/VEH
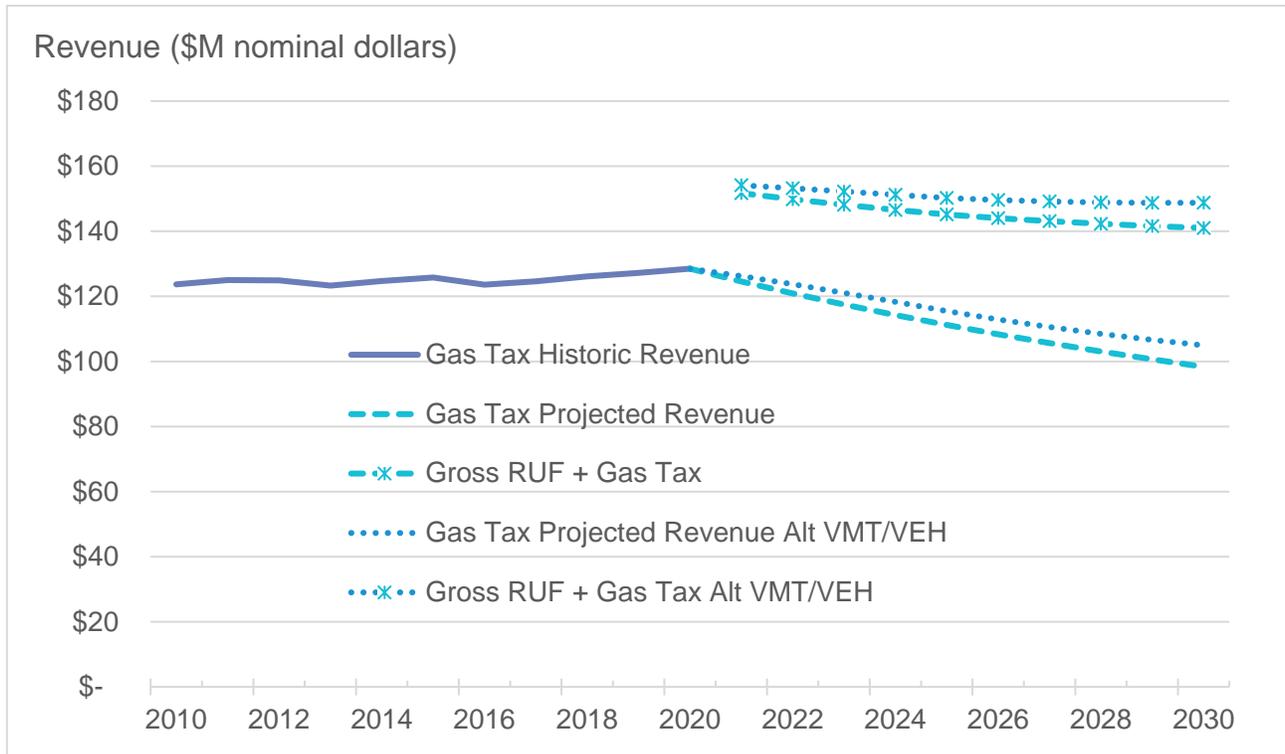
5.4 CAFE Standard Rollback Scenario

Another sensitivity scenario we modeled projects a future in which CAFE standards are frozen at 2020 levels, as proposed by the Trump Administration, resulting in a less efficient vehicle fleet in the future (Figure 5.10). While the decline in fuel tax revenues is less precipitous in a future with frozen CAFE standards, revenue is still projected to decline by $20 million in this scenario as a result of efficiency improvements in the vehicle fleet prior to 2020. The projected 2030 revenue in the CAFE rollback scenario is nearly identical to the projected revenue shown in 2030 from the continuation of New Hampshire fuel efficiency trends shown in Section 5.1 (just over $110 million).

Figure 5.10 Unrestricted Highway Fund Revenue Under CAFE Rollback Scenario

Revenue ($M nominal dollars)

Legend:
- Gas Tax Historic Revenue
- Gas Tax Projected Revenue
- Gas Tax Projected Revenue CAFE Rollback Scenario
- Gross RUF + Gas Tax
- Gross RUF + Gas Tax CAFE Rollback Scenario
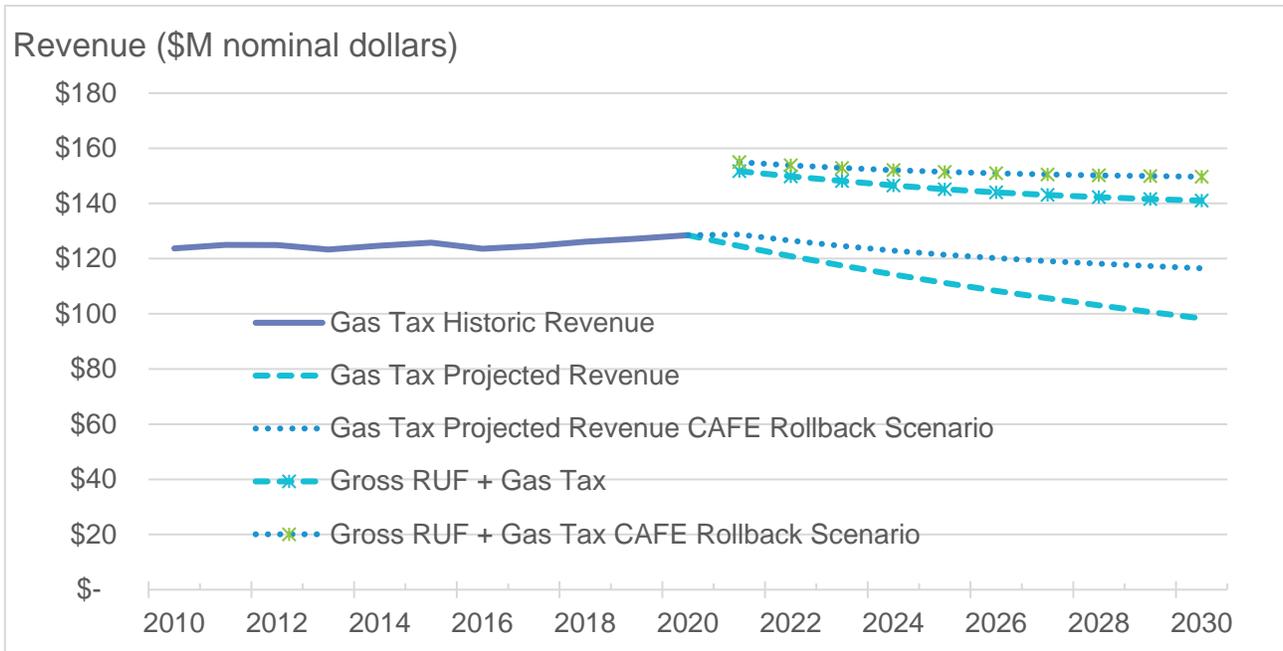
5.5   Alternative EV Adoption Scenarios

In order to understand how greater adoption of electric vehicles might impact future statewide transportation revenues, two separate EV uptake scenarios were tested against the baseline scenario, which assumes no significant EV growth, other than an increase in vehicles in high-MPG (60+) categories consistent with upward drift of the current year MPG distribution shown in Figure 3.2. The "EV Low" scenario represents projections from the 2019 AEO Reference Case, comprising 9 percent of new sales in 2030. The "EV High" scenario represents projections from the 2018 Bloomberg New Energy Finance 2018 Electric Vehicle Outlook, an annual forecast of electric vehicles, shared mobility and road transport, which projects that EVs will make up 32 percent of new vehicle sales in 2030. Revenue projections under these scenarios are shown in Figure 5.11.

Figure 5.11 Unrestricted Highway Fund Revenue Under Different EV Adoption Scenarios
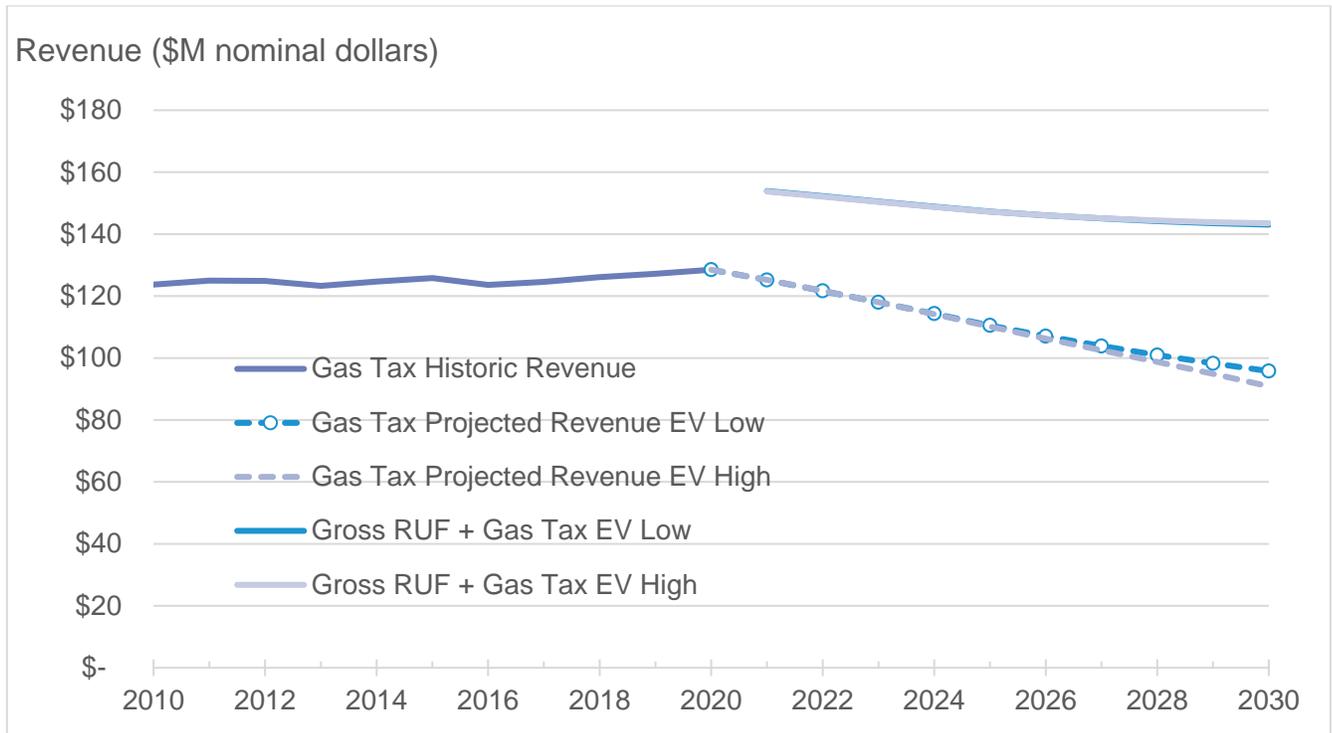
While the low EV adoption only results in $5 million less in transportation revenues in 2030 compared to the baseline forecast, the high EV adoption scenario results in $10 million less in revenue in 2030. Despite different revenue projections without the RUF, the RUF + revenue projections are almost identical in each scenario, generating about the same level of transportation revenue in 2030 as the gas tax generated for New Hampshire in 2018. Additional revenue from the RUF in the form of $125 per non-gasoline vehicle offsets the lost gas tax revenue in both scenarios.

5.6 Summary

All of the scenarios modeled show statewide transportation revenues declining over the next decade, although the pace of revenue decline might differ based on contingencies. In the highest EV adoption scenario, annual unrestricted highway fund revenue from motor fuel taxes could drop as low as $91 million in 2030, while in the case of a linear continuation of statewide fuel efficiency trends or a CAFE rollback scenario, revenues could stay as high as $117 million in 2030. In all scenarios, the imposition of a RUF program would increase statewide revenues while making revenue flows more consistent. In each of the modeled scenarios, 2030 transportation revenues from unrestricted fuel taxes plus the proposed RUF are projected between $140 million and $150 million. Table 5.1 and Table 5.2 provide a detailed breakdown of projections for state gas tax revenue and RUF receipts in the baseline and all of the tested sensitivity scenarios, while Table 5.3 provides the sum of the gas tax and RUF receipts for each scenario.

These tables also show the percent change in nominal and real revenue between 2020 and 2030. When adjusting for inflation, fuel tax revenues alone are projected to decline by 33 to 47 percent. Even when

considering the added revenue from the RUF, total real unrestricted highway fund revenues are projected to decline by around 13 to 18 percent from current levels.

Table 5.1 Projected Unrestricted Gas Tax Revenue from Tested Scenarios (Millions of Nominal Dollars)

Year	Baseline (National MPG Projections)	NH MPG Trend	CAFE Rollback	Higher VMT per Vehicle	More EVs (Low Market Share)	More EVs (High Market Share)
2020	$128.5	$128.5	$128.5	$128.5	$128.5	$128.5
2021	$124.6	$127.1	$128.8	$126.2	$125.2	$125.2
2022	$120.9	$125.7	$126.5	$123.7	$121.7	$121.7
2023	$117.5	$124.4	$124.6	$121.0	$118.0	$118.0
2024	$114.2	$123.1	$122.9	$118.3	$114.3	$114.2
2025	$111.2	$121.8	$121.4	$115.5	$110.5	$110.1
2026	$108.3	$120.6	$120.2	$112.9	$107.0	$106.2
2027	$105.6	$119.4	$119.1	$110.6	$103.9	$102.5
2028	$103.1	$118.2	$118.2	$108.5	$101.0	$98.7
2029	$100.6	$117.0	$117.3	$106.6	$98.3	$94.9
2030	$98.3	$115.9	$116.5	$104.9	$95.8	$90.9
2020 – 2030 Change:						
Nominal $	-24%	-10%	-9%	-18%	-25%	-29%
Real $	-43%	-33%	-32%	-39%	-44%	-47%

Table 5.2 Projected RUF Revenue from Tested Scenarios (Millions of Nominal Dollars)

Year	Baseline (National MPG Projections)	NH MPG Trend	CAFE Rollback	Higher VMT per Vehicle	More EVs (Low Market Share)	More EVs (High Market Share)
2021	$27.1	$26.6	$26.2	$27.9	$28.7	$28.5
2022	$28.9	$27.3	$27.3	$29.5	$30.6	$30.4
2023	$30.7	$28.0	$28.3	$31.2	$32.5	$32.4
2024	$32.3	$28.8	$29.2	$32.9	$34.6	$34.6
2025	$34.0	$29.5	$30.0	$34.8	$36.8	$37.1
2026	$35.7	$30.2	$30.7	$36.7	$39.0	$39.8
2027	$37.5	$31.0	$31.4	$38.6	$41.2	$42.6
2028	$39.2	$31.7	$32.0	$40.4	$43.2	$45.7
2029	$41.0	$32.4	$32.6	$42.1	$45.3	$48.9
2030	$42.7	$33.1	$33.2	$43.8	$47.3	$52.6

Table 5.3 Projected Unrestricted Gas Tax + RUF Combined Revenue from Tested Scenarios (Millions of Nominal Dollars)

| Year	Baseline (National MPG Projections)	NH MPG Trend	CAFE Rollback	Higher VMT per Vehicle	More EVs (Low Market Share)	More EVs (High Market Share)
2020	$128.5	$128.5	$128.5	$128.5	$128.5	$128.5
2021	$151.7	$153.7	$155.0	$154.1	$153.9	$153.7
2022	$149.8	$153.0	$153.8	$153.2	$152.3	$152.1
2023	$148.2	$152.4	$152.9	$152.2	$150.5	$150.4
2024	$146.5	$151.9	$152.1	$151.2	$148.9	$148.8
2025	$145.3	$151.3	$151.4	$150.3	$147.3	$147.2
2026	$144.0	$150.8	$150.9	$149.6	$146.0	$146.0
2027	$143.1	$150.4	$150.5	$149.2	$145.1	$145.1
2028	$142.3	$149.9	$150.2	$148.9	$144.2	$144.4
2029	$141.6	$149.4	$149.9	$148.7	$143.6	$143.8
2030	$141.0	$149.0	$149.7	$148.7	$143.1	$143.5
2020 – 2030 Change:						
Nominal $	10%	16%	16%	16%	11%	12%
Real $	-18%	-14%	-13%	-14%	-14%	-17%

6.0 Equity Implications

Equity is a key consideration for the successful implementation of the RUF program. This section evaluates the potential equity implications of a RUF program using several different lenses, including examining differential effects based on miles driven per year, vehicle age, geography (urban vs. rural), and household income. Section 6.4 presents an analysis of equity based on location-based services (LBS) data, gathered anonymously from cell phones, to provide a more detailed picture of how different population groups would be affected differently by fuel taxes vs. a Road Usage Fee.

6.1 Incidence by Miles Driven per Year

One potential concern is that the fee could have an outsized impact on both drivers of certain types of vehicles and drivers who drive fewer miles per year, who would pay a flat fee despite using the state's transportation system less. When holding annual mileage constant at 12,000, the total cost of fuel (including taxes) and the RUF is still much lower for drivers of more efficient vehicles despite their payment of a higher fee, as shown in Figure 6.1.[4]

**Figure 6.1 Annual Fuel + RUF Cost at Various MPG Levels and 12,000 mi/year**
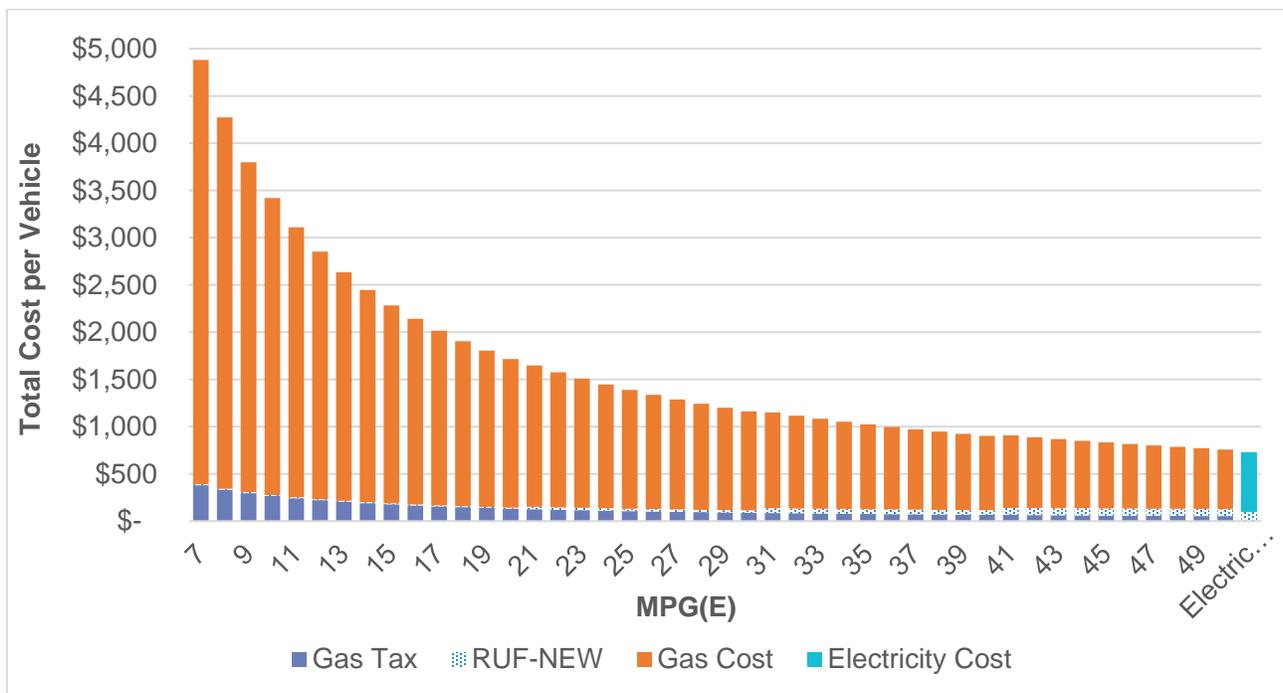
When examining incidence based on a miles driven per year basis, however, this situation is slightly different. Figure 6.2 shows how the impact of the RUF and fuel taxes differs based on both fuel economy and annual miles driven. With a RUF program in place, drivers of the most efficient vehicles pay significantly

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[4] Fuel costs are based on an average retail price of $2.62 per gallon of gasoline as of August 2019 per the New Hampshire Office of Strategic Initiatives (https://www.nh.gov/osi/energy/energy-nh/fuel-prices/). Electric vehicle operating costs are calculated using an MPGe of 110 and a residential retail electricity rate of $0.17 per kilowatt-hour based on U.S. DOE state electricity profile data from 2018 (https://www.eia.gov/electricity/state/).

more in taxes and fees at low levels of annual miles driven, but as miles driven increases the burden on drivers of less efficient vehicles increases. At the highest levels of annual miles driven, the combined taxes and fees for all vehicles over 30 MPG are grouped tightly together. For most drivers, the RUF will only have a marginal impact on their transportation taxes and fees, but drivers of highly efficient vehicles who only drive occasionally will be impacted the most. For the vast majority of drivers, the RUF would only constitute a very slight increase in the total cost of driving. However, for owners of very efficient vehicles who drive less than 10,000 miles a year, the RUF would constitute a substantial portion (or in the case of no-gas vehicle owners, the entirety) of their annual cost of fuel (including taxes). Despite this discrepancy, their contribution to state transportation revenues would still be substantially lower than drivers of less efficient vehicles.

Figure 6.2 Annual Gas Tax + RUF at Various Miles/year and MPG levels
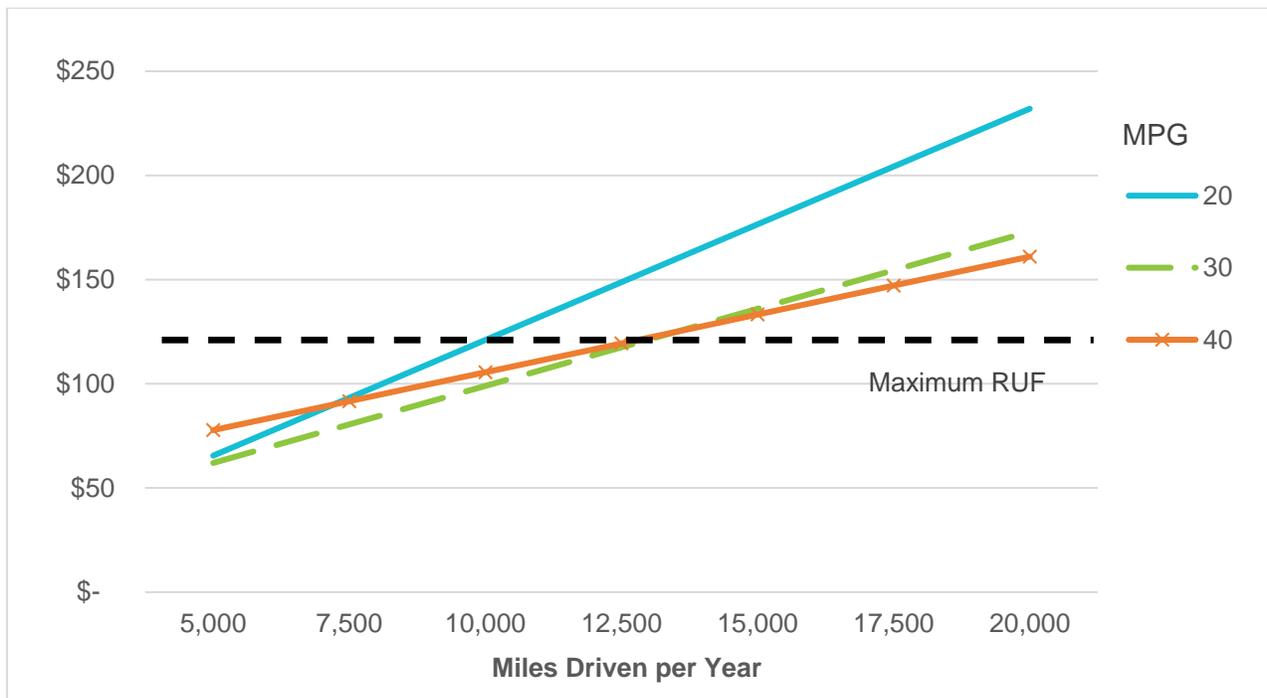
6.2 Incidence by Vehicle Age

In order to understand if impacts would vary based on the age of vehicles, the total sum of state motor fuel taxes and RUF was evaluated by vehicle model year. Figure 6.3 shows the costs paid by vehicles on average according to their age, with fuel taxes and the proposed RUF overlaid on top. This version is adjusted to account for differing (usually lower) annual mileages for vehicles as they age.

Figure 6.3 Fuel Cost and RUF Incidence by Vehicle Age (average miles/vehicle by age)

Average Gas Cost, Gas Tax, and RUF per Vehicle and by Model Year
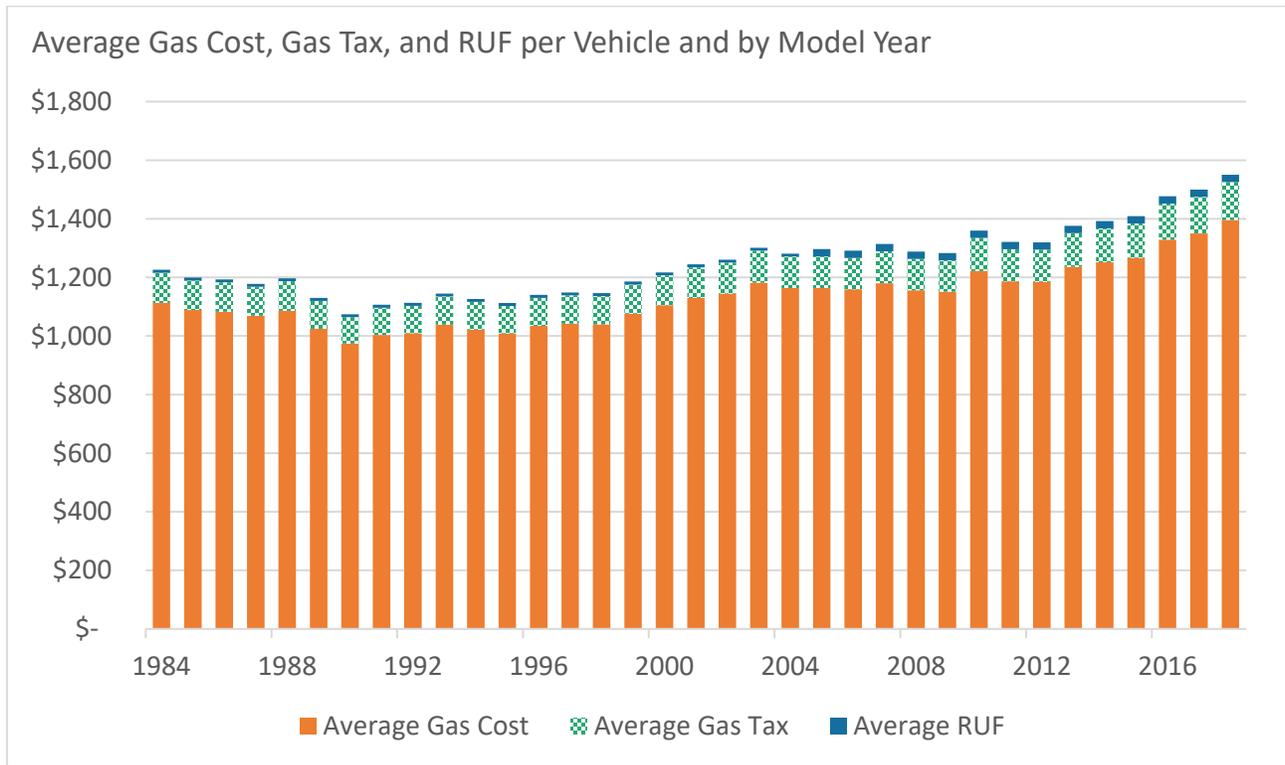
Given that older vehicles are driven less than newer ones, there is not a great deal of variation in transportation cost based on vehicle age, although in this projection newer vehicles pay somewhat more. However, in an unadjusted scenario (with VMT/vehicle staying constant), drivers of old vehicles that drive as much as new car owners would bear a higher share of the burden, paying about 30 percent more overall, due to the lower fuel efficiency of older cars on average.

## 6.3   Incidence by Geography of Vehicle Owner

The incidence of gas cost and RUF by different geographic contexts in New Hampshire was also evaluated, using average VMT per vehicle data by area type from the 2017 National Household Travel Survey (NHTS), to understand if transportation costs vary by geographic context in New Hampshire. The NHTS geographic classifications were used for this evaluations, four of which apply to New Hampshire: Second City, Suburban, Small Town, and Rural. The definitions of these classifications are somewhat complex, but are mostly based on population density in context of its surrounding area, or "contextual density". To establish this classification, the United States was divided into a grid to reduce the impact of variation in size (land area) of census tracts and block groups. Density was converted into centiles, that is, the raw numbers (persons per square mile) were translated into a scale from 0 to 99. There are four classifications that apply to New Hampshire:

- **Suburban areas** -- not population centers of their surrounding communities (density centile score between 40 and 90). Examples include Bedford and Atkinson.

- **Second Cities** -- Satellite cities surrounding major metropolitan areas (density centile score between 40 and 90). Examples include Manchester and Nashua.

- **Small Towns** and **Rural areas** include exurbs, farming communities, and various rural areas.

  - 98% of block groups designated **Town** have a density centile between 20 and 40. An example is Newport.

  - 100% of block groups designated **Rural** have a density centile between 0 and 20. An example is Marlow.

Across the board, rural and small town drivers pay higher amounts of motor fuel taxes because their average VMT is higher, compared to residents of New Hampshire's largest urban areas ("second cities") and the state's suburban areas, as shown in Figure 6.4. In contrast to the fuel tax, which is proportional to miles driven, the Road Usage Fee would be the same for all drivers regardless of miles driven, and therefore would constitute a higher relative proportion of transportation costs for the state's urban and suburban drivers than it would for its residents of rural areas and small towns However, as the efficiency of vehicles increases, the difference in costs between different MPG categories is diminished.

Figure 6.4 Annual Gas Cost and RUF Incidence by Driver Home Geography
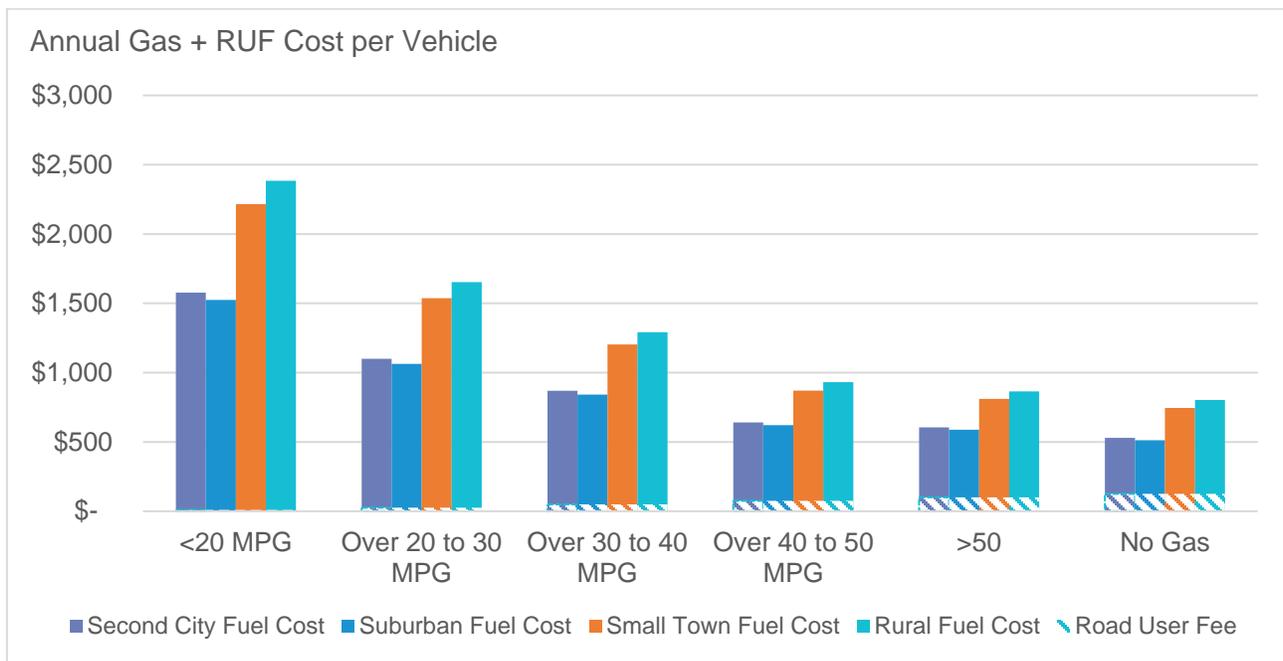
6.4 Equity Analysis Using Location-Based Services Data

The project team used a national dataset on travel patterns as collected from cell phones and mobile devices, known as location-based services or LBS data, to examine travel patterns by geography in more detail. These data are collected from cell phones, reported anonymously and do not contain any information related to the owner of the device. The project team applied proprietary processing methods to generate trip flows (origins and destinations at a census block group level) and home locations from the cell phone locations. Each cell phone was assumed to represent a single vehicle and the dataset was expanded to match the vehicle population of New Hampshire based on the DMV dataset. The trip data was also weighted to account for home location, work location, and trip length distribution. The distance traveled by each trip

was then estimated by applying a factor adjustment to the straight-line distance between the origin and destination in order to account for the difference between straight-line and actual network travel distance. The total VMT was further adjusted to match the average VMT of New Hampshire vehicles obtained from the 2017 NHTS.

The percentage of VMT occurring inside New Hampshire and outside of New Hampshire was estimated based on the origin and destination of each trip, for example a trip between Massachusetts and New Hampshire was assumed to occur 50 percent in each State. As a validation check, the total annual New Hampshire VMT obtained from the LBS data was checked against the Federal Highway Administration Highway Performance Monitoring System estimate, and both estimates were around 12.7 billion miles.

In addition to calculating VMT from the LBS data, each vehicle was assigned a household income based on the home location of the vehicle. Income was randomly assigned so that the overall income distribution of vehicles matched the income distribution obtained from the latest (2013 – 2017) American Community Survey (ACS) at the census block group level. Each vehicle was also assigned a rural vs. urban designation based on the characteristics of the home block group from the ACS. If the block group had more than 50 percent urban residents, it is classified as urban, otherwise it is classified as rural. Finally, each vehicle was randomly assigned an MPG category to match the MPG category distribution at a ZIP code level from the DMV dataset. From the 2017 NHTS it was observed that lower income households are more likely to own older vehicles (which have lower MPG ratings) while higher income households are more likely to own SUVs (that also have lower MPG ratings). These distinctions were also accounted for when MPG category was assigned to each vehicle.

The following issues were investigated with the comprehensive LBS dataset:

- Distance traveled and taxes + fees paid by New Hampshire residents vs. visitors (based on the proportion of VMT in New Hampshire by vehicles garaged in the state).

- Taxes + fees paid by income group (based on the average income of the town in which the vehicle is garaged).

- Taxes + fees paid by rural vs. urban residents.

- Taxes + fees paid by MPG category (based on the distribution of vehicles by MPG by city/town).

- Taxes + fees paid by annual miles driven.

6.4.1 Residents vs. Visitors

Fifteen percent of VMT in New Hampshire is estimated to be taken by visitors, while 85 percent is taken by residents. Assuming that visitors and residents buy motor fuel in proportion to where they drive, it may be inferred that 15 percent of New Hampshire's motor fuel taxes are paid by out-of-state visitors. (Conversely, New Hampshire residents will pay some fuel taxes to other states). This assumption may not be valid if fuel price differences between states lead drivers to disproportionately buy gas in one state or another.

The RUF is paid entirely by New Hampshire residents. The implication is that a shift from motor fuel taxes to the RUF may result in a reduction in the percentage of transportation costs paid for by visitors, compared to raising the same amount of revenue from motor fuel taxes only. Visitors currently contribute an estimated $19 million to unrestricted fuel tax revenues, compared to $24 million that would be raised from the RUF in

2021. If the motor fuel tax is maintained at current levels, however, New Hampshire would continue to receive fuel tax revenue from visitors.

6.4.2   Incidence by Income Group

The LBS data was used to estimate the annual distance traveled by income group, using our estimate of the distance traveled by block group in combination with the distribution of income by census block group from the ACS. On a per-vehicle basis, the incidence of gas tax shows little variation, ranging from $90 annually for the lowest income group to just over $100 for the highest groups; and the RUF would average $21-24 per year for all groups. However, high-income households tend to own more vehicles and drive more than low-income households. We combined the LBS and ACS information with information on the average vehicles per household in each income bracket from the 2017 NHTS. Figure 6.5 shows that the overall gas tax and RUF burden has a linear relationship with household income, increasing from $100 for the lowest income group to over $350 for the highest groups, although costs level off towards the upper end of the income spectrum. While households from all income groups would pay slightly more under a RUF scheme, the increase would be greater for higher income households given the higher vehicle ownership levels, although the new fee would represent a higher proportion of the overall "Gas Tax + RUF" cost for lower-income households. The overall cost burden is – and will continue to be – proportionately less, as a percentage of income, for higher-income households.

Figure 6.5 Gas Tax and RUF Burden by Income Bracket
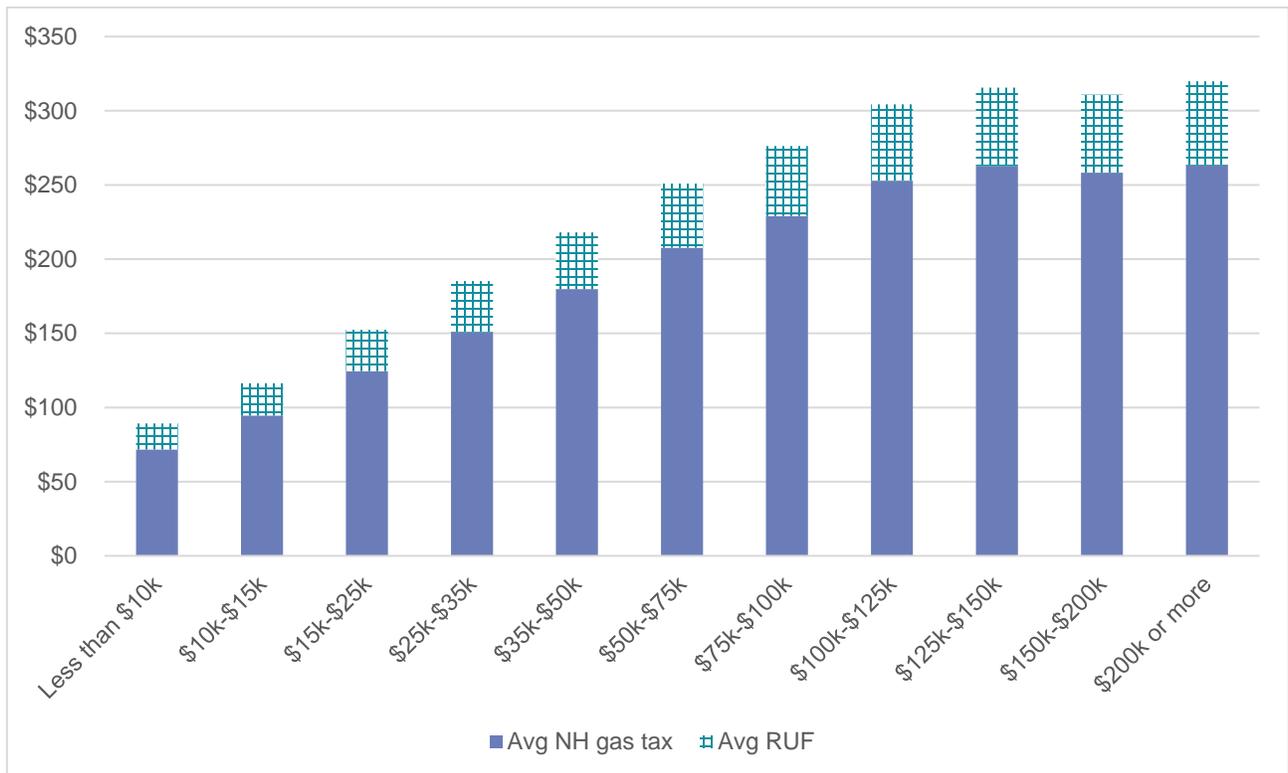
Note: "gas tax" in these charts only includes state gas tax paid within New Hampshire. Gas taxes paid during out-of-state travel is not included.

6.4.3 Incidence by Rural vs. Urban

The LBS data, consistent with the NHTS, shows that drivers from rural block groups tend to drive longer distances than drivers from urban block groups. The LBS data suggest that rural drivers currently pay about $30 more in fuel taxes annually than urban drivers ($119 vs. $89). However, they would pay about the same amount in RUF. Thus, a shift to the RUF would represent a very modest shift in the cost burden from rural to urban residents. Rural residents are responsible for about 44 percent of VMT generated by New Hampshire residents in this analysis.

6.4.4 Incidence by MPG Category

As discussed in previous sections (and by design), residents with lower-MPG vehicles would pay more in fuel taxes but less RUF. Figure 6.6 shows the estimated sum of motor fuel tax and RUF paid by MPG category based on association of vehicles by MPG registration by ZIP code from the DMV data, and average miles driven by ZIP code from the LBS data. It ranges from a low of $112 for the 20-30 MPG category to a high of $137 for the <20 MPG category or $141 for the 50-60 MPG category.

Figure 6.6 Average Annual Fuel Tax + RUF by MPG Category
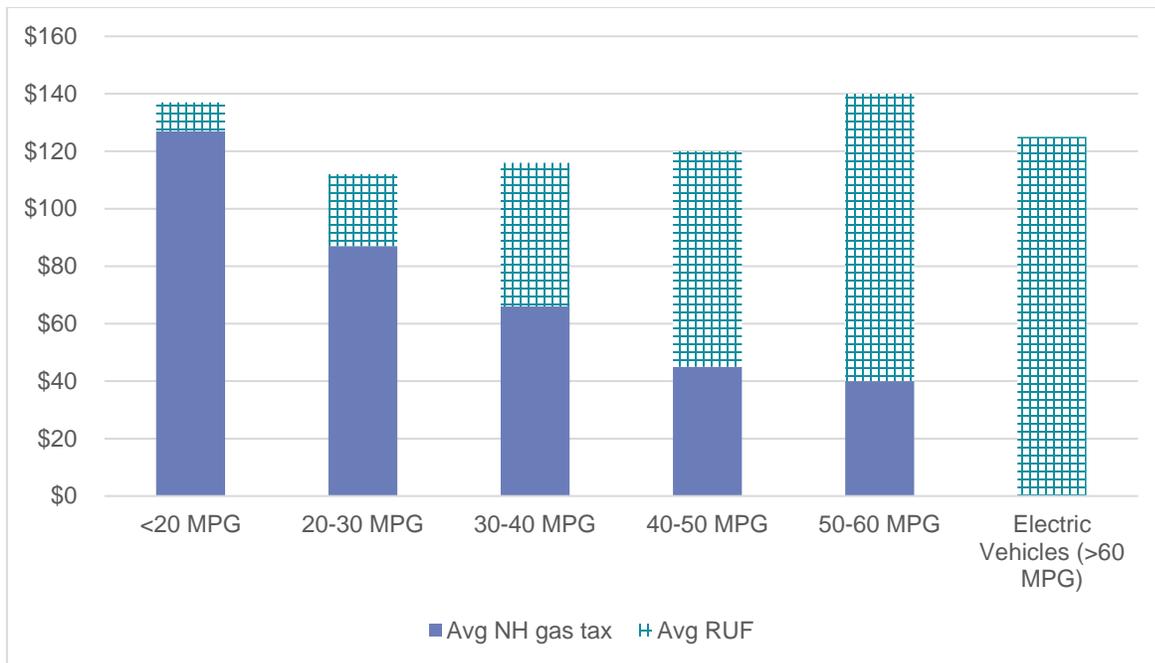
6.4.5 Incidence by Annual Miles Driven

The incidence of the current motor fuel tax varies in proportion to miles driven, from a low of about $30 for less than 5,000 miles a year to over $300 for drivers exceeding 30,000 miles a year, as shown in Figure 6.7. In contrast, the RUF would be fixed at an average of about $21 per vehicle regardless of distance driven.

Figure 6.7 Average Annual Fuel Tax + RUF by Distance Driven
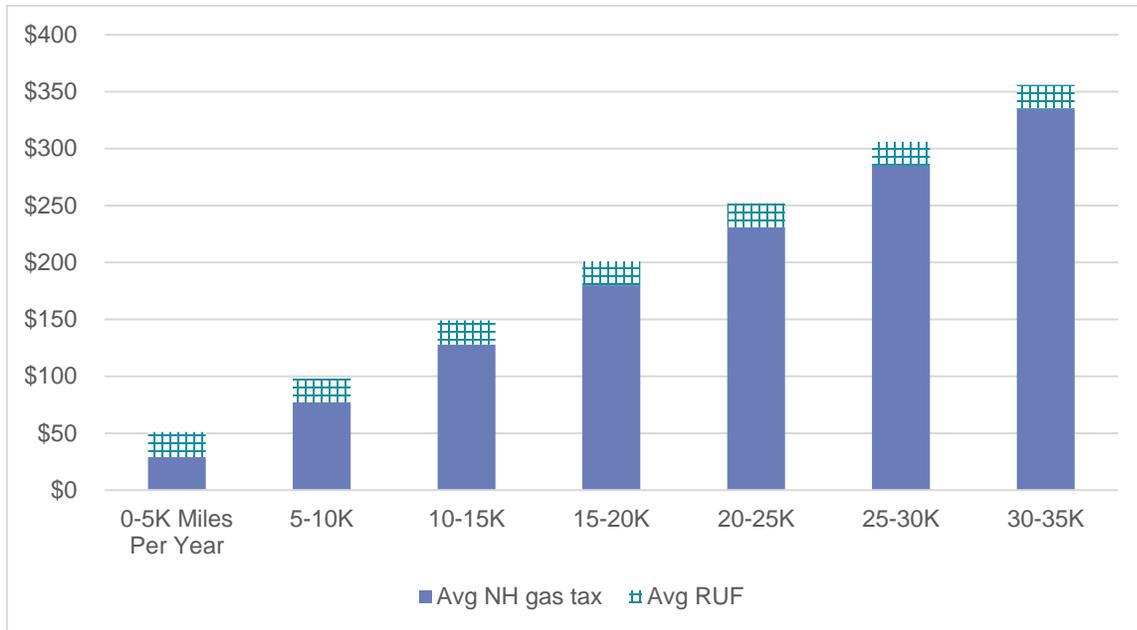
7.0 Public Opinion of RUF Options

Cambridge Systematics worked with subcontractor University of New Hampshire Survey Research Center (UNH-SRC) to investigate public opinion related to current state transportation funding mechanisms and the proposed RUF. Methods included:

- Including a small number of questions on the Granite State Poll conducted in September/October 2019, which is a representative phone survey of 500 New Hampshire residents.

- Conducting focus groups to gather more in-depth insights from a small sample of the population, and explore funding options and concerns with greater nuance.

Appendix B contains the detailed report on poll results including survey questions, while Appendix C contains a detailed report on the focus group findings.

7.1 Granite State Poll

The University of New Hampshire Survey Center included 11 questions on its fall 2019 Granite State Poll for the New Hampshire Department of Transportation to understand New Hampshire residents' opinions on transportation funding in the state.

Figure 7.1 Opinions of New Hampshire's Current Transportation System

New Hampshire's transportation system includes many different components. How well do each of the following components meet your needs for getting around?
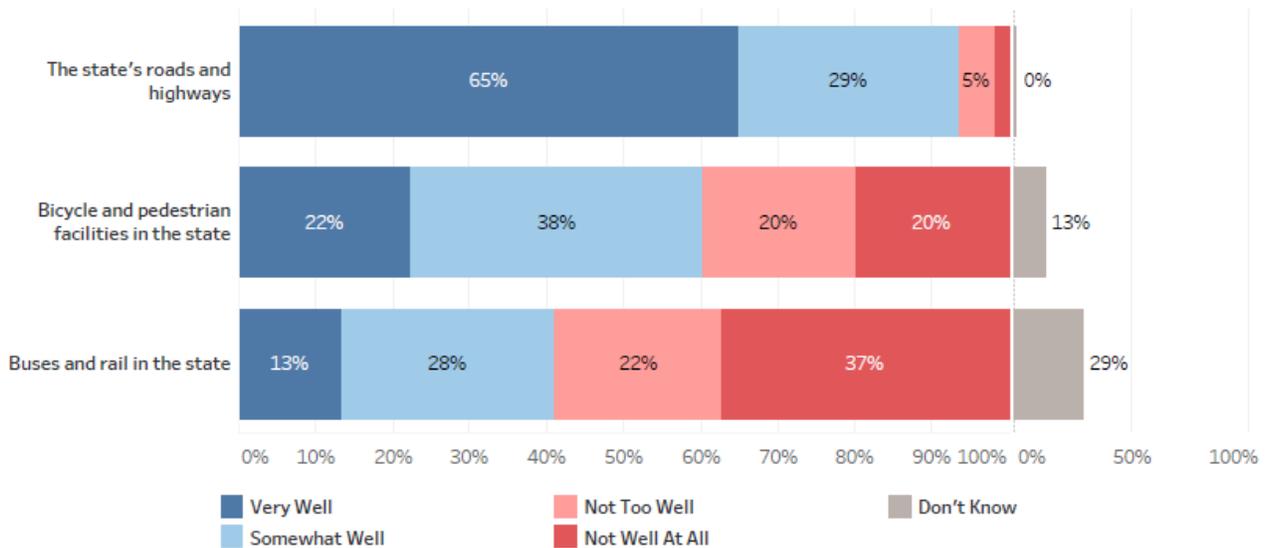

Efficacy of Transportation Components – Ninety-four percent of New Hampshire residents say the state's roads and highways meet their needs very or somewhat well. Six in 10 say the same about the state's bicycle and pedestrian facilities. However, less than half say buses and rail meet their needs very or somewhat well and a third say they don't meet their needs well at all.

Current State Gasoline Tax – New Hampshire residents on average estimate the state gas tax is 35 cents per gallon, higher than the actual rate of approximately 24 cents per gallon. Just over a third estimate the gas tax is less than 25 cents, just under a quarter think the tax is between 25 and 49 cents per gallon, and about the same number think it is 50 cents or more. More than four in five New Hampshire residents believe the gas tax can be used on roads and bridges, half believe it can be used for buses, three in eight believe it can be used for passenger rail, and about three in 10 believe it can be used for bicycle and pedestrian facilities or airports.

Figure 7.2 Opinions of the State's Level of Investment in Transportation

The state invests money to maintain today's roads, bridges, and to expand and improve transportation where needed. How do you feel about the state's current level of investment in its transportation system?
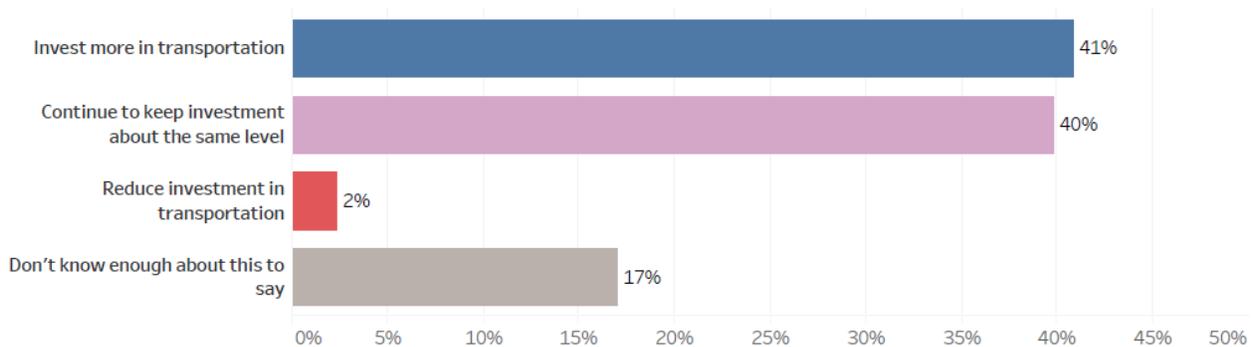
Overall State Investment in Transportation System – Four in 10 New Hampshire residents would like the state to invest more in transportation and the same number would like the state to maintain its current level of funding (81 percent overall). Very few would like the state to decrease its transportation funding. Democrats and self-described liberals tend to support higher funding in transportation while Republicans and self-described conservatives are more likely to oppose higher transportation funding.

Feelings on Potential Funding Sources – While a large majority of residents want the state to maintain or increase its investment in transportation, no potential funding source garners support from a majority. Residents are divided on increasing tolls on highways, about half oppose instituting a Road Usage Fee or increasing the gasoline tax, and larger majorities oppose a user fee based on the number of miles a person drives in a year or increasing vehicle registration fees. Self-identified liberals tend to be more in favor of these new funding sources while conservative radio listeners are less likely than others to support them.

7.2 Focus Groups

The University of New Hampshire Survey Center hosted focus groups in October 2019 consisting of adults living in four regions of New Hampshire in Dover (Seacoast), Manchester (Central New Hampshire), Claremont (Western New Hampshire), and Plymouth (Northern New Hampshire). The goal of these groups was to assess New Hampshire residents' knowledge of the current funding structure for state highway maintenance and construction, perceptions of funding equity and sustainability, attitudes towards electric vehicles, impressions of the current funding system, and reaction to a proposed Road Usage Fee funding structure. The focus groups were structured in three phases with incrementally more information provided to the participants between each phase. The primary topic for phase one was what participants understood about the current approach to transportation funding. After the discussion of phase one the moderator

provided information to the participants about how transportation is actually funding and funding trends. Phase 2 of the discussion focused on the perceived fairness of the current system. Following phase 2 the moderator provided additional information about who pays for transportation and the RUF approach. Phase 3 of the discussion focused on the RUF proposal.

Knowledge of Current Transportation Funding is Very Limited – Participants' knowledge of how highway construction and maintenance in New Hampshire is currently funded is modest. There is a good understanding of the sources of funding, but little awareness of the contribution made by those sources. There is also almost no knowledge of what the current state gasoline tax is.

Gasoline Tax Seen As Fair – the more you drive, the more you pay – The current system of funding is perceived to be "fair" as it is based on users – the more you use the roads, the more gas you buy, and the more taxes you pay. That said, when participants discussed this issue longer, they came to the conclusion that electric cars and high mileage cars are not paying a fair share.

Electric Vehicles – Participants recognized that EVs were not paying a fair share under the current approach and agreed that EVs are becoming more popular. There was also concern with the RUF approach of assessing a fee being viewed as a disincentive to EVs, which should be encouraged for the environmental benefits they provide.

Impressions of Current Funding Structure – Participants where then shown a PowerPoint presentation that showed where funding for state highways comes from, how much comes from the federal government and various state sources, historic and projected gasoline tax revenues, projections for road usage, and projections for fuel mileage and the impact it will have on gasoline tax revenues. After seeing this information, the discussion immediately became more focused on the lack of sustainability and the lack of fairness of the current system. In particular, the issue of the lack of contribution to the gasoline tax by electric vehicles was thought to be unfair. While a Road Usage Fee was not specifically mentioned, the concept of a Road Usage Fee came up as a potential solution.

There was also support expressed in all groups for a mileage based system of funding similar to how over-the-road trucks are taxed. This came up in early discussions as well as after participants had been presented with information about a proposed Road Usage Fee.

Support for Proposed RUF – Participants were next shown a PowerPoint presentation that illustrates the proposed Road Usage Fee and how it would impact drivers of varying kinds of cars. There was grudging support for the concept of a RUF which is seen as being fairer than the current system, but also seen as a new or additional tax. After hearing how a RUF would work, participants understood the concept, although this was challenging for some. Most supported the central idea of making funding for roads more balanced by increasing the amount that high mileage and electric vehicles would pay and to increase funds available for maintenance and construction.

8.0 Options for Implementation

To implement the proposed RUF, each vehicle registered in New Hampshire must be assigned an MPG rating. This rating would need to be stored in the DMV database as long as the vehicle is registered in the state, and would be used for annual assignment and collection of the fee.

The project team considered a range of implementation options for assigning and collecting the fee. In crafting policy designs, the team considered the ease of use for municipal clerks, as well as the practicality and level of effort for DMV's managers of the state database. Additional considerations included ensuring a robust revenue flow across different uncertainties and whether any mechanism would present significant equity or administrative concerns. The project team discussed the potential options and issues with DOT and DMV staff.

Implementation of a RUF program involves two essential components: 1) assigning MPG ratings to all vehicles already registered prior to implementation of the program (which can be done once, when the program is established); and 2) assigning an MPG rating to each vehicle newly registered after the program is implemented. Table 8.1 suggests and assesses potential options for assigning MPG ratings for vehicles registered at the time of RUF program initiation, while Table 8.2 suggests and assesses potential options for assigning MPG for vehicles registered after the RUF program is established.

For all options it is assumed that the DMV would create a new field in the registration database to store the MPG rating, which after being assigned once, would be carried through the life of the vehicle. There also may need to be a process for owners to contest MPG rating assignments, if they believe the assignment was erroneous.

Table 8.1 Options for Assigning MPG for Vehicles Registered at Time of RUF Program Initiation

Option	Advantages	Disadvantages
1. DMV staff or consultant assigns MPG value to all vehicles currently in database, using automated matching to the extent possible	• Ensures consistent & comprehensive application of a new/ unfamiliar program • Reduces burden on town/city staff	• Will require effort on part of DMV staff or consultant to match records that fail automated matching process
2. Town/City Clerk assigns MPG at time of first registration renewal following establishment of program, using one of the methods described in Table 8.2	• Decentralizes level of effort for program startup	• Will require training of town/city clerks and DMV QC to ensure all vehicles are tagged by end of first year

Table 8.2 Options for Assigning MPG for Vehicles Registered After RUF Program Established

Option	Advantages	Disadvantages
1. Clerk assigns MPG rating registration via software drop-down menu *(centralized, remote-access software application)*	• Standardizes vehicle model name entries (drop-down selections) for clerk • Choices drawn directly from EPA fuel economy database – easier update	• Tradeoff in sub-model choices (trim/transmission) vs. selection error • Requires ongoing consultant support to update database annually and maintain software
2. Clerk assigns vehicle model at registration via lookup table *(electronic document distributed to DMVs)*	• Standardizes vehicle model name entries (via lookup table) for clerk • Lookup drawn directly from EPA fuel economy database – easier update	• Tradeoff in sub-model choices (trim/transmission) vs. selection error • Requires ongoing consultant support to update lookup table annually
3. Clerk enters VIN only, custom VIN application assigns MPG *(centralized, remote-access software application)*	• Custom NH VIN application that includes MPG reduces likelihood of selection error	• Requires annual update of VIN decoder to match with EPA fuel economy data – a more involved update • Would account for make, model, and displacement, but not trim level or transmission • VIN matching may not always be successful and a backup process (e.g., #4) may be required
4. Clerk assigns MPG based on manual lookup from Fuel Economy Guide *(PDF or CSV file downloaded from fueleconomy.gov)*	• Does not require ongoing consultant support to update database, lookup table, or VIN decoder • Possibility of exact match based on transmission, displacement, trim levels, etc.	• Slightly more work on the part of the town/city clerk • Greater possibility for selection error

New Hampshire has a somewhat unique vehicle registration process in that the vehicle is registered both with the city/town and the state. Of the 234 municipalities in the state, 230 provide the option of the city/town completing the state portion as "municipal agents."

Initial discussion with DMV and DOT staff, held in October 2019, suggested the following:

• Given the range of MPG ratings proposed for the fee structure (10 MPG increments), an approximate match in MPG rating, rather than an exact match, would be acceptable.

• It would be impractical to expect town/city clerks to manually look up and assign MPG ratings. The MPG must be provided directly or through an automated population process.

• For new vehicles sold in New Hampshire, the EPA combined city/highway MPG rating could be listed on the vehicle's title so that it is directly available when the vehicle is registered. This could be required through legislation or administrative rules.

- For vehicles already registered in New Hampshire at the time the program is established, the DMV would process the database to assign MPG ratings, using automated methods as much as possible (such as applied in this study). For vehicles not successfully matched with an MPG rating, options would include:

  - Additional manual matching (resources permitting); or

  - Defaulting to the minimum fee (except for electric/alternative fuel vehicles, which would have the "no gasoline" fee applied).

- A method and process would be needed for assigning an MPG rating to vehicles whose registration is transferred from other states in the future. This is proposed to be done by the DMV's vendor, which is able to match MPG ratings based on the VIN. A workflow will need to be developed so that the MPG rating is matched before or at the time the state fee is applied; otherwise, gasoline or diesel vehicles that are newly registered in the state would not be assessed the full fee the first time they are registered.

- If the MPG rating is not available to the town/city clerk, the fee would default to the minimum ($10 for gasoline and diesel vehicles in the schedule analyzed in this report, or $125 for electric and alternative fuel vehicles).

- Vehicles older than a certain year (e.g., 2000) might be exempted from the fee (default to the minimum $10). Older vehicles tend to be driven less and also have a lower rate of successful matching of MPG ratings.

Once a specific system for assessing the RUF is proposed, outreach to a sample of municipal clerks is recommended to discuss the feasibility of this system from their perspective and to identify training and support needs.

9.0 Conclusions

While New Hampshire's highway revenue has remained relatively steady through 2020, the state's vehicle fleet is projected to become increasingly efficient. Even in nominal terms, gas tax revenue appears likely to decline over the next decade, with a decline by 2030 likely to be in the range of 10 to 25 percent from 2020 levels. When adjusted for purchasing power, the decline in revenue could range from over 30 percent to over 45 percent, assuming that current inflation trends continue.

The implementation of a Road Usage Fee, according to the schedule presented in Section 2.0, would increase net transportation revenues in the short term, and at least stabilize nominal revenue in long term, with net projected (nominal) revenue in 2030 in most modeled scenarios projected to be around 10 to 15 percent higher than 2020 levels of revenue. These projections of combined fuel tax and RUF revenue were found to be robust under different scenarios for fleet changes in fuel efficiency, miles traveled per vehicle, and different levels of adoption for electric vehicles. However, when adjusted for purchasing power, even the addition of the RUF will be insufficient to stabilize revenue, as revenue in real dollars would still decline by around 15 percent.

If the state chooses to move forward with implementing the proposed RUF, the following next steps are recommended:

- The state legislature should require that the EPA combined city/highway MPG rating be listed on the title of new vehicles sold in New Hampshire.

- The state legislature should clarify the treatment of vehicles that do not have an MPG rating, e.g., defaulting to $10 for gasoline and diesel vehicles, and to $125 for alternative fuel and electric vehicles.

- The DMV should add a field for EPA combined city/highway MPG to the state's registration database and assign an MPG rating to all existing light-duty vehicles included in the database.

- The DMV's vendor will need to assign an MPG rating to vehicles whose registration is transferred from other states after the program is implemented. A workflow for providing vehicle information to the vendor and returning the MPG rating to the database will need to be determined.

- Additional outreach will be needed to educate the public on the need for the fee and its impacts, as well as to municipal clerks to discuss any implementation issues and identify training needs.