Project 2312 | March 2024

How Will California's Electric Vehicle Policy Impact State-Generated Transportation Revenues? Projecting Scenarios through 2040

Asha Weinstein Agrawal, Ph.D.
Hannah King
H. A. "Burt" Tasaico, P.E.

California State University Transportation Consortium

MINETA TRANSPORTATION INSTITUTE

Founded in 1991, the Mineta Transportation Institute (MTI), an organized research and training unit in partnership with the Lucas College and Graduate School of Business at San José State University (SJSU), increases mobility for all by improving the safety, efficiency, accessibility, and convenience of our nation's transportation system. Through research, education, workforce development, and technology transfer, we help create a connected world. MTI leads the Mineta Consortium for Transportation Mobility (MCTM) and the Mineta Consortium for Equitable, Efficient, and Sustainable Transportation (MCEEST) funded by the U.S. Department of Transportation, the California State University Transportation Consortium (CSUTC) funded by the State of California through Senate Bill 1 and the Climate Change and Extreme Events Training and Research (CCEETR) Program funded by the Federal Railroad Administration. MTI focuses on three primary responsibilities:

Research

MTI conducts multi-disciplinary research focused on surface transportation that contributes to effective decision making. Research areas include: active transportation; planning and policy; security and counterterrorism; sustainable transportation and land use; transit and passenger rail; transportation engineering; transportation finance; transportation technology; and workforce and labor. MTI research publications undergo expert peer review to ensure the quality of the research.

Education and Workforce Development

To ensure the efficient movement of people and products, we must prepare a new cohort of transportation professionals who are ready to lead a more diverse, inclusive, and equitable transportation industry. To help achieve this, MTI sponsors a suite of workforce development and education opportunities. The Institute supports educational programs offered by the Lucas Graduate School of Business: a Master of Science in Transportation Management, plus graduate certificates that include High-Speed and Intercity Rail Management and Transportation Security Management. These flexible programs offer live online classes so that working transportation professionals can pursue an advanced degree regardless of their location.

Information and Technology Transfer

MTI utilizes a diverse array of dissemination methods and media to ensure research results reach those responsible for managing change. These methods include publication, seminars, workshops, websites, social media, webinars, and other technology transfer mechanisms. Additionally, MTI promotes the availability of completed research to professional organizations and works to integrate the research findings into the graduate education program. MTI's extensive collection of transportation-related publications is integrated into San José State University's world-class Martin Luther King, Jr. Library.

REPORT 24-03

HOW WILL CALIFORNIA'S ELECTRIC VEHICLE POLICY IMPACT STATE-GENERATED TRANSPORTATION REVENUES? PROJECTING SCENARIOS THROUGH 2040

Asha Weinstein Agrawal, Ph.D.
Hannah King
H. A. "Burt" Tasaico, P.E.

March 2024

A publication of
Mineta Transportation Institute
Created by Congress in 1991

College of Business
San José State University
San José, CA 95192-0219

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. 24-03	**2. Government Accession No.**	**3. Recipient's Catalog No.**
4. Title and Subtitle How Will California's Electric Vehicle Policy Impact State-Generated Transportation Revenues? Projecting Scenarios through 2040		**5. Report Date** March 2024 **6. Performing Organization Code**
7. Authors Asha Weinstein Agrawal, Ph.D. Hannah King H. A. "Burt" Tasaico, P.E.		**8. Performing Organization Report** CA-MTI-2312
9. Performing Organization Name and Address Mineta Transportation Institute College of Business San José State University San José, CA 95192-0219		**10. Work Unit No.** **11. Contract or Grant No.** ZSB12017-SJAUX
12. Sponsoring Agency Name and Address State of California SB1 2017/2018 Trustees of the California State University Sponsored Programs Administration 401 Golden Shore, 5th Floor Long Beach, CA 90802		**13. Type of Report and Period Covered** Final Report **14. Sponsoring Agency Code**

15. Supplemental Notes

DOI: 10.31979/mti.2024.2312, 10.31979/mti.2024.2312.ds

16. Abstract

California faces unprecedented uncertainty about how much revenue the state will raise from a package of taxes on motor fuels and annual registration fees on light-duty vehicles that was established in 2017 by Senate Bill 1 (SB 1). The SB 1 taxes are by far the largest source of revenue that the State of California generates to support maintenance, operations, and improvements for state highways, and the funds also contribute substantially to local transportation and public transit budgets.
To help policymakers navigate the uncertainty about future SB 1 transportation revenue, this study used spreadsheet models to project revenue from the SB 1 taxes through 2040 under a set of eight scenarios that consider a wide range of possible futures. The scenarios consider changes to revenue that could arise from implementation of California's zero-emission vehicle (ZEV) regulations, as well as potential changes in driving costs, population size, vehicle ownership rates, and trucking industry operations.

Key findings include:

- It is impossible to project future revenues with any confidence for more than a few years into the future. By 2040, annual revenue ranges from a low of $4.81 billion to a high of $12.15 billion.
- The state may lose substantial revenue if the SB 1 taxes and fees are not changed and/or replaced within the coming few years. In 2027, just three years out, projected annual revenue for some scenarios drops by more than a billion dollars below 2024 revenue.
- A fast ICE to ZEV transition would significantly reduce annual revenue—but so could changes in VMT.
- Fuel taxes currently provide most SB 1 revenue, but by 2040 California may rely on vehicle registration fees to provide most of the revenue.

17. Key Words Transportation revenue, Fuel taxes, Vehicle registration fees, Electric vehicles, Projections	**18. Distribution Statement** No restrictions. This document is available to the public through The National Technical Information Service, Springfield, VA 22161		
19. Security Classif. (of this report) Unclassified	**20. Security Classif. (of this page)** Unclassified	**21. No. of Pages** 60	**22. Price**

Form DOT F 1700.7 (8-72)

DOI: 10.31979/mti.2024.2312

Mineta Transportation Institute
College of Business
San José State University
San José, CA 95192-0219

Tel: (408) 924-7560
Fax: (408) 924-7565
Email: mineta-institute@sjsu.edu

transweb.sjsu.edu

032524

ACKNOWLEDGMENTS

We thank the many people who offered valuable help during the project. Research assistants Kevin Pham and Amelia Le prepared the figures. We also received critical help from numerous experts who helped us to develop the concepts for the scenarios modeled and/or offered feedback on a draft report: Max Baumhefner (Natural Resources Defense Council), Tony Brasil (California Air Resources Board), Randy Chinn (California Senate Transportation Committee), Joshua Cunningham (California Air Resources Board), Sue Dexter (METRANS, University of Southern California), Keith Duncan (Caltrans), Steve Finnegan (Automobile Club of Southern California), Lewis M. Fulton (Institute of Transportation Studies, UC Davis), Loren Kaye (California Chamber of Commerce), Stephen Keck (Caltrans), Timothy E. Lipman (Transportation Sustainability Research Center, UC Berkeley), Joe Lyou (Coalition for Clean Air and California Transportation Commission), Tom O'Brien (Center for International Trade and Transportation, California State University Long Beach), Lauren Prehoda (Caltrans), David Reichmuth (Union of Concerned Scientists), Daniel Sperling (Institute of Transportation Studies, UC Davis), Tam Tran (California Transportation Commission), Hannah Walters (California Transportation Commission), and Melissa White (California Senate Transportation Committee).

We also thank the Mineta Transportation Institute (MTI) for funding this research and MTI staff for supporting the work, including Lisa Rose for editing, Katerina Earnest for report layout, Director of Operations Alverina Weinardy, Deputy Executive Director Hilary Nixon, PhD, and Executive Director Karen Philbrick, PhD.

The responsibility for the content remains exclusively with the authors.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

California faces unprecedented uncertainty about how much revenue the state will raise from a package of taxes on motor fuels and annual registration fees on light-duty vehicles that was established in 2017 by Senate Bill 1 (SB 1). The SB 1 taxes, which generated over $12 billion for fiscal year 2022-23, are by far the largest source of revenue that the State of California generates to support maintenance, operations, and improvements for state highways, and the funds also contribute substantially to local transportation and public transit budgets.[1]

To help policymakers navigate the uncertainty about critical transportation revenue, this study used spreadsheet models to project revenue from the SB 1 taxes through 2040 under a set of eight scenarios that consider a wide range of possible futures over the coming years. The scenarios consider changes to revenue that could arise from implementation of California's zero-emission vehicle (ZEV) regulations, as well as potential changes in driving costs, population size, vehicle ownership rates, and trucking industry operations.

California's stringent regulations and legislation aimed at reducing carbon emissions from the transportation sector are a particular focus of this study. The best known of these efforts are regulations that will transition the state's light-duty and heavy-duty fleets from internal combustion engine (ICE) vehicles to ZEVs.[2] While there is no doubt that replacing ICE vehicles with ZEVs will reduce fuel purchases and thus fuel tax revenue, there is considerable uncertainty as to how quickly the vehicle fleet will convert to ZEVs and, thus, the impact on future transportation revenue. The almost daily announcements from vehicle technology markets, along with the uncertainty in economic conditions and consumer behavior, make it impossible to anticipate the future with any degree of certainty.

We chose to "project" revenue under multiple scenarios instead of "forecasting" a single estimate because the immense uncertainty of the moment suggests California would be wise to prepare for a range of possible future transportation revenue streams. While forecasting attempts to predict future conditions with some level of certainty, projections take a very different approach. As planning scholar Andrew Isserman explains, "projections are conditional 'if, then' statements about the future. They are calculations of the numerical consequences (the 'then') of the underlying assumptions (the 'if')."[3]

In the case of this study, the scenarios illustrate the revenue consequences (the "then") of plausible alternative future vehicle fleet mixes and amounts of travel (the "ifs"). There is no certainty that the future will resemble any of the chosen scenarios, but testing different

1 For an overview of transportation revenue at all levels of government in California, see *Caltrans, Transportation Funding in California 2023* (2023), https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/data-analytics-services/transportation-economics/transportation-funding-booklet/2023/2023-transportation-funding-10-9-23-a11y.pdf; and Caltrans, "Fiscal Year 2023-24 California Transportation Financing Package" (April 17, 2023), https://dot.ca.gov/-/media/dot-media/programs/budgets/documents/fiscal_year_2023-24_california_transportation_financing_package_signed-a11y.pdf.

2 These are the California Air Resource Board's Advanced Clean Trucks, Advanced Clean Fleets, and Advanced Clean Cars programs. Details available at California Air Resources Board, "Zero-Emission Transportation," https://ww2.arb.ca.gov/our-work/topics/zero-emission-transportation.

3 Andrew M. Isserman, "Projection, Forecast, and Plan: On the Future of Population Forecasting," *APA Journal* 50, no. 2 (1984), p. 208.

future scenarios allows policymakers to identify revenue options that are likely to prove effective under a wide range of potential futures.

Examples of the uncertainty around future conditions that would impact SB 1 transportation revenue include far more than just the question of how growth of ZEVs will impact revenue. Changes in population size would likely translate to changes in both miles traveled and the number of light-duty vehicles. For the first time in its history, California's population fell during the COVID-19 pandemic years, and some forecasters have predicted that the state may be entering a long period of population decline. However, other forecasts assume that California's population will soon begin to grow again. In addition, an increase or decrease in statewide VMT could occur if the marginal cost of driving changes. The behavioral economics literature has found that falling marginal costs of driving lead to more miles traveled, while rising costs lead to the inverse, fewer miles traveled.[4] Some experts predict that driving costs will drop because of factors such as ZEVs offer cheaper operating costs than ICE vehicles, autonomous vehicles that reduce the "time" cost of travel, and/or growing availability of "mobility as a service" (MaaS) that leads travelers to replace transit trips with MaaS trips.[5] Alternatively, VMT could decrease if driving costs *increase* substantially from factors ranging from steeply rising energy costs to changes in government policy. For example, per-mile driving costs could rise if the state were to raise fuel tax rates substantially or introduce a high per-mile fee. The upfront costs of automobile use could also rise if communities replace unpriced but publicly subsidized "free" parking with metered parking spaces or paid parking lots.[6] Finally, the future could bring major disruptions to the trucking industry that translate into either more or less mileage driven. For example, truck travel might rise if e-commerce home deliveries increase. Conversely, changing global trade patterns could substantially reduce the flow of goods entering California ports (and thus the need for truck travel) or improvements to the logistics industry could lead to more efficient home delivery that reduces truck miles.

4 Frank Goetzke and Colin Vance, "An Increasing Gasoline Price Elasticity in the United States?" *Energy Economics* 95 (March 1, 2021): 104982, https://doi.org/10.1016/j.eneco.2020.104982; Kenneth Gillingham, "Identifying the Elasticity of Driving: Evidence from a Gasoline Price Shock in California," *Regional Science and Urban Economics*, SI: Tribute to John Quigley, 47 (July 1, 2014): 13–24, https://doi.org/10.1016/j.regsciurbeco.2013.08.004; Tom Wenzel and K. Sydny Fujita, Elasticity of Vehicle Miles of *Travel to Changes in the Price of Gasoline and the Cost of Driving in Texas* (Berkeley: Lawrence Berkeley National Laboratory, March 2018), https://eta-publications.lbl.gov/sites/default/files/_lbnl-2001138.pdf.

5 Ra Sun, et al, "Impacts of Connected and Autonomous Vehicles on Travel Demand and Emissions in California," *Transportation Research Record: Journal of the Transportation Research Board* (2023), https://doi.org/10.1177/03611981231186984; S. Hardman, et al. "Estimating the Travel Demand Impacts of Semi-Automated vehicles," *Transportation Research Part D* 107 (2022); Aaupal Mondal, et al, "Accounting for Ride-Hailing and Connected and Autonomous Vehicle Empty Trips in a Four-Step Travel Demand Model," *Transportation Research Record* 2677, no. 3 (2023), https://doi.org/10.1177/03611981221115072.

6 Chandra Kiran B. Krishnamurthy and Nicole S. Ngo, "The Effects of Smart-Parking on Transit and Traffic: Evidence from SFpark," *Journal of Environmental Economics and Management* 99 (January 1, 2020): 102273, https://doi.org/10.1016/j.jeem.2019.102273; Asha Weinstein Agrawal, et al, *Pay as You Go Driving: Examining Possible Road Charge Rate Structures for California* (Mineta Transportation Institute, December 2023), https://transweb.sjsu.edu/research/2149-Pay-As-You-Go-Driving; Sajjad Shafiei, "Impact of Self-Parking Autonomous Vehicles on Urban Traffic Congestion," *Transportation* 50 (2021), p. 183-203.

This report builds on a small number of studies examining how vehicle electrification may impact revenue from California's fuel taxes and vehicle fees. In addition to this study and a series of four preceding studies that the authors prepared starting in 2018, the California Air Resources Board (CARB) and the California Legislative Analyst's Office (LAO) have published estimates of future transportation revenue.[7] The current report differs from the CARB and LAO efforts in several important ways:

- This report projects a wider range of scenarios in recognition of the inherent uncertainty in such projections. The CARB and LAO projections, by contrast, each project just two scenarios, a "reference scenario" that is described as a baseline comparison and a "scoping plan scenario" that assumes the vehicle fleet meets CARB's ZEV guidelines and that light-duty per-capita VMT falls as prescribed by CARB.

- This report addresses a more limited set of taxes. Unlike the LAO, this study does not project revenue from the state's heavy-duty vehicle weight fees. The CARB analysis considers even a wider range of taxes and fees that are not considered in this report, including locally generated revenues and state revenue from the vehicle license fee, energy resource fees, vehicle sales tax, and sales tax revenue on gasoline.

- This report provides a detailed explanation of the methodology behind the projections and shares the Excel spreadsheets used to run the model. The LAO and CARB reports, in contract, present their modeling results but do not share details about the input data used to build the models, including assumptions made. We provide complete transparency within this report and the accompanying spreadsheet about how the projection models operate so that readers can consider how different assumptions would change the revenue impacts, even running the same models with different sets of inputs, such as different ZEV adoption pathways. Thus, our models allow those interested to track how changes to specific input variables, such as VMT or gasoline prices, are likely to affect future transportation revenues.

The remaining chapters of the report present the following material:

- Chapter 2 presents the methodology, including the projection model inputs and scenarios tested.

- Chapter 3 presents the revenue projections from the scenarios.

- Chapter 4 summarizes key findings and suggests policy implications

- Appendices present technical details on the methods, including the formulas used to project revenue, data sources and assumptions, and values used to create the figures in the report.

7 Legislative Analyst's Office, *Assessing California's Climate Policies–Implications for State Transportation Funding and Programs* (December 2023); California Air Resources Board, "Chapter 4: Fiscal Impacts," in *Advanced Clean Cars II: Proposed Amendments to the Low Emission, Zero Emission, and Associated Vehicle Regulations: Standardized Regulatory Impact Assessment* (January 26, 2022).

II. METHODOLOGY

We projected revenue produced by taxes and fees collected by the State of California as established by the SB 1 legislation in 2017: the gasoline excise tax, diesel excise tax, diesel sales tax, Transportation Improvement Fee (TIF) assessed annually on all light-duty vehicles, and Road Improvement Fee (RIF) assessed annually on light-duty ZEVs. Table 1 shows the rate for each tax or fee at the start of the calendar year 2024. These five taxes and fees all share three characteristics: (1) they are collected from vehicle owners and users, (2) proceeds are dedicated to transportation programs, and (3) proceeds depend at least somewhat on whether the vehicle is powered by motor fuel or electricity.

Table 1. Rates for the Taxes and Fees Considered in this Report

Tax/fee	Rate as of January 1, 2024[a]
Motor fuel taxes	
Gasoline excise taxes	57.9¢ per gallon (sum of three taxes)[b]
Diesel excise tax	44.1¢ per gallon
Diesel sales tax	10.5% of purchase price
Light-duty vehicle fees (annual)	
Transportation Improvement Fee (TIF)	$32 to $227 per vehicle annually, dependent on vehicle value
Road Improvement Fee (RIF)	$118 per ZEV with model year 2020 or later

Sources: California Department of Motor Vehicles, "Registration Fees," https://www.dmv.ca.gov/portal/vehicle-registration/registration-fees/; California Department of Tax and Fee Administration, "Sales Tax Rates for Fuels," https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm.

[a] The rates are to be adjusted for inflation for the gasoline and diesel excise taxes, the RIF, and the TIF. The diesel sales tax rate remains fixed.

[b] The state assesses its gasoline tax in three parts: the Base Excise Tax of 22.0¢ per gallon, the SB 1 Excise Tax of 14.7¢ per gallon, and the State Incremental Excise Tax of 21.2¢ per gallon.

Given the enormous uncertainty inherent in projecting any revenue source sixteen years into the future, we developed a series of varying scenarios and projected revenue for each. The approach is designed to illustrate revenue streams under widely different circumstances, given that it is impossible to make accurate forecasts so far into the future. The research did not assess the likelihood that any of the scenarios may occur.

We constructed the projections by modifying existing spreadsheet models from four earlier studies that estimated annual transportation revenue collected by the State of California from the SB 1 taxes and fees. The first of these projected revenue under different tax and fee rates,[8] the second compared revenue under different ZEV adoption scenarios,[9] and the third and fourth projected revenue under different COVID-19 economic recovery scenarios.[10]

8 Martin Wachs, Hannah King, and Asha Weinstein Agrawal, *The Future of California Transportation Revenue* (San Jose: Mineta Transportation Institute, October 2018).

9 Martin Wachs, Hannah King, and Asha Weinstein Agrawal, *The Impact of ZEV Adoption on California Transportation Revenue* (San Jose: Mineta Transportation Institute, July 2019).

10 Asha Weinstein Agrawal, Hannah King, and Martin Wachs, *The Impact of COVID-19 on California Transportation Revenue* (Mineta Transportation Institute, May 2020); and Asha Weinstein Agrawal, et al, The Impact of the COVID-19 Recovery on California Transportation Revenue: A Scenario Analysis through 2040 (Mineta Transportation Institute, December 2020).

The models for the current study calculate revenue by applying the state's SB 1 tax and fee rates to projected sales of motor fuel for transportation purposes and the projected fleet size for both ICE and ZEV light-duty vehicles. Inputs to the models include factors such as annual vehicle miles traveled, fuel efficiency rates for ICE vehicles, diesel fuel prices, the number of registered light-duty vehicles, light and heavy-duty ZEV adoption rates, and inflation rates. Appendix A presents the formulas used to project revenue. Readers interested in viewing the specific values for each model input will find them in the accompanying data spreadsheet.[11]

The models rely on data from authoritative sources, such as revenue data from the State of California and projections prepared by the Energy Information Administration (EIA) of the U.S. Department of Energy.[12] Complete details about the data sources and assumptions employed to operationalize the projections are available in Appendix B.

Revenue raised was calculated for eight different scenarios. At the center of the models is a set of three possible trajectories for each of six transportation-specific model inputs that we term "the variable model inputs." These variable inputs were selected because their trajectories are uncertain and they also have a direct impact on SB 1 revenue through their effect on statewide VMT, the size of the light-duty vehicle fleet, and/or the relative proportions of ICE and ZEV vehicles for both the light-duty and heavy-duty fleets. Although the primary goal of the research is to understand how different ZEV penetration levels will affect revenue, we vary these other core factors as well to compare the impacts of ZEV adoption to changes to those other factors. (Beyond these six variable inputs, all other model inputs were kept constant across the scenarios, as explained in Section 2C.)

Table 2 summarizes the three trajectories for each of the six variable inputs used to build the scenarios, and the following sections of the chapter describes in more detail the constant and variable model inputs and construction of scenarios. Appendix B provides more detail about the data sources and assumptions for all model inputs.

11 Asha Weinstein Agrawal, Hannah King, and H.A. Tasaico, "Spreadsheet Model for 'How Will California's Electric Vehicle Policy Impact State-Generated Transportation Revenues? Projecting Scenarios through 2040'" (Mineta Transportation Institute, March 2024), https://doi.org/10.31979/mti.2024.2312.ds.

12 U.S. Energy Information Administration, *Alternative Fuel Infrastructure Expansion: Costs, Resources, Production Capacity, and Retail Availability for Low-Carbon Scenarios* (April 2013), https://www.nrel.gov/docs/fy13osti/55640.pdf.

Table 2. High, Medium, and Low Trajectories for the Variable Inputs

Variable inputs		High	Medium	Low
State population		Rises by 220,000 annually	Remains constant	Declines 1% annually
Light-duty vehicles per capita		Rises linearly to 0.81 per capita in 2040	Remains constant	Declines linearly to 0.61 per capita in 2040.
VMT	Annual light-duty, per capita	Rises along a sigmoid curve such that per capita VMT in 2040 is 25% higher than in 2024	Remains constant	Declines along a sigmoid curve such that annual per capita VMT in 2040 is 17% lower than in 2024
	Annual heavy-duty	Rises 3% annually	Rises 1% annually	Declines 2% annually
ZEV share:	Light-duty fleet	Rises along an exponential curve such that 99% of light-duty vehicles are ZEVs in 2040	Rises along an exponential curve such that 50% of light-duty vehicles are ZEVs in 2040	Rises along an exponential curve such that 20% of light-duty vehicles are ZEVs in 2040
	Heavy-duty fleet	Rises along a sigmoid curve such that 80% of heavy-duty vehicles are ZEVs in 2040	Rises along a sigmoid curve such that 40% of heavy-duty vehicles are ZEVs in 2040	Rises along a sigmoid curve such that 5% of heavy-duty vehicles are ZEVs in 2040

2.1. MODEL INPUTS KEPT CONSTANT ACROSS ALL SCENARIOS

The models keep the majority of inputs constant across the eight scenarios to highlight revenue changes that would result from the factors of most interest for this study, most notably changes in the proportions of ZEV vehicles in the light-duty and heavy-duty fleets.

Model inputs remain constant across all the scenarios if they met either of the following criteria:

- The transition to ZEV vehicles is unlikely to have a major impact on the trajectory. For example, it is unlikely that the transition to ZEV vehicles will impact inflation rates, so for all scenarios we assume a 2.5% annual inflation (the mean inflation rate from 2000 to 2022).
- The variable has minimal impact on the total SB 1 revenue collected in any year. For example, gasoline-powered heavy-duty vehicles generate a small value of gasoline excise tax revenue, so we did not create different trajectories related to the number of gasoline-powered heavy-duty vehicles.

2.2. VARIABLE MODEL INPUTS DETERMINING REVENUE RAISED FROM LIGHT-DUTY VEHICLES

We developed four variable inputs that have a direct impact on the three SB 1 taxes paid by light-duty vehicles: gasoline excise taxes, the RIF, and the TIF. Three of the variable model inputs are used to calculate statewide light-duty VMT, which is a key determinant of gasoline excise tax revenue. These inputs are state population, the number of light-duty vehicles per capita, and annual light-duty per-capita VMT. The fourth variable model input—proportion of light-duty vehicles that are ZEV—influences revenue from the vehicle registration fees as well as fuel tax revenue.

A. State population: Population indirectly affects revenue through the impact on both the size of the light-duty vehicle fleet (TIF and RIF revenue) and light-duty VMT (gasoline tax revenue).[13]

All trajectories start with the California Department of Finance population estimate for 2024 (38,940,231).[14] The high trajectory assumes annual population growth of 220,000 people per year, which is the average rate of state population growth from 2010 to 2020.[15] The medium trajectory assumes population stays constant through 2040. The low trajectory projects a 1% decrease per year. This decline roughly approximates the average rate of population loss between 2020 and 2021, the depth of the COVID-19 pandemic, in the three

13 To simplify the model, we assume that all light-duty ICE miles are driven by gasoline vehicles. In other words, we assume that no light-duty ICE vehicles consume diesel.

14 California Department of Finance, "State's Population Decline Slows While Housing Grows Per New State Demographic Report" (May 1, 2023), https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2023PressRelease.pdf.

15 State of California, Department of Finance, "E-4 Population Estimates for Cities, Counties, and the State, 2011-2020, with 2010 Census Benchmark" (Sacramento, California, May 2022), https://dof.ca.gov/forecasting/demographics/estimates/e-4-population-estimates-for-cities-counties-and-the-state-2011-2020-with-2010-census-benchmark-new/.

urbanized states of New York (-1.58%), Illinois (-0.89%), and California (-0.66).[16] While such a sustained loss of population over 17 years is unlikely, it is conceivable with some combination of a recession and perhaps major natural disasters in urban areas.

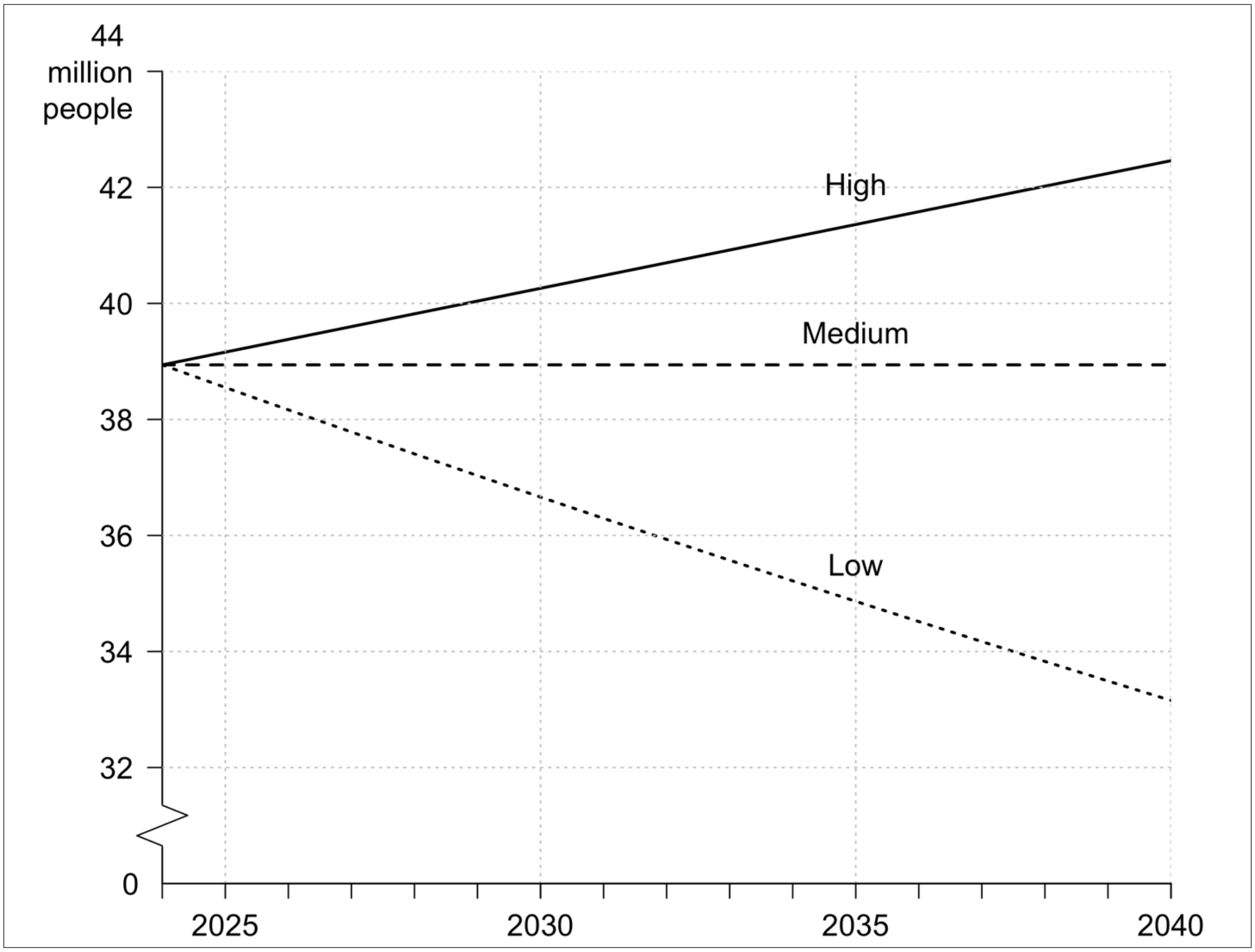

Figure 1. State Population Trajectories

B. Number of light-duty vehicles per capita: The number of light-duty vehicles is central to projecting revenue from the TIF and RIF, annual registration fees. We used a per-capita measure of vehicle ownership to reflect the fact that both population changes and changes in rates of vehicle ownership would influence the overall number of vehicles.

We estimated that California will have 0.71 vehicles per capita in 2024, which equates to 28 million light-duty vehicles in the state. The high trajectory assumes that the number of vehicles per person rises linearly to reach 0.81 by 2040. For the medium trajectory, the number of vehicles per capita remains constant at 0.71. The low trajectory sees vehicle ownership rates falling linearly to 0.61 vehicles per person by 2040. To put that rate of

16 Joanna Biernacka-Lievestro and Alexandre Fall, “A Third of States Lost Population in 2021” (Pew Trust, May 12, 2022), https://www.pewtrusts.org/en/research-and-analysis/articles/2022/04/25/a-third-of-states-lost-population-in-2021.

0.61 vehicles per person into context, it is just lower than the per-capita rate of vehicle ownership in Canada in 2015.[17]

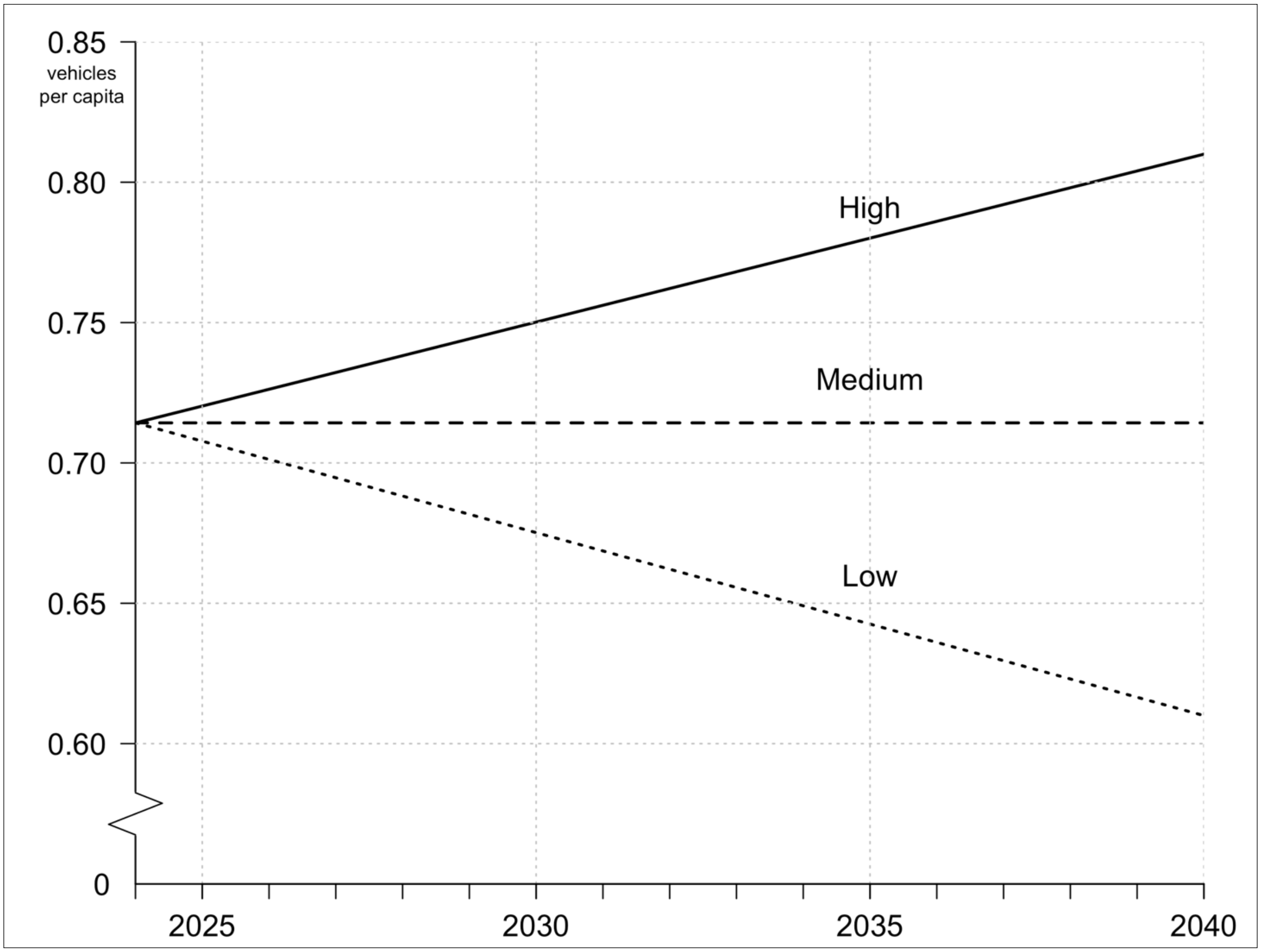

Figure 2. Trajectories for Light-Duty Vehicles per Capita

C. Annual light-duty per-capita VMT: Light-duty VMT directly affects fuel consumption and thus revenue from gasoline taxes.[18] We chose per-capita VMT as the model input to reflect the fact that both population changes and travel habits will influence overall state VMT.

We estimated light-duty VMT at 7,656 miles per person in 2024 (298 billion miles statewide). The high trajectory assumes that by 2040 per capita light-duty VMT has grown along a sigmoid curve by a total of 25%, to 9,570 miles per person. Such growth is conceivable if the "cost" of driving were to fall considerably due to some combination of cheaper operating costs for electric vehicles, a major increase in vehicle sharing at low cost through Mobility as a Service models, and/or widespread adoption of autonomous vehicles that facilitates growing travel by reducing the disutility of time spent in vehicles. The medium trajectory

17 Statistics Canada, "Table 23-10-0067-01: Vehicle Registrations, by Type of Vehicle" (2020), https://doi.org/10.25318/2310006701-eng.

18 To simplify the model, we assume that all light-duty ICE miles are driven by gasoline vehicles. In other words, we assume that no light-duty ICE vehicles consume diesel.

assumes that per capita light-duty VMT remains constant at 2024 levels. The low trajectory assumes that annual per capita VMT drops along a sigmoid curve to 6,424 miles per person, similar to the decline that CARB's *2022 Scoping Plan* concluded is necessary for California to meet its climate goals.[19] This reduction is a 17% drop compared to the projected value of 2024.

The sigmoid shape of the three ZEV adoption curves reflects the likely pace of ZEV adoption: slowly at first, then a faster rate of increase, and finally tapering off.

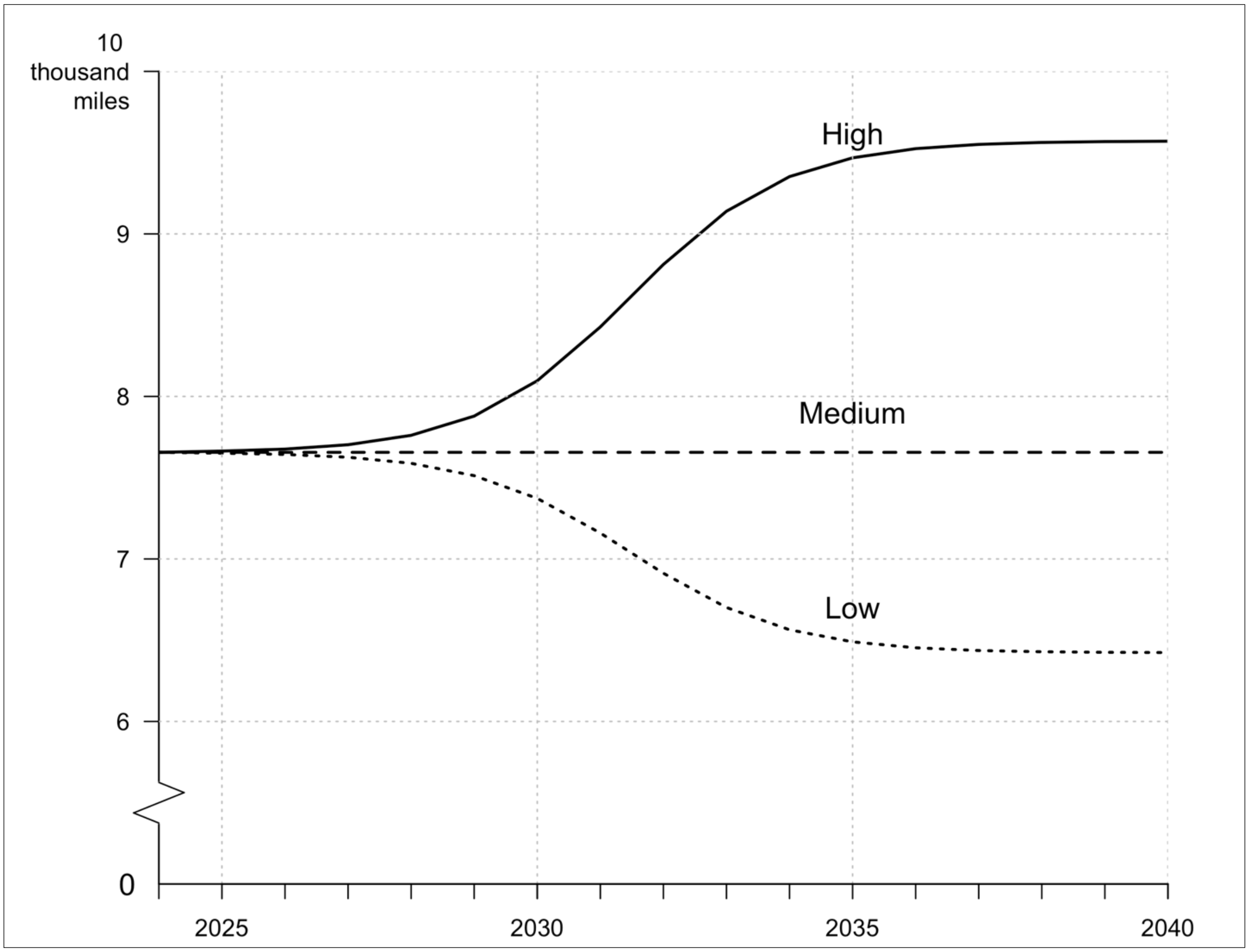

Figure 3. Trajectories for Annual Light-Duty VMT per Capita

D. Annual heavy-duty VMT: Revenue from the diesel excise and sales taxes relate directly to heavy-duty VMT, since more miles driven means higher diesel fuel consumption.

19 California Air Resources Board, 2022 *Scoping Plan* (December 2022), Table 2-1 and Appendix E.

For 2024, we estimated that heavy-duty VMT in California was approximately 37 million miles.[20] The high trajectory assumes that VMT rises 3% per year as a result of increasing delivery services, increased cargo coming into the U.S. through California's ports, and/or increased numbers of trucks needed to move goods in ZEV vehicles as compared to diesel trucks.[21] The medium trajectory assumes that annual heavy-duty VMT rises by 1% a year, which approximates the annual change in diesel consumption observed from 1990 to 2020.[22] The low trajectory assumes that annual heavy-duty VMT shrinks by 2% a year. Such a drop could be caused by changes to package delivery logistics (i.e., distribution centers move closer to urban centers, cutting delivery trip distances), moving some freight currently on trucks to rail, and/or shippers choosing to send goods to ports outside California to avoid labor disputes or higher trucking costs created by a required shift to ZEV trucks.

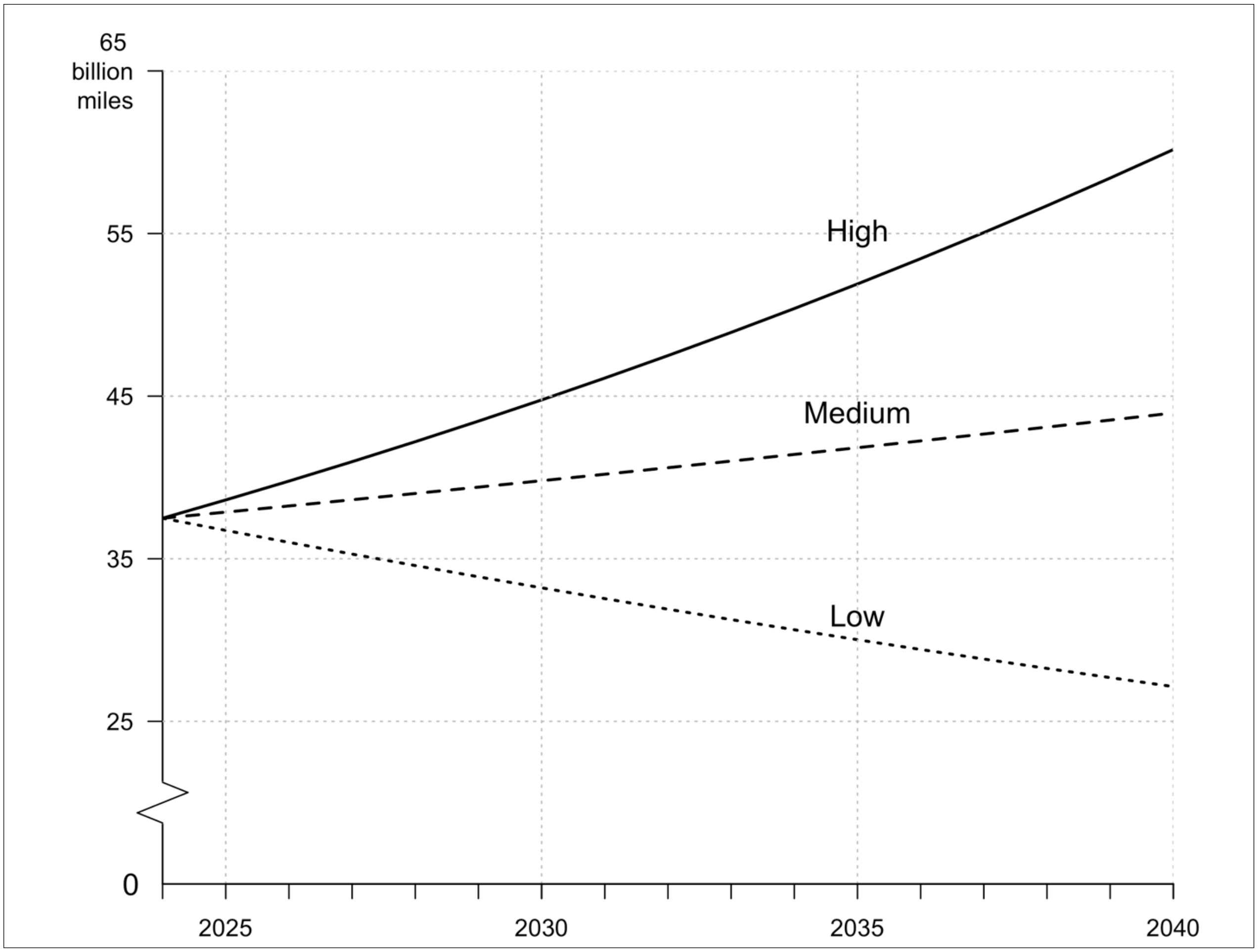

Figure 4. Trajectories for Annual Heavy-Duty VMT

20 Federal Highway Administration, "Table VM-1 Vehicle miles of travel and related data, by highway category and vehicle type," in *Highway Statistics 2021*, https://www.fhwa.dot.gov/policyinformation/statistics/2021/.

21 California imposes weight limits on trucks, and since battery-electric trucks are currently much heavier than diesel equivalents, the former cannot carry as large a load as the latter. For example, see this study exploring the impacts of a shift from ICE to ZEV drayage trucks in California: Genevieve Guiliano, et al. "Heavy-Duty Trucks: The Challenge of Getting to Zero" [article 102753], *Transportation Research Part D* 93 (2021), https://doi.org/10.1016/j.trd.2021.102742.

22 Energy Information Administration, "Weekly U.S. Product Supplied of Distallate Fuel Oil," https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=WDIUPUS2&f=W.

D. ZEV share of the light-duty fleet: The RIF is assessed only on light-duty ZEVs, so RIF revenue depends on both the ZEV share of the fleet and overall fleet size.

In 2024, 3% of registered light-duty vehicles were ZEVs, as classified by CARB and the California Energy Commission, which define ZEVs to include 100% battery electric vehicles, plug-in hybrid vehicles, and vehicles powered by fuel cells.[23] The high trajectory assumes that the share of ZEVs rises along an exponential curve to 99% by 2040. While this is faster adoption than currently required by California regulation, such a scenario could conceivably occur if prices to own and operate EVs fall dramatically below ICE vehicle costs (perhaps due to major innovations in battery technology) and/or climate considerations lead California to require that ICE vehicles be phased out earlier than called for in current regulations. The medium trajectory assumes that the proportion of ZEVs increases along an exponential curve to 50% by 2040. The low trajectory assumes that the proportion of ZEVs rises along an exponential curve to only 20% by 2040. Such a slow growth rate could occur if major resource shortages stymie battery production, thus keeping ZEV prices very high or even limiting ZEV production altogether.

The medium and high trajectories chosen for this study (50% and 99%) bracket the ZEV shares assumed in similar projection models published in reports by CARB, the California Legislative Analyst's Office (LAO), and the Union of Concerned Scientists. The three publications do not publish their precise predicted ZEV share for light-duty vehicles in 2040, but the reports include figures that show this share at around 70%.[24]

23 California Energy Commission, "Light-Duty Vehicle Population in California" (2024), https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle; California Department of Motor Vehicles, "1/1/2023 Vehicle Fuel Type by Zip Code," https://data.ca.gov/dataset/vehicle-fuel-type-count-by-zip-code.

24 Legislative Analyst's Office, *Assessing California's Climate Policies–Implications for State Transportation Funding and Programs* (December 2023), p. 8; California Air Resources Board, "Chapter 4: Fiscal Impacts," in *Advanced Clean Cars II: Proposed Amendments to the Low Emission, Zero Emission, and Associated Vehicle Regulations: Standardized Regulatory Impact Assessment* (January 26, 2022); David Reichmuth, "Can California Stop Selling Polluting Cars by 2035? Yes It Can" (Union of Concerned Scientists, August 22, 2022), https://blog.ucsusa.org/dave-reichmuth/can-california-stop-selling-polluting-cars-by-2035-yes-it-can/.

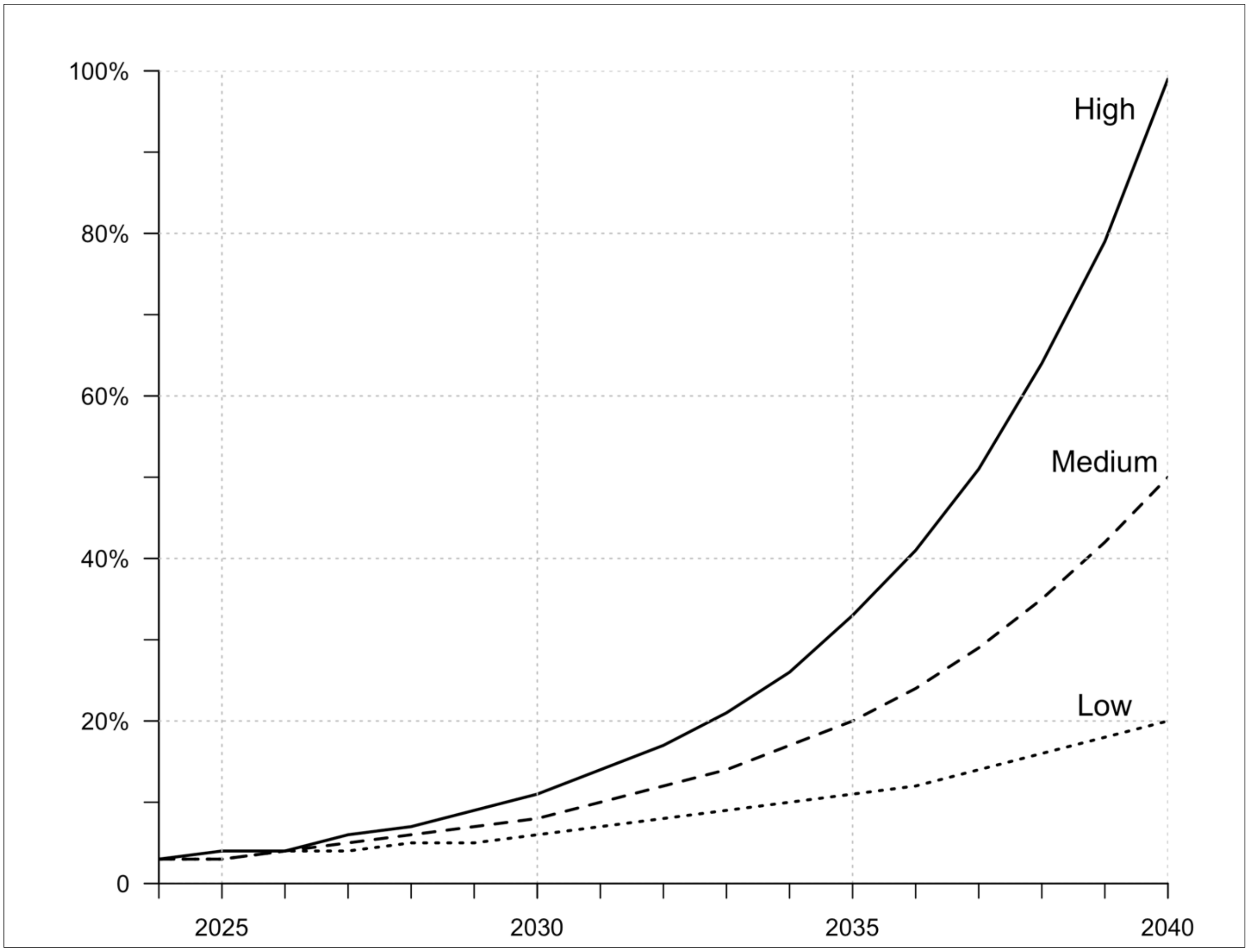

Figure 5. Trajectories for ZEV Share of Light-Duty Vehicles

F. ZEV share of the heavy-duty fleet: This input directly impacts diesel tax revenue since diesel fuel sales will drop as the proportion of heavy-duty ZEV vehicles rises.

In 2024, only 0.23% of heavy-duty vehicles registered in California were ZEVs.[25] The high trajectory assumes that the percentage of heavy-duty vehicles increases along a sigmoid curve to 80% in 2040, perhaps as a result of major technological improvements that reduce battery weight and make ZEV miles much cheaper than ICE miles. The medium trajectory assumes that the proportion of ZEV trucks rises along a sigmoid curve to 40% by 2040. This trajectory is slightly below 2022 projections from ACT Research that 50% of U.S. heavy-duty trucks will be ZEV by 2040.[26] The low trajectory assumes that the proportion of ZEV heavy-duty vehicles rises along a sigmoid curve only to 5% by 2040, perhaps due to a failure to develop the technology needed to make ZEV trucks economically viable for longer trips and/or successful advocacy from the trucking industry that eliminates the state's heavy-duty ZEV mandates. Similar to the fleet composition of light-duty vehicles, we

25 California Department of Motor Vehicles, "1/1/2023 Vehicle Fuel Type by Zip Code," https://data.ca.gov/dataset/vehicle-fuel-type-count-by-zip-code'.

26 The report projected Class 4 through 8 trucks. Source: ACT Research, "Half of All Commercial Vehicles Will be Zero Emissions by 2040" (September 12, 2023), https://www.actresearch.net/resources/blog/charging-forward-blog?utm_campaign=CF3&utm_content=264054277&utm_medium=social&utm_source=linkedin&hss_channel=lcp-7317475.

predict that the percent of heavy-duty vehicles (and miles) will increase along a trajectory best described by a sigmoid curve because the percent of heavy-duty vehicles that are ZEV will be slow at first, then rapid as adoption spread, and finally tapers off as market penetration is reached.

The sigmoid shape of the three ZEV adoption curves reflects the likely pace of ZEV adoption: slowly at first, then a faster rate of increase, and finally tapering off.

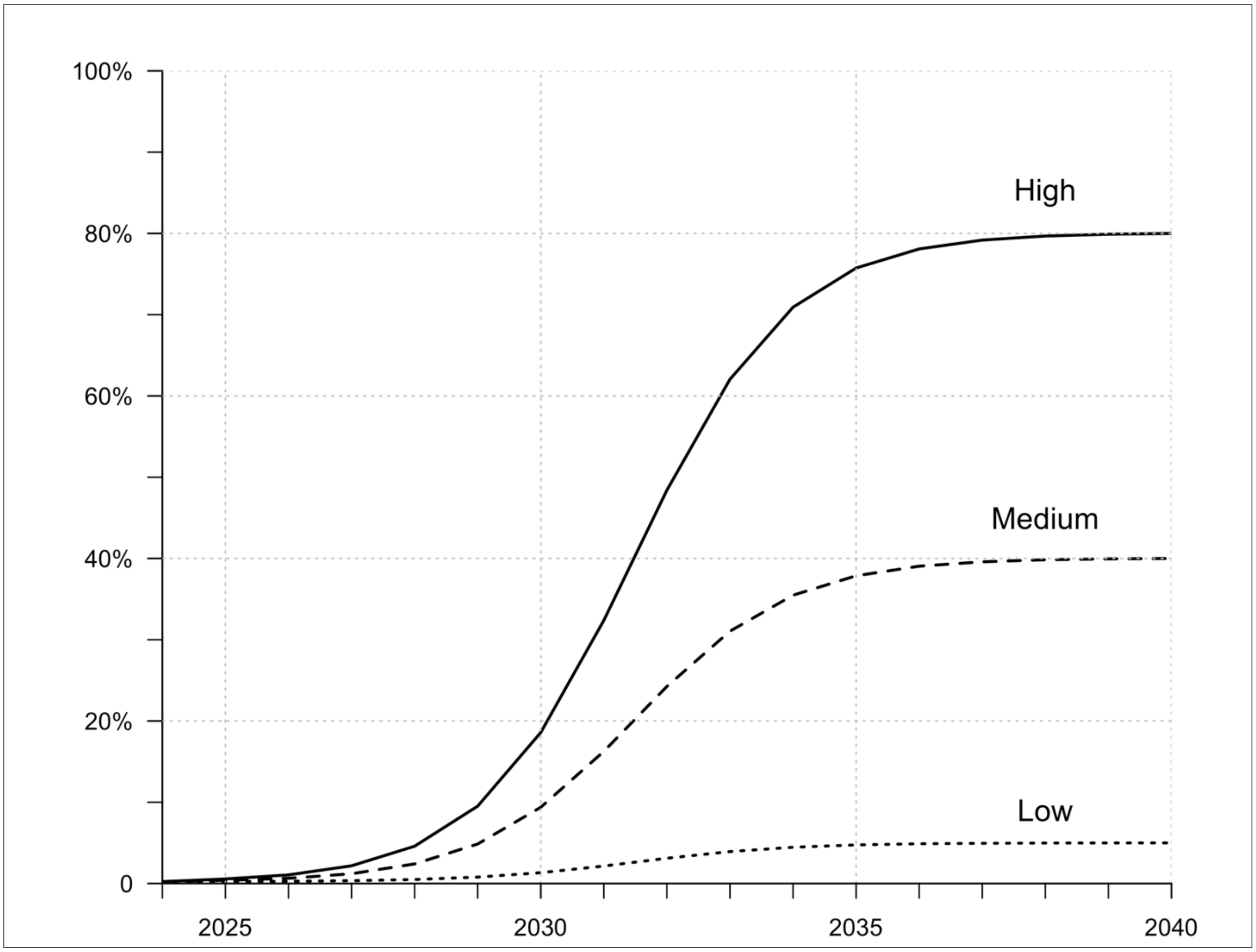

Figure 6. Trajectories for ZEV Share of Heavy-Duty Vehicles

2.3. THE SCENARIOS

We created eight future revenue scenarios that differ primarily along two major dimensions: changes in the fleet by motive power (ICE vs. ZEV) and overall VMT. Table 3 shows how the eight recovery scenarios each draw from the high, medium, and low trajectories for the variable inputs summarized in Table 2. Scenarios 1, 2, and 3 all envision high VMT levels but vary the ZEV proportion of both the light-duty and heavy-duty fleets. Scenarios 6, 7, and 8 all assume high VMT factors, but vary the ZEV share of the light-duty and heavy-duty fleets. Finally, Scenarios 4 and 5 both assume a medium trajectory for the ZEV share of the light- and heavy-duty fleets but vary the VMT factors. The eight scenarios thus represent a wide range of combinations of VMT and fleet composition.

Table 3. Trajectories for Each Variable Model Input in the Scenarios

		LDV revenue factors				HDV revenue factors	
Scenarios		Population	LD VMT per capita	LDVs per capita	% of LDVs that are ZEV	HD VMT	% of HDVs that are ZEV
Low VMT, varying ZEVs	1. High ZEV	Low	Low	Low	High	Low	High
	2. Medium ZEV	Low	Low	Low	Medium	Low	Medium
	3. Low ZEV	Low	Low	Low	Low	Low	Low
Mid-range VMT, medium ZEVs	4. Medium VMT + medium ZEV	Medium	Medium	Medium	Medium	Medium	Medium
	5. Mixed VMT + medium ZEV	High	High	Low	Medium	High	Medium
High VMT, varying ZEVs	6. High ZEV	High	High	High	High	High	High
	7. Medium ZEV	High	High	High	Medium	High	Medium
	8. Low ZEV	High	High	High	Low	High	Low

Notes: LD = light duty; LDV = light-duty vehicle; HD = heavy duty; HDV = heavy-duty vehicle; VMT = vehicle miles traveled; ZEV = zero-emission vehicle.

III. FINDINGS

This section presents the results of the projections, looking first at the total revenue raised under each scenario, next at the projected revenue for each individual tax under the eight scenarios, and finally the proportion of annual revenue raised from each tax and fee. Technical Appendix C shows the value of the projected revenue for each individual tax and fee, as well as for total state revenue.

We projected 2024 revenues to be identical across all eight scenarios. Because of this, differences between our projected scenarios emerge only as of calendar year 2025.

3.1. TOTAL PROJECTED TRANSPORTATION REVENUE

Figure 7 presents the total projected revenue that California would collect from 2024 to 2040 under the eight scenarios. All projections are presented in inflation-adjusted 2024 dollars. Table C7 provides the values used to construct Figure 7.

The model projects total revenue of $13.3 billion for 2024 across all scenarios, so revenue differences between the scenarios emerge only as of calendar year 2025. By 2040, annual projected revenue ranges from $4.8 billion to $12.1 billion.

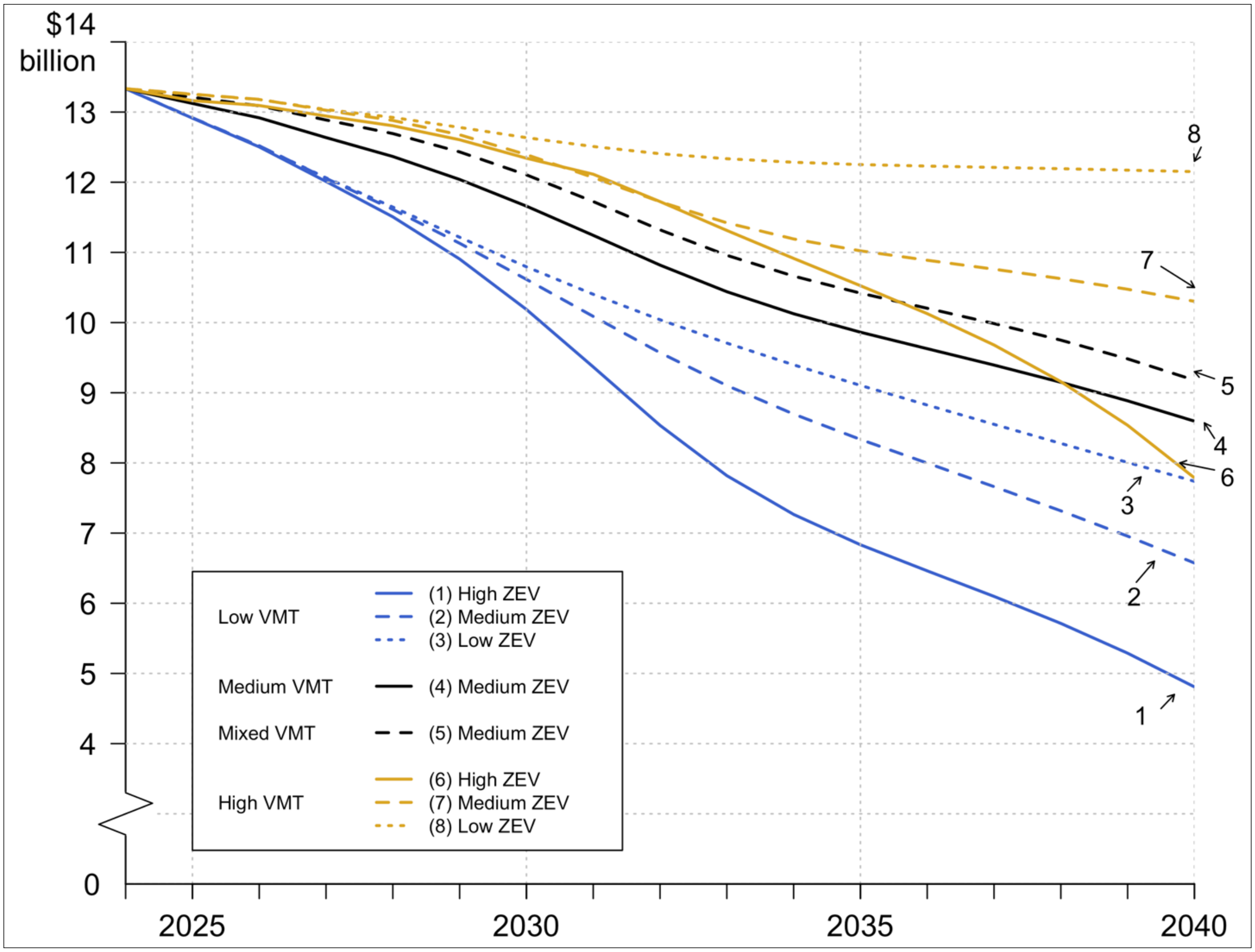

Figure 7. Total Projected State Revenue, by Scenario (2024 dollars)

Annual revenue loss: Across all scenarios, by 2040 total annual revenue in inflation-adjusted dollars falls below the 2024 model estimate of $13.3 billion. The scenario with the smallest revenue loss is the low-ZEV/high-VMT one (# 8), for which annual revenue in 2040 is $12.2 billion, 9% less than revenue in 2024. For the other scenarios, 2040 revenue ranges from 23% to 64% below 2024 revenue.

Cumulative revenue loss: For all scenarios, cumulative revenue through 2040 is from $12.8 billion to $75.1 billion less than cumulative revenue would be if the state continued to raise the same amount annually as it did in 2024 ($226.7 billion). These values equate to a cumulative revenue loss ranging from 6% to 33%.

Timing of revenue loss: Comparing annual revenue in 2024 with annual revenue in later years helps policymakers understand how much time is left before changes are needed to mitigate significant revenue loss. For example:

- In 2025, annual revenue is less than 2024 revenue for all scenarios. The decrease ranges from $78 million to $420 million.

- In 2030, annual revenue ranges from 5% to 24% less than 2024 revenue. The annual loss ranges from $698 million to $3.1 billion.

- In 2040, annual revenue ranges from 9% to 64% less than 2024. The annual loss ranges from $1.2 to $8.5 billion.

Revenue impact from ZEV mandates: Comparing the three low VMT scenarios shows that different ZEV adoption rates lead to very different total revenues over the years. For example, looking at the three scenarios that have low VMT inputs (scenarios #1, #2, and #3), annual revenue in 2040 is $2.9 billion higher for the low-ZEV scenario (#3) than the high-ZEV scenario (#1). The difference is even larger across the three scenarios that all have high VMT inputs: 2040 annual revenue in the low-ZEV scenario (#8) is $4.4 billion more than revenue in the high-ZEV scenario (#6).

Electric vehicles are not the only factor that could cause large changes in revenue, however. The projection scenarios illustrate that falling VMT could lead to similarly large revenue shortfalls. Scenarios #1 and #6 both have high ZEV share but vary by VMT, and by 2040 annual revenue will be $3.0 billion higher for the high-VMT scenario (#6) than for the low-VMT scenario (#1). Also, comparing two low-ZEV scenarios with different VMT trajectories shows that the high-VMT scenario (#8) is projected to raise $4.4 billion more than the low-VMT scenario (#6).

3.2. PROJECTED REVENUE FROM EACH TAX

Figure 8 shows the projected revenue in constant 2024 dollars for each tax and fee, under each scenario. (Tables C8 to C12 present the values used to construct Figure 8.) As Figure 8 makes clear, revenue does not fall in all cases. Annual revenue drops considerably for the gasoline and diesel excise taxes in every scenario, but for the diesel sales tax and TIF revenue could either rise or fall, and for the RIF revenue rises in every scenario.

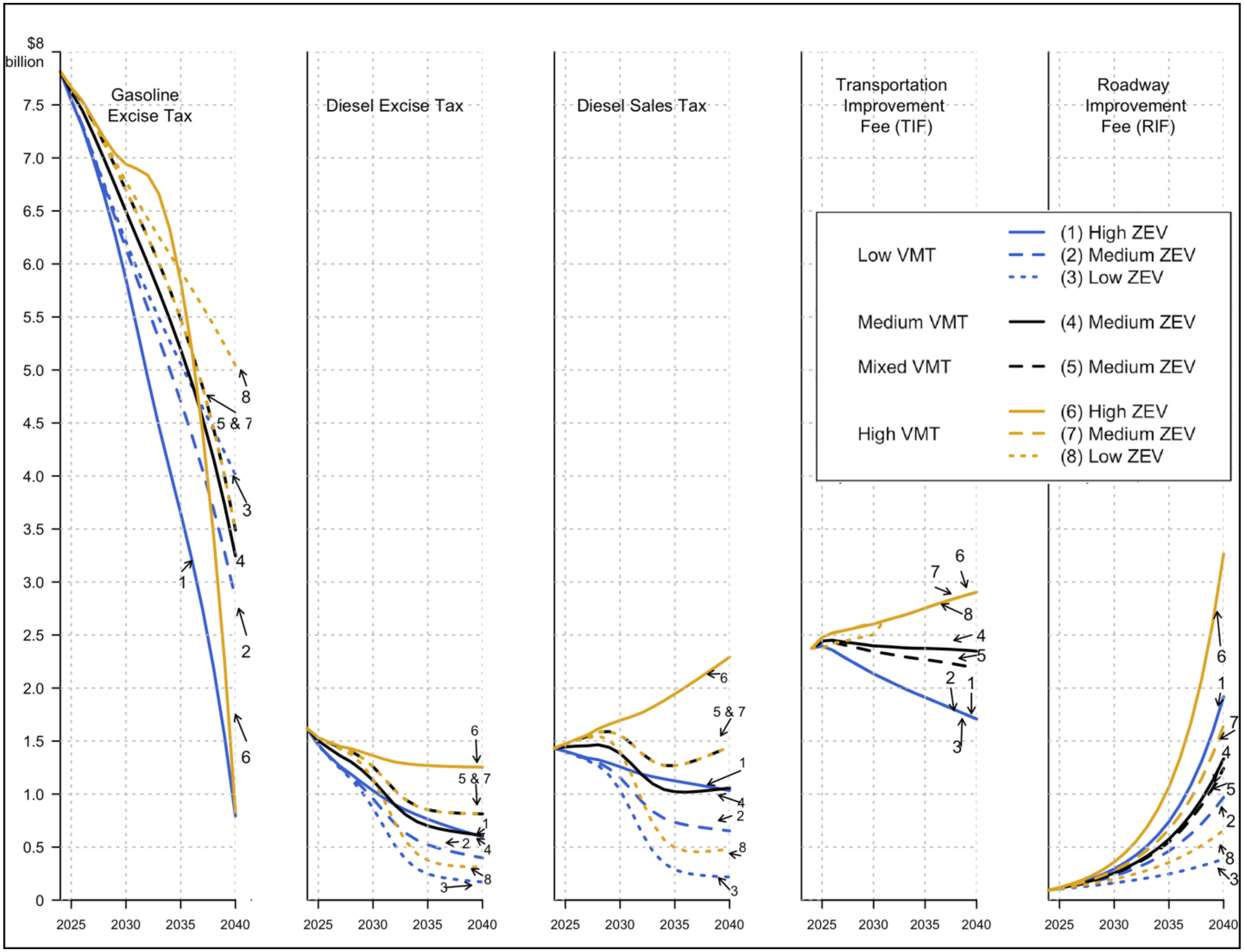

Figure 8. Projected Revenue by Tax, by Scenario (2024 dollars)

Gasoline excise tax: Gasoline excise tax revenue projections are calculated according to the conceptual approach shown in Figure 9.

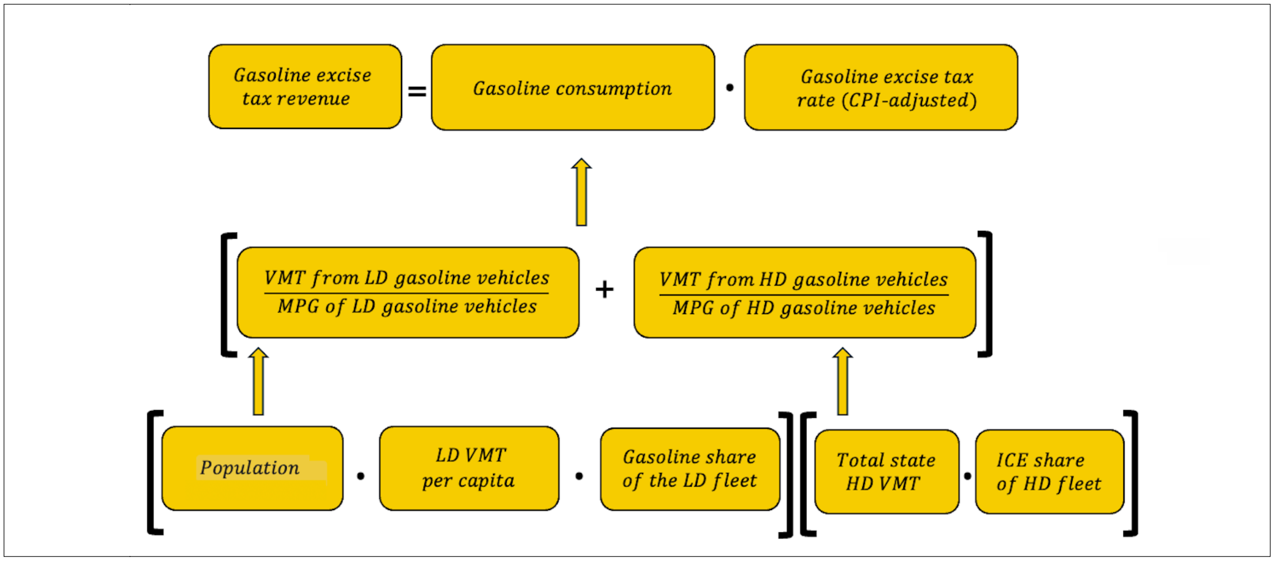

Figure 9. Conceptual Approach to Calculating Annual Gasoline Excise Tax Revenue

Annual gasoline excise tax revenue declines in all scenarios. Even for the highest revenue scenario, with high VMT and low ZEV adoption (Scenario #8), annual revenue in 2040 is 35% less than 2024 revenue, a loss of $2.8 billion. At the other extreme, low ZEV shares paired with high VMT factors (Scenario #1), 2040 annual revenue is 90% below 2024 levels, an annual loss of $7.0 billion. While much of the lost gasoline excise tax revenue can be attributed to rising ZEV shares, the model assumes gradual increases in fuel efficiency for gasoline-powered vehicles, another factor that reduces revenue.

Diesel excise and sales tax revenue: Annual diesel excise and sales tax revenue projections are calculated according to the conceptual approach shown in Figures 10 and 11.

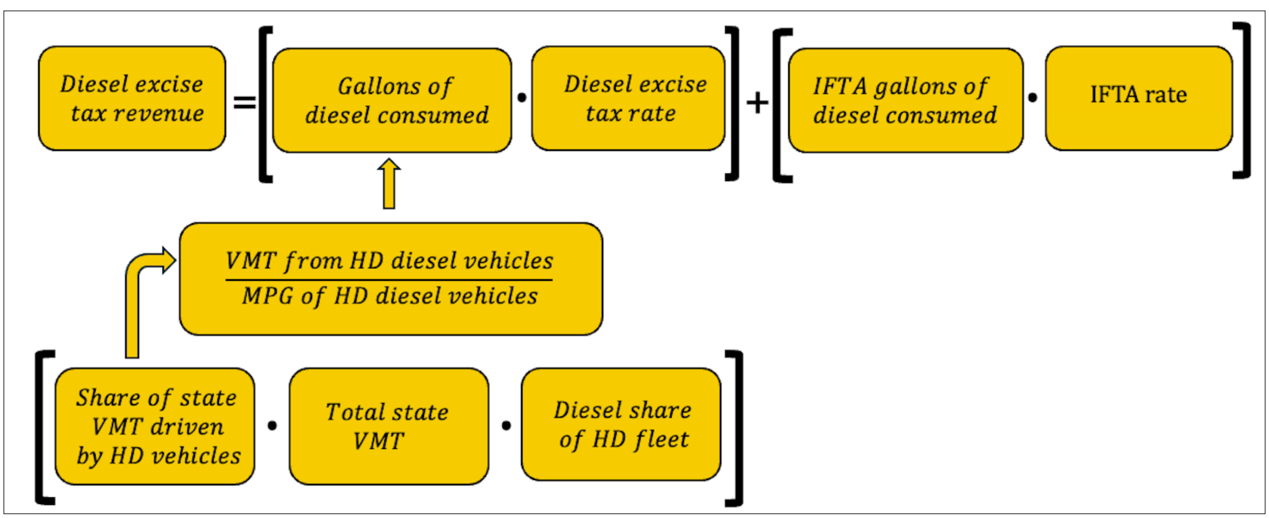

Figure 10. Conceptual Approach to Calculating Annual Diesel Excise Tax Revenue

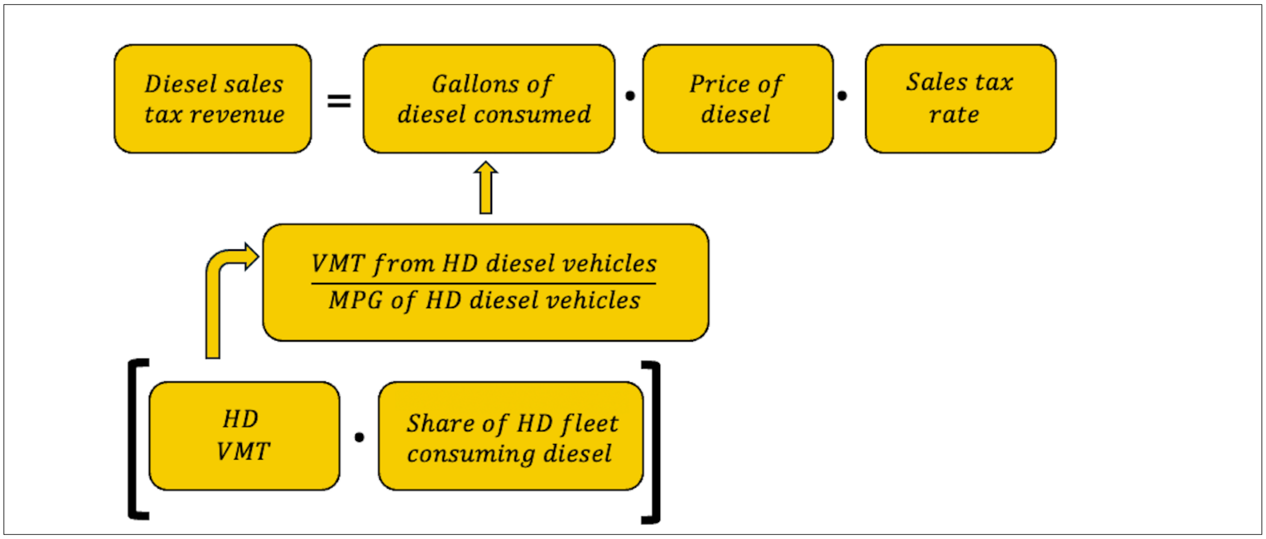

Figure 11. Conceptual Approach to Calculating Annual Diesel Sales Tax Revenue

Like gasoline tax revenue, proceeds from the two taxes on diesel fuel fall across time for most scenarios. As with gasoline tax revenue, revenue is reduced both when ZEVs replace ICE vehicles and because the models assume, in line with EIA projections, that diesel vehicles become more fuel-efficient. Looking at the two taxes combined, annual revenue in 2040 is projected to be from 26% to 87% lower than in 2024 ($0.8 billion to $2.7 billion less) for Scenarios #1 through #7. Much of this loss is driven by the rising ZEV share of the heavy-duty fleet. For example, comparing the low VMT scenarios in 2040, the high-ZEV option (Scenario #3) raises $1.2 billion less than the high-ZEV option (Scenario #1).

For Scenario #8, in contrast to the other scenarios, total revenue from the diesel sales and excise taxes are expected to be $0.5 billion (16%) higher in 2040 than in 2024. In this scenario, high VMT growth and low-ZEV adoption are enough to counteract improvements in diesel fuel efficiency, so that total revenue from diesel fuel increases over time.

Revenue does not change over time at the same *rate* for the diesel excise and sales taxes; the revenue loss is greater from the excise tax than the sales tax. This difference occurs because diesel prices are projected to rise over time, even though the number of gallons sold falls, and sales tax revenue is a function of both gallons sold and price. For the diesel excise tax, revenue in 2040 is 22% to 89% lower than in 2024, depending on the scenario. Similarly, diesel sales tax revenues in 2040 range from 26% to 85% lower than in 2040 for Scenarios #1, #2, #3, #4, and #6. However, diesel sales tax revenue in 2040 is *higher* under Scenarios #5, #7, and #8, with increases ranging from 1% to 60%.

Transportation Improvement Fee (TIF) revenue: TIF revenue projections are calculated according to the conceptual approach shown in Figure 12.

$$\text{TIF revenue} = \sum_{\text{Value bin } n} \left[\text{\# of LD vehicles in Value Bin } n \cdot \text{Rate for TIF Value Bin } n \text{ (CPI-adjusted)} \right]$$

Note: There are 5 TIF rates, depending on vehicle value. The "value bin" is the range of values associated with each rate.

Figure 12. Conceptual Approach to Calculating Annual TIF Revenue

As for the diesel sales tax, TIF revenue does not fall across all scenarios. The models project that TIF revenue in 2040 is 22% higher than 2024 revenue for Scenarios #6, #7, and #8, which all assume high growth in the number of light-duty vehicles.[27] (The three scenarios generate the same TIF revenue because they share the same population and vehicle ownership assumptions.) The two scenarios with mid-level VMT factors show very little change in annual revenue between 2024 and 2040 (a 1% drop for Scenario #4 and an 8% drop for Scenario #5). For the low-VMT factor scenarios (#1, #2, and #3), by 2040 annual TIF revenue has dropped by 28%, a loss of $0.7 billion in annual revenue. (These three scenarios generate the same TIF revenue because they share the same population and vehicle ownership assumptions.)

The TIF holds its value better than fuel taxes for two primary reasons. First, as an annual registration fee charged on light-duty vehicles, TIF revenue is not impacted directly by VMT, fuel efficiency, or the factor of most interest for this report: the growing proportion of ZEV vehicles in the light-duty fleet. Rather, TIF revenue depends primarily on the change in the number of vehicles and, to a lesser extent, on their value. Differences in TIF revenues across scenarios are determined overwhelmingly by differences in sizes of the light-duty fleet, which are in turn influenced by population and vehicle ownership rates.

The second reason the TIF holds its value in the projection models comparatively well is that the TIF rate depends on vehicle value,[28] and our model assumes that new ZEV prices remain more expensive than new ICE vehicles until 2040. We assume this price difference will decline over time before reaching parity in 2040. All else equal, then, our models for 2024 through 2039 assume that the fleet will generate more TIF revenue if the share of the more expensive ZEVs rises.

27 The number of light-duty vehicles is a factor of light-duty vehicles per capita and population size, two variable inputs that follow the high trajectory in Scenarios 6, 7, and 8.

28 The TIF rate a vehicle owner pays is determined by the value of the vehicle. However, TIF fees do not change linearly with vehicle values. Rather, vehicle owners are charged one of five TIF fees depending on the range of values within which their vehicle falls. For example, vehicles with a market value under $5,000 pay a TIF of $32, regardless of whether the vehicle is valued at $400 or $4,000. Similarly, a vehicle valued at $61,000 will pay the same TIF ($227) as a vehicle valued at $90,000. As a result, TIF revenues are less sensitive to differences in vehicle values than a naive association of higher vehicle values with increased TIF revenues would imply.

Road Improvement Fee (RIF) revenue: RIF revenue projections are calculated according to the conceptual approach shown in Figure 13.

$$\text{RIF revenue} = \#\text{ of taxable LD ZEVs (model year 2020 on)} \cdot \text{RIF rate (CPI-adjusted)}$$

Figure 13. Conceptual Approach to Calculating Annual RIF Revenue

Revenue from the RIF, a registration fee assessed only on light-duty ZEVs, is the one unquestionable bright spot in the revenue projections. RIF revenue rises in every scenario, since they all assume an increase in the number of light-duty ZEVs and, like the TIF, RIF revenue is not impacted by VMT or fuel efficiency. The revenue in 2024 is quite low, projected at just over $94 million, but by 2040, annual revenue for the high-ZEV + high-VMT scenario (#6) is $3.3 billion, a 3,300% increase. The low-ZEV + low-VMT scenario (#3) sees the smallest growth by 2040; RIF revenue in 2040 is $388 million, or roughly quadruple the 2024 revenue.

3.3. THE PROPORTION OF ANNUAL REVENUE RAISED FROM EACH TAX AND FEE

While the previous section discusses changes in the relative dollar values of revenue raised from the five taxes and fees over time, this section examines how the *share* of total revenue contributed by each tax and fee changes over time (Figure 14).[29] Analyzing these proportions reveals how reliant the state may be on a particular tax or fee at any point in time. When interpreting Figure 14, readers should note that the total revenue collected each year varies greatly, as discussed above. To help readers keep these differences in mind, the figure notes for each scenario the total revenue to be collected in 2040.

29 Tables C13 to C20 in Appendix C show the values used to construct Figure 14.

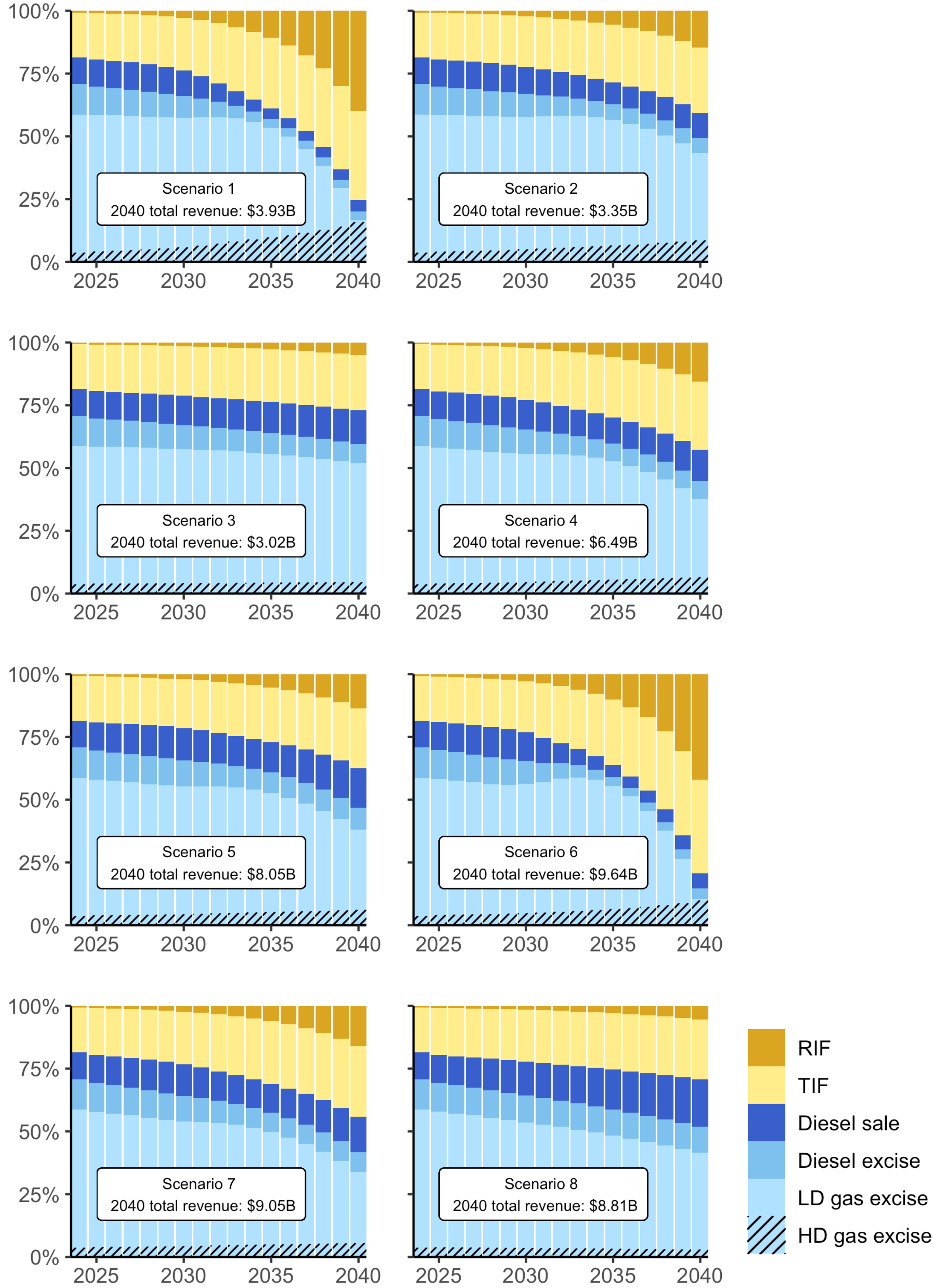

Figure 14. Proportion of Total Projected Revenue Raised from Each Tax and Fee, by Scenario

Over time, revenue from fuel taxes will decline as a proportion of state transportation tax revenue, with RIF and TIF revenue becoming relatively more important. This trend occurs because the scenarios all assume some combination of (a) declining revenue from fuel excise taxes as more and more vehicles are ZEVs or extremely efficient ICE vehicles, and (b) revenue from the two annual fees assessed on light-duty vehicles grows for the RIF in all scenarios and in some scenarios for the TIF

In 2024, the taxes on fuels are projected to generate more than three-quarters of all revenue (81%). By the year 2040, however, taxes on fuels will generate a smaller percentage of total revenue under every scenario. At one extreme, revenue from taxes on fuels in Scenario #6 (high VMT + high ZEV) falls to only 21% of total revenue by 2040. In this scenario, the most critical source of revenue becomes the annual vehicle registration fees, the RIF and TIF. By contrast, the relative proportion of revenue from taxes on fuels falls only to 71% in Scenario #3 (low VMT and low ZEV), leaving the state still largely reliant on revenue from fuel taxes.

Mirroring the decline in revenue from fuel taxes, by 2040, the vehicle fees generate proportionately more revenue over time. At the extreme, the vehicle fees generate more than half of revenue by 2040 for both Scenarios #1 and #6, the two that have high ZEV fleet share for both light-duty and heavy-duty vehicles.

Looking more closely into the relative contributions from the different taxes on fuels shows that in 2024, the gasoline excise tax raises almost twice as much annual revenue as the combined diesel taxes, and gasoline excise tax continues to generate more annual revenue than diesel through 2040 across all the scenarios. For example, Scenario #1 projects 17% of revenue coming from gasoline sales and 8% coming from taxes on diesel fuel, and in Scenario #8 the relative contributions shift somewhat to 42% from gasoline fuel sales and 29% from sales of diesel. The one outlier is Scenario #6; by 2040, the revenues from gasoline and diesel sales converge to 11% and 10%, respectively.

The TIF, the annual fee assessed on all light-duty vehicles, will generate a steadily growing proportion of total revenue across all scenarios. In 2024 the TIF is projected to generate 18% of revenue, but by 2040 the TIF generates between 22% and 37% of total revenue for every scenario.

The trajectory of the RIF, the flat annual fee assessed on light-duty ZEVs, varies far more than the TIF among the scenarios. For Scenarios #1 and #6, the two high-ZEV scenarios, by 2040 the RIF will generate 40% and 42% of all revenue, respectively. However, in Scenarios #3 and #8 the RIF will generate only 5% of total revenue in 2040. For the remaining scenarios, the RIF generates from 14% to 16% of revenue.

IV. CONCLUSION

This research projected transportation revenue generated by California's SB 1 taxes and fees for the years 2024 through 2040, using tested spreadsheet models and well-known data sources.

Recognizing the extreme uncertainty posed by the state's climate policy, as well as unknown future changes in driving behavior and population, we developed eight future scenarios and projected SB 1 transportation revenue for each. The differences among the scenarios illuminate a range of possible futures for which the State of California may wish to prepare. Key findings show how climate specific policies and changing statewide VMT could impact future revenue.

4.1. SUMMARY OF FINDINGS

The scenarios illustrate the futility of projecting future revenues with any confidence for more than a few years into the future. The annual revenue raised under the eight scenarios diverge steadily over time. In 2028, just four years out, projected total annual revenue varies across the scenarios by more than a billion dollars. By 2040, total annual revenue ranges from a low of $4.8 billion to a high of $12.2 billion. The fact that the revenue projections are so highly sensitive to assumptions about underlying conditions such as ZEV shares and per capita VMT highlights the importance of using scenario analysis to plan for a broad range of potential futures.

The state may lose substantial revenue if the SB 1 taxes and fees are not changed and/or replaced within the coming few years. In just three years, by 2027, the state could be losing more than one billion dollars annually compared to projected 2024 revenue.

A fast ICE to ZEV transition would significantly reduce annual revenue—but so would lower VMT. For example, comparing the two scenarios that have low VMT inputs but different ZEV levels (scenarios #1 and #3), annual revenue in 2040 is $2.9 billion higher for the low-ZEV scenario (#3) than the high-ZEV scenario (#1). Falling VMT could lead to similarly large revenue shortfalls. Scenarios #1 and #6 both have high ZEV share but vary by VMT, and by 2040 annual revenue will be $3.0 billion higher for the high-VMT scenario (#6) than for the low-VMT scenario (#1).

Fuel taxes currently provide most SB 1 revenue, but by 2040 vehicle registration fees may generate the majority of SB 1 revenue. In 2024, taxes on fuels are projected to generate 82% of all revenues, but by 2040 the models predict the fees will generate somewhere between 21% and 73% of total revenue. However, although SB 1 vehicle fees hold their value in the face of a transition to ZEV fleets, the fees do not fully compensate for the lost fuel tax revenue.

4.2 POLICY RECOMMENDATIONS

Based on the study findings, we suggest policymakers consider the following actions.

1. *Establish a plan for replacing lost fuel tax revenues within a few years.* Ideally, California will identify a replacement for fuel tax revenue by around 2027, when revenues fall below 2024 levels for all scenarios and could potentially be more than $1 billion lower than in 2024.

2. *Explore a wide variety of tax and fee options to either augment or replace the state's fuel taxes.* Should the state achieve its policy goals of reducing carbon emissions from the transportation sector through ZEV mandates and/or policies to reduce VMT, then policymakers will almost certainly choose to change the structure of taxes to "replace" the revenue lost from fuel taxes.

   One potential alternative to motor fuel taxes that is receiving increasing consideration is the concept of replacing motor fuel taxes with "mileage fees." These charges, often in California called "road-user fees," assess drivers a fee for every mile traveled. California has completed multiple field trials of road-user charges,[30] with more currently underway, and the federal government is about to begin a new national mileage fee pilot as called for in the Infrastructure Investment and Jobs Act of 2021 (H.R.3684).

   Other revenue options to replace dwindling fuel tax revenue include taxing the electricity used to power electric vehicles, increasing annual vehicle registration fees, or moving away from user fees altogether to rely more on general revenues, such as income and sales taxes.

   Regardless of what revenue alternative(s) are selected to replace the motor fuel tax, the rates should be indexed to inflation to retain purchasing power over time without the need for regular legislative action.

3. *Update scenario revenue projections annually to reflect changing conditions.* Adopting a policy to update these revenue projections annually would allow legislators to understand how changes to vehicle technology and travel behavior are influencing potential future revenue streams.

4. *Expand the scope of scenario projections to include other large sources of California's transportation revenue.* Two major sources of revenue used to maintain and improve the transportation system that could be integrated into the model are vehicle weight fees and local-option sales taxes.

5. *Choose simple and transparent models for future projection studies.* Providing this information in easy-to-understand language and formats allows stakeholders to understand how different inputs translate to different revenue trends. Further, making explicit the key choices behind the scenarios allows stakeholders to

30 California State Transportation Agency, *California Road Charge Pilot Program Final Report* (2017), https://caroadcharge.com/projects/california-s-road-charge-pilot/.

experiment with different sets of inputs that may seem plausible to them but were not included in the study.

6. *Engage a wide range of stakeholders when developing the scenarios.* This approach allows the model to incorporate the different futures that different groups may be anticipating. Such collaboration also allows stakeholder representatives to better understand how their vision of likely future conditions compares to the visions held by other groups. Finally, collaborative scenario-building can build trust in the projection results.

7. *Develop a public, online projection application that allows users to experiment with different inputs.* California could provide an online, interactive planning tool that allows policymakers, stakeholders, and the general public to compare how different future conditions would impact transportation revenues sources. In addition, the tool could allow the users to vary the tax and fee rates to understand how these changes would influence future revenue. One example of such a public-engagement tool is the North Carolina Department of Transportation's "Creating Revenue and Finding Transportation Solutions (CRAFTS)" web application.[31]

31 North Carolina Department of Transportation, "CRAFTS - Creating Revenue and Finding Transportation Solutions" (no date), https://ndtviyaprod.ondemand.sas.com/tins/?sso_guest=true&sas-welcome=false.

ABOUT THE AUTHORS

ASHA WEINSTEIN AGRAWAL, PH.D.

Dr. Agrawal works at San José State University, where she is Director of MTI's National Transportation Finance Center, the MTI Education Director, and Professor of Urban and Regional Planning. Her research agenda is guided by a commitment to the principles of sustainability and equity: what policy and planning tools can communities adopt to encourage environmentally-friendly travel and improve accessibility for people struggling with poverty or other disadvantages? Dr. Agrawal has researched transportation funding policy questions for more than 25 years. Her work focuses on holistic evaluation of the advantages and challenges of different tax and fee options for raising transportation revenues, as well as public opinion about different tax and fee options. She earned a BA in Folklore and Mythology from Harvard University, an MSc in Urban and Regional Planning from the London School of Economics and Political Science, and a PhD in City and Regional Planning.

HANNAH KING

Ms. King is a doctoral candidate at UCLA's Institute of Transportation Studies and Department of Urban and Regional Planning. Her research focuses on transportation finance, travel behavior, and transportation equity. At Florida State University she earned MS degrees in Urban and Regional Planning and Geographic Information Systems, as well as a BS in Applied Economics. Prior to starting her doctoral studies, Ms. King worked for the state of Florida providing technical assistance to local governments as they planned for the effects of sea-level rise.

H.A. "BURT" TASAICO, PE

Mr. Tasaico is an MTI Research Associate and retired Director of Strategic Initiatives and Program Support for the North California Department of Transportation. He worked for 40 years both in the private and public sectors in all phases of transportation planning, modeling, programming, funding and revenue forecast, and cash management. He is also a member and past officer of many professional organizations, including former AASHTO Financial Management Fellow, former Vice-chair of AASHTO's Transportation Policy Forum, and a member of the Transportation Research Board's Committee on Economics and Finance (AJE50).

BIBLIOGRAPHY

ACT Research. "Half of All Commercial Vehicles Will be Zero Emissions by 2040." September 12, 2023. https://www.actresearch.net/resources/blog/charging-forward-blog?utm_campaign=CF3&utm_content=264054277&utm_medium=social&utm_source=linkedin&hss_channel=lcp-7317475.

Agrawal, Asha Weinstein, Hannah King, and Martin Wachs, *The Impact of COVID-19 on California Transportation Revenue*. Mineta Transportation Institute, May 2020.

Asha Weinstein Agrawal, et al. *The Impact of the COVID-19 Recovery on California Transportation Revenue: A Scenario Analysis through 2040*. Mineta Transportation Institute, December 2020. https://transweb.sjsu.edu/research/2054-Impact-COVID-19-Recovery-California-Transportation-Revenue.

_____. *Pay as You Go Driving: Examining Possible Road Charge Rate Structures for California.* Mineta Transportation Institute, December 2023. https://transweb.sjsu.edu/research/2149-Pay-As-You-Go-Driving.

Biernacka-Lievestro, Joanna, and Alexandre Fall. "A Third of States Lost Population in 2021." Pew Trust, May 12, 2022. https://www.pewtrusts.org/en/research-and-analysis/articles/2022/04/25/a-third-of-states-lost-population-in-2021.

California Air Resources Board. 20*22 Scoping Plan*. December 2022. https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents.

_____. *Advanced Clean Cars II: Proposed Amendments to the Low Emission, Zero Emission, and Associated Vehicle Regulations: Standardized Regulatory Impact Assessment (SRIA).* January 26, 2022.

California Department of Finance. "State's Population Decline Slows While Housing Grows Per New State Demographic Report." May 1, 2023. https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2023PressRelease.pdf.

_____. "E-4 Population Estimates for Cities, Counties, and the State, 2011-2020, with 2010 Census Benchmark." Sacramento, California: May 2022. https://dof.ca.gov/forecasting/demographics/estimates/e-4-population-estimates-for-cities-counties-and-the-state-2011-2020-with-2010-census-benchmark-new/.

_____. "State's Population Decline Slows While Housing Grows Per New State Demographic Report." May 1, 2023. https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2023PressRelease.pdf.

California Department of Motor Vehicles, "1/1/2023 Vehicle Fuel Type by Zip Code." https://data.ca.gov/dataset/vehicle-fuel-type-count-by-zip-code'.

Caltrans. "Fiscal Year 2023-24 California Transportation Financing Package." April 17, 2023. https://dot.ca.gov/-/media/dot-media/programs/budgets/documents/fiscal_year_2023-24_california_transportation_financing_package_signed-a11y.pdf

_____. *Transportation Funding in California 2023.* 2023. https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/data-analytics-services/transportation-economics/transportation-funding-booklet/2023/2023-transportation-funding-10-9-23-a11y.pdf.

California Legislative Analyst's Office. *Assessing California's Climate Policies: Implications for State Transportation Funding and Policies*. December 2023.

California State Transportation Agency. *California Road Charge Pilot Program Final Report.* 2017. https://caroadcharge.com/projects/california-s-road-charge-pilot/.

Chandra, Kiran B. Krishnamurthy, and Nicole S. Ngo. "The Effects of Smart-Parking on Transit and Traffic: Evidence from SFpark." *Journal of Environmental Economics and Management* 99 (January 1, 2020): 102273. https://doi.org/10.1016/j.jeem.2019.102273.

Gillingham, Kenneth. "Identifying the Elasticity of Driving: Evidence from a Gasoline Price Shock in California." *Regional Science and Urban Economics* 47 (July 1, 2014), 13–24. https://doi.org/10.1016/j.regsciurbeco.2013.08.004.

Genevieve Guiliano, et al. "Heavy-Duty Trucks: The Challenge of Getting to Zero" [article 102753]. *Transportation Research Part D* 93 (2021). https://doi.org/10.1016/j.trd.2021.102742

Goetzke, Frank, and Colin Vance. "An Increasing Gasoline Price Elasticity in the United States?" *Energy Economics* 95 (March 1, 2021). https://doi.org/10.1016/j.eneco.2020.104982.

Hardman, Scott, Debaprita Chakraborty, and Gil Tal. "Estimating the Travel Demand Impacts of Semi-Automated Vehicles." *Transportation Research Part D* 107 (2022).

Isserman, Andrew M. "Projection, Forecast, and Plan: On the Future of Population Forecasting." *APA Journal* 50, no. 2 (1984).

Mondal, Aaupal, et al. "Accounting for Ride-Hailing and Connected and Autonomous Vehicle Empty Trips in a Four-Step Travel Demand Model." *Transportation Research Record* 2677, no. 3 (2023). https://doi.org/10.1177/03611981221115072.

North Carolina Department of Transportation. "CRAFTS - Creating Revenue and Finding Transportation Solutions." No date. https://ndtviyaprod.ondemand.sas.com/tins/?sso_guest=true&sas-welcome=false.

Reichmuth, David. "Can California Stop Selling Polluting Cars by 2035? Yes It Can." Union of Concerned Scientists, August 22, 2022. https://blog.ucsusa.org/dave-reichmuth/can-california-stop-selling-polluting-cars-by-2035-yes-it-can/.

Shafiei, Sajjad. "Impact of Self-Parking Autonomous Vehicles on Urban Traffic Congestion." *Transportation* 50 (2021), 183-203.

Statistics Canada. "Table 23-10-0067-01: Vehicle Registrations, by Type of Vehicle." 2020. DOI: https://doi.org/10.25318/2310006701-eng.

Sun, Ra, et al. "Impacts of Connected and Autonomous Vehicles on Travel Demand and Emissions in California." *Transportation Research Record: Journal of the* Transportation *Research Board* (2023). https://doi.org/10.1177/03611981231186984.

U.S. Energy Information Administration, *Alternative Fuel Infrastructure Expansion: Costs, Resources, Production Capacity, and Retail Availability for Low-Carbon Scenarios*, April 2013, https://www.nrel.gov/docs/fy13osti/55640.pdf.

Wachs, Martin, Hannah King, and Asha Weinstein Agrawal. *The Impact of ZEV Adoption on California Transportation Revenue.* San Jose: Mineta Transportation Institute, July 2019.

_____. *The Future of California Transportation Revenue.* San Jose: Mineta Transportation Institute, October 2018.

Wenzel, Tom, and K. Sydny Fujita. *Elasticity of Vehicle Miles of Travel to Changes in the Price of Gasoline and the Cost of Driving in Texas*. Berkeley: Lawrence Berkeley National Laboratory, March 2018. https://eta-publications.lbl.gov/sites/default/files/_lbnl-2001138.pdf.

APPENDIX A: FORMULAS USED TO PROJECT REVENUE

This appendix presents the formulas used to project the annual revenue generated by each SB 1 tax and fee.

The formulas use the following abbreviations: CPI = Consumer Price Index, HD = heavy duty, ICE = internal combustion engine, LD = light duty, MPG = miles per gallon, VMT = vehicle miles traveled, and ZEV = zero-emission vehicle.

Gasoline Excise Tax Revenue

1a. $$\text{Gasoline excise tax revenue} = \text{Gallons of gasoline consumed} \cdot \text{CPI-adjusted gasoline excise tax rate}$$

1b. $$\text{Gallons of gasoline consumed} = \frac{\text{VMT from LD gasoline vehicles}}{\text{MPG of LD gasoline vehicles}} + \frac{\text{VMT from HD gasoline vehicles}}{\text{MPG of HD gasoline vehicles}}$$

1c. $$\text{VMT from LD gasoline vehicles} = \text{Population} \cdot \text{LD VMT per capita} \cdot \text{Gasoline share of the LD fleet}$$

1d. $$\text{VMT from HD gasoline vehicles} = \text{HD VMT} \cdot \text{Gasoline share of the HD fleet}$$

Diesel Excise Tax Revenue

2a. $$\text{Diesel excise tax revenue} = \left[\text{Gallons of diesel consumed} \cdot \text{CPI-adjusted diesel excise tax rate}\right] + \left[\text{IFTA gallons of diesel consumed} \cdot \$0.27\ (\text{IFTA rate})\right]$$

2b. $$\text{Gallons of diesel consumed} = \frac{\text{VMT from HD diesel vehicles}}{\text{MPG of HD diesel vehicles}}$$

2c. $$\text{IFTA gallons of diesel consumed} = \text{Projected IFTA gallons of diesel consumed} + \left[\text{The average annual rate of decrease } (-0.01) \cdot \text{IFTA gallons of diesel in previous year}\right]$$

2d. $$\text{VMT from HD diesel vehicles} = \text{HD VMT} \cdot \text{Diesel share of HD fleet}$$

Diesel Sales Tax Revenue

3a. $$\text{Diesel sales tax revenue} = \text{Gallons of diesel consumed} \cdot \text{Inflation-adjusted diesel price} \cdot \text{Diesel sales tax rate } (10.5\%)$$

3b. $$\text{Gallons of diesel consumed} = \frac{\text{VMT from HD diesel vehicles}}{\text{MPG of HD diesel vehicles}}$$

3c. $$\text{VMT from HD diesel vehicles} = \text{HD VMT} \cdot \text{Diesel share of HD fleet}$$

Transportation Improvement Fee (TIF) Revenue

4a.
$$\text{TIF revenue} = \text{ICE TIF revenue} + \text{ZEV TIF revenue}$$

4b.
$$\text{ICE TIF revenue} = \sum_{\text{Value bin } n} \left[\text{\# of LD ICE vehicles in TIF Value bin } n \cdot \text{CPI-adjusted rate for TIF in Value bin } n \right]$$

4c.
$$\text{ZEV TIF revenue} = \sum_{\text{Value bin } n} \left[\text{\# of LD ZEV vehicles in TIF Value bin } n \cdot \text{CPI-adjusted rate for TIF in Value bin } n \right]$$

* A "value bin" covers all of the vehicles in a given year that will pay the same TIF rate. Vehicles may have different values but be in the same value bin.

Road Improvement Fee (RIF) Revenue

5a.
$$\text{RIF revenue} = \text{Net ZEV registrations*} \cdot \text{CPI-adjusted RIF rate}$$

* Net ZEV registrations is the total number of ZEVs in the fleet minus the number of ZEVs with model year 2019 or earlier.

APPENDIX B: DATA SOURCES AND ASSUMPTIONS FOR THE MODEL INPUTS

The table below presents the model inputs, noting for each the data source and assumptions. We explain the method used to project our 2024 values and then the approach to projecting the revenue forward through 2040. For 2024 projections, we distinguish between variables where we used values taken directly from other sources ("assumed" values) and variables where we calculated our own values ("estimated" values).

The six inputs for which we constructed the three trajectories used to build scenarios are highlighted in blue.

Input	Data source & years of data used	Assumptions
Tax and fee rates		
Rates under SB1 for the gasoline excise tax, diesel excise tax, diesel sales tax, Road Improvement Fee, and Transportation Improvement Fee	California Legislative Information SB1 Transportation Funding Bill Text https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1	We assumed that the gasoline excise tax rate, diesel excise tax rate, and Road Improvement Fee rate will be adjusted for inflation using the California Consumer Price Index (CPI), following the methodology specified in SB1.
Economic indicators and population		
California Consumer Price Index	State of California Department of Industrial Relations California Consumer Price Index https://www.dir.ca.gov/OPRL/CPI/EntireCCPI.PDF	We assumed the California Consumer Price Index (CPI) would grow 9.71% faster than the projected U.S. EIA CPI, which is the average rate at which the CA CPI exceeded the U.S. CPI between 2019 and 2022.
U.S. Consumer Price Index	United States Energy Information Administration Annual Outlook 2023 (Region: United States) https://www.eia.gov/outlooks/aeo/	We assumed the U.S. Consumer Price Index is equal to that projected by the EIA.
	Bureau of Labor Statistics Consumer Price Index (2000-2022) https://www.bls.gov/cpi/	We assumed inflation continues at 2.5% per year. This rate is the mean annual change from 2000 to 2022.
Population	California Department of Finance, *State's Population Decline Slows While Housing Grows Per New State Demographic Report* (May 2023) https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2023PressRelease.pdf	We assumed that California's population was 38,940,231 in 2024. We modeled three population trajectories for the rate of change: • Population increases by 220,000 annually. • Population stays constant. • Population decreases 1% annually.
VMT		
Statewide VMT (annual)	Caltrans Highway Performance Monitoring System (HPMS) Data	We estimated 2024 statewide VMT by taking the latest Caltrans HPMS VMT data (2021) and applying a 3.8% annual growth factor.
	Federal Highway Administration, Highway Statistics 2021, Table VM-1 Vehicle miles of travel and related data, by highway category and vehicle type https://www.fhwa.dot.gov/policyinformation/statistics/2021/	

Light-duty VMT per capita (annual)	Federal Highway Administration, *Highway Statistics 2021*, Table VM-1 Vehicle miles of travel and related data, by highway category and vehicle type https://www.fhwa.dot.gov/policyinformation/statistics/2021/	To estimate California annual, per-capita light-duty VMT in 2024 (7,656 miles), we multiplied the light-duty share of national VMT (89% in Table VM-1) by the estimated 2024 California annual VMT, and then divided by the estimated 2024 California population. We modeled three trajectories for the rate of change: • Light-duty VMT per capita increases along a sigmoid curve to 9,570 annual miles in 2040 (25% growth). • Light-duty VMT per capita stays constant. • Light-duty VMT per capita declines along a sigmoid curve to 6,424 annual miles in 2040 (17% decline).
Heavy-duty statewide VMT (annual)	Federal Highway Administration, *Highway Statistics 2021*, Table VM- 1 Vehicle miles of travel and related data, by highway category and vehicle type https://www.fhwa.dot.gov/policyinformation/statistics/2021/vm1.cfm	We estimated the California heavy-duty VMT of 30,753 million miles in 2024 by multiplying the heavy-duty share of national VMT (11% in Table VM-1) by the estimated 2024 California annual VMT. We modeled three trajectories for the rate of change: • Heavy-duty VMT increases linearly by 3% annually by 2040. • Heavy-duty VMT increases linearly by 1% annually by 2040. • Heavy-duty VMT decreases linearly by 2% annually by 2040.
Motor fuel-related inputs		
Gallons of diesel covered under the International Fuel Tax Agreement (IFTA)	California Board of Equalization Taxes and Fees - Annual Summaries (2006-2019)	We estimated gallons of diesel covered under IFTA in 2024 by dividing California's annual IFTA tax revenue receipts by the IFTA tax rates. We projected that the number of gallons covered under the IFTA agreement will decrease 1% per year, the observed rate of change from 2007-2017.
IFTA Component B tax rate	California Board of Equalization IFTA Tax Rates (2007-2017)	We estimated that the IFTA Component B rate remains at $0.27 per gallon from 2024to 2040. This is the mean rate from 2007 to 2017. The IFTA Component B rate rose and fell slightly from year to year during the period from 2007 to 2017, but there was no obvious growth, so we assumed there would be no change in the IFTA Component B tax rate moving forward.
Diesel prices	United States Energy Information Commission Gasoline and Diesel Fuel Prices; Region: United States (2019-2022)	We estimated that diesel prices in 2024 equal the average observed price in California from 2019-2022 and projected that future prices will increase $0.49 per year, which is half the observed average annual increase ($0.98) from 2020 to 2022.

Vehicle-related inputs		
Light-duty vehicles per capita	California Department of Motor Vehicles, 1/1/2023 Vehicle Fuel Type Count by Zip Code	Using DMV data, we assumed a per-capita rate of light-duty vehicle ownership of 0.71 in 2024. We modeled three trajectories for the rate of change: • The number of light-duty vehicles per capita increases linearly to 0.81 in 2040. • The number of light-duty vehicles per capita remains constant over time. • The number of light-duty vehicles per capita decreases linearly to 0.61 in 2040.
ZEV share of light-duty fleet	California Department of Motor Vehicles, 1/1/2023 Vehicle Fuel Type Count by Zip Code	We assumed that ZEVs comprise 4% of light-duty vehicles in California in 2024. We modeled three trajectories for the rate of change: • The share of ZEVs increases exponentially to 99% of light-duty vehicles in 2040. • The share of ZEVs increases exponentially to 50% of light-duty vehicles in 2040. • The share of ZEVs increases exponentially to 20% of light-duty vehicles in 2040.
ZEV share of heavy-duty fleet	California Department of Motor Vehicles, 1/1/2023 Vehicle Fuel Type Count by Zip Code	Using DMV data, we estimated that ZEVs comprise 0.23% of heavy-duty vehicles in California in 2024. We modeled three trajectories for the rate of change: • The share of ZEVs increases parabolically to 80% of heavy-duty vehicles by 2040. • The share of ZEVs increases parabolically to 40% of heavy-duty vehicles by 2040. • The share of ZEVs increases parabolically to 5% of heavy-duty vehicles by 2040.
Gasoline share of heavy-duty fleet	United States Energy Information Administration Annual Outlook 2023 (Region: United States)	We assumed the gasoline share of the heavy-duty fleet is equal to that projected by the EIA for the full study period (2024 through 2040).
Age of the light-duty vehicle fleet	California Department of Motor Vehicles, 1/1/2023 Vehicle Fuel Type Count by Zip Code	We assumed that the age composition of the light-duty vehicle fleet from 2024-2040 mirrors the age composition in January 2023.
Light-duty gasoline vehicle per-mile MPG	United States Energy Information Administration Annual Outlook 2023 (Region: United States)	We estimated 2024 MPG for each light-duty mile driven by calculating the value needed to generate annual gasoline excise tax revenue close to the amount projected in the 2023-2024 state budget, given the statewide VMT assumption above. For 2025 through 2040, we projected that the light-duty gasoline vehicle per-mile MPG is equal to the average vehicle MPG projected by the EIA.
Heavy-duty gasoline vehicle per-mile MPG	United States Energy Information Administration Annual Outlook 2023 (Region: United States)	For all years, from 2024 through 2040, we assumed that the heavy-duty gasoline vehicle per-mile MPG is equal to the average vehicle MPG projected by the EIA.

APPENDIX C: DATA TABLES

This appendix provides the values used to create the report figures: values for the variable inputs, projected statewide revenue, and projected revenue from each SB 1 tax and fee.

Values for the Variable Inputs, By Scenario

Table C1: State Population, by Scenario (millions of people)

	Scenarios 1, 2, & 3	Scenario 4	Scenarios 5, 6, 7, & 8
2024	38.94	38.94	38.94
2025	38.55	38.94	39.16
2026	38.17	38.94	39.38
2027	37.78	38.94	39.60
2028	37.41	38.94	39.82
2029	37.03	38.94	40.04
2030	36.66	38.94	40.26
2031	36.29	38.94	40.48
2032	35.93	38.94	40.70
2033	35.57	38.94	40.92
2034	35.22	38.94	41.14
2035	34.86	38.94	41.36
2036	34.52	38.94	41.58
2037	34.17	38.94	41.80
2038	33.83	38.94	42.02
2039	33.49	38.94	42.24
2040	33.16	38.94	42.46

Table C2: Light-Duty Vehicles per Capita, by Scenario

	Scenarios 1, 2, 3, & 5	Scenario 4	Scenarios 6, 7, & 8
2024	0.71	0.71	0.71
2025	0.71	0.71	0.72
2026	0.70	0.71	0.73
2027	0.69	0.71	0.73
2028	0.69	0.71	0.74
2029	0.68	0.71	0.74
2030	0.68	0.71	0.75
2031	0.67	0.71	0.76
2032	0.66	0.71	0.76
2033	0.66	0.71	0.77
2034	0.65	0.71	0.77
2035	0.64	0.71	0.78
2036	0.64	0.71	0.79
2037	0.63	0.71	0.79
2038	0.62	0.71	0.80
2039	0.62	0.71	0.80
2040	0.61	0.71	0.81

Table C3: Annual Light-Duty VMT per Capita, by Scenario

	Scenarios 1, 2, & 3	Scenarios 4	Scenarios 5, 6, 7, & 8
2024	7,656	7,656	7,656
2025	7,664	7,656	7,651
2026	7,676	7,656	7,643
2027	7,703	7,656	7,626
2028	7,761	7,656	7,589
2029	7,879	7,656	7,512
2030	8,096	7,656	7,373
2031	8,428	7,656	7,159
2032	8,812	7,656	6,912
2033	9,140	7,656	6,701
2034	9,353	7,656	6,564
2035	9,468	7,656	6,490
2036	9,525	7,656	6,453
2037	9,551	7,656	6,437
2038	9,563	7,656	6,429
2039	9,568	7,656	6,426
2040	9,570	7,656	6,424

Table C4: Annual Heavy-Duty VMT, by Scenario (millions of miles)

	Scenarios 1, 2, & 3	Scenario 4	Scenarios 5, 6, 7, 8
2024	37,492	37,492	37,492
2025	36,742	37,867	38,617
2026	36,007	38,246	39,775
2027	35,287	38,628	40,969
2028	34,582	39,014	42,198
2029	33,890	39,405	43,464
2030	33,212	39,799	44,768
2031	32,548	40,197	46,111
2032	31,897	40,599	47,494
2033	31,259	41,005	48,919
2034	30,634	41,415	50,386
2035	30,021	41,829	51,898
2036	29,421	42,247	53,455
2037	28,832	42,670	55,058
2038	28,256	43,096	56,710
2039	27,691	43,527	58,412
2040	27,137	43,963	60,164

Table C5: ZEV Share of Light-Duty Fleet, by Scenario

	Scenarios 1 & 6	Scenarios 2, 4, 5, & 7	Scenarios 3 & 8
2024	3%	3%	3%
2025	3%	3%	4%
2026	4%	4%	4%
2027	4%	5%	6%
2028	5%	6%	7%
2029	5%	7%	9%
2030	6%	8%	11%
2031	7%	10%	14%
2032	8%	12%	17%
2033	9%	14%	21%
2034	10%	17%	26%
2035	11%	20%	33%
2036	12%	24%	41%
2037	14%	29%	51%
2038	16%	35%	64%
2039	18%	42%	79%
2040	20%	50%	99%

Table C6: ZEV Share of Heavy-Duty Vehicles, by Scenario

	Scenarios 1 & 6	Scenarios 2, 4, 5, & 7	Scenarios 3 & 8
2024	0.23%	0.23%	0.23%
2025	0.25%	0.39%	0.56%
2026	0.28%	0.64%	1.06%
2027	0.35%	1.20%	2.18%
2028	0.49%	2.41%	4.59%
2029	0.79%	4.86%	9.52%
2030	1.33%	9.38%	18.58%
2031	2.15%	16.26%	32.38%
2032	3.11%	24.25%	48.40%
2033	3.93%	31.05%	62.05%
2034	4.46%	35.48%	70.92%
2035	4.75%	37.87%	75.74%
2036	4.89%	39.05%	78.09%
2037	4.95%	39.59%	79.18%
2038	4.98%	39.84%	79.68%
2039	4.99%	39.95%	79.90%
2040	5.00%	40.00%	80.00%

Total Revenue Projected, by Scenario

Table C7: Total State Revenue, by Scenario (millions of 2024 dollars)

	Low VMT Factors			Mid VMT Factors		High VMT Factors		
	Low ZEV	Medium ZEV	High ZEV	All Medium	Mix VMT, Med ZEV	Low ZEV	Medium ZEV	High ZEV
	1	2	3	4	5	6	7	8
2024	13,333	13,333	13,333	13,333	13,333	13,333	13,333	13,333
2025	12,913	12,919	12,915	13,123	13,210	13,163	13,255	13,252
2026	12,503	12,519	12,516	12,918	13,089	13,093	13,181	13,179
2027	12,011	12,056	12,063	12,637	12,887	12,943	13,026	13,036
2028	11,507	11,613	11,646	12,367	12,693	12,805	12,880	12,924
2029	10,906	11,130	11,216	12,039	12,432	12,605	12,676	12,781
2030	10,187	10,616	10,795	11,660	12,105	12,342	12,393	12,635
2031	9,368	10,088	10,403	11,243	11,725	12,114	12,068	12,509
2032	8,536	9,571	10,040	10,819	11,321	11,724	11,722	12,406
2033	7,819	9,103	9,708	10,440	10,959	11,313	11,421	12,335
2034	7,266	8,697	9,398	10,126	10,662	10,915	11,192	12,284
2035	6,834	8,335	9,105	9,863	10,420	10,526	11,022	12,252
2036	6,462	7,998	8,825	9,628	10,204	10,127	10,888	12,230
2037	6,098	7,662	8,550	9,395	9,986	9,681	10,761	12,211
2038	5,713	7,318	8,278	9,150	9,750	9,159	10,626	12,193
2039	5,289	6,956	8,007	8,885	9,483	8,536	10,475	12,172
2040	4,809	6,574	7,738	8,595	9,179	7,787	10,303	12,151

Projected Revenue from Each Individual Tax and Fee, By Scenario

Table C8: Gasoline Tax Revenue, by Scenario (millions of 2024 dollars)

	Low VMT Factors			Mid VMT Factors		High VMT Factors		
	Low ZEV	Medium ZEV	High ZEV	All Medium	Mix VMT, Med ZEV	Low ZEV	Medium ZEV	High ZEV
	1	2	3	4	5	6	7	8
2024	7,815	7,815	7,815	7,815	7,815	7,815	7,815	7,815
2025	7,542	7,547	7,546	7,619	7,659	7,665	7,659	7,658
2026	7,295	7,312	7,314	7,450	7,529	7,541	7,529	7,532
2027	6,987	7,027	7,036	7,227	7,341	7,365	7,341	7,352
2028	6,649	6,734	6,756	6,989	7,136	7,190	7,136	7,162
2029	6,276	6,439	6,479	6,745	6,921	7,041	6,921	6,970
2030	5,854	6,143	6,209	6,493	6,696	6,941	6,696	6,776
2031	5,394	5,859	5,958	6,248	6,475	6,897	6,475	6,597
2032	4,920	5,578	5,720	6,001	6,249	6,837	6,249	6,425
2033	4,471	5,293	5,491	5,745	6,011	6,662	6,011	6,257
2034	4,056	5,004	5,271	5,478	5,758	6,327	5,758	6,093
2035	3,649	4,704	5,058	5,193	5,482	5,836	5,482	5,930
2036	3,221	4,391	4,851	4,885	5,180	5,202	5,180	5,767
2037	2,743	4,055	4,644	4,545	4,840	4,413	4,840	5,600
2038	2,193	3,689	4,436	4,164	4,451	3,446	4,451	5,424
2039	1,551	3,288	4,225	3,734	4,004	2,267	4,004	5,238
2040	793	2,846	4,012	3,247	3,490	828	3,490	5,043

Table C9: Diesel Excise Tax Revenue, by Scenario (millions of 2024 dollars)

	Low VMT Factors			Mid VMT Factors		High VMT Factors		
	Low ZEV	Medium ZEV	High ZEV	All Medium	Mix VMT, Med ZEV	Low ZEV	Medium ZEV	High ZEV
	1	2	3	4	5	6	7	8
2024	3,049	3,049	3,049	3,049	3,049	3,049	3,049	3,049
2025	2,859	2,863	2,867	2,948	3,004	2,999	3,004	3,008
2026	2,709	2,720	2,729	2,883	2,994	2,982	2,994	3,005
2027	2,557	2,581	2,603	2,817	2,981	2,953	2,981	3,006
2028	2,411	2,464	2,511	2,769	2,987	2,922	2,987	3,044
2029	2,197	2,305	2,400	2,666	2,932	2,792	2,932	3,053
2030	1,905	2,111	2,291	2,513	2,816	2,539	2,816	3,058
2031	1,533	1,879	2,182	2,302	2,628	2,138	2,628	3,057
2032	1,148	1,649	2,088	2,078	2,418	1,672	2,418	3,070
2033	841	1,466	2,014	1,900	2,252	1,274	2,252	3,109
2034	643	1,339	1,947	1,784	2,155	1,011	2,155	3,156
2035	533	1,256	1,888	1,722	2,120	870	2,120	3,213
2036	474	1,198	1,832	1,691	2,122	806	2,122	3,274
2037	440	1,154	1,779	1,677	2,145	782	2,145	3,339
2038	418	1,117	1,728	1,671	2,179	777	2,179	3,406
2039	402	1,083	1,679	1,668	2,218	782	2,218	3,475
2040	389	1,051	1,631	1,667	2,260	792	2,260	3,545

Table C10: Diesel Sales Tax Revenue, by Scenario (millions of 2024 dollars)

	Low VMT Factors			Mid VMT Factors		High VMT Factors		
	Low ZEV	Medium ZEV	High ZEV	All Medium	Mix VMT, Med ZEV	Low ZEV	Medium ZEV	High ZEV
	1	2	3	4	5	6	7	8
2024	3,049	3,049	3,049	3,049	3,049	3,049	3,049	3,049
2025	2,859	2,863	2,867	2,948	3,004	2,999	3,004	3,008
2026	2,709	2,720	2,729	2,883	2,994	2,982	2,994	3,005
2027	2,557	2,581	2,603	2,817	2,981	2,953	2,981	3,006
2028	2,411	2,464	2,511	2,769	2,987	2,922	2,987	3,044
2029	2,197	2,305	2,400	2,666	2,932	2,792	2,932	3,053
2030	1,905	2,111	2,291	2,513	2,816	2,539	2,816	3,058
2031	1,533	1,879	2,182	2,302	2,628	2,138	2,628	3,057
2032	1,148	1,649	2,088	2,078	2,418	1,672	2,418	3,070
2033	841	1,466	2,014	1,900	2,252	1,274	2,252	3,109
2034	643	1,339	1,947	1,784	2,155	1,011	2,155	3,156
2035	533	1,256	1,888	1,722	2,120	870	2,120	3,213
2036	474	1,198	1,832	1,691	2,122	806	2,122	3,274
2037	440	1,154	1,779	1,677	2,145	782	2,145	3,339
2038	418	1,117	1,728	1,671	2,179	777	2,179	3,406
2039	402	1,083	1,679	1,668	2,218	782	2,218	3,475
2040	389	1,051	1,631	1,667	2,260	792	2,260	3,545

Table C11: Transportation Improvement Fee (TIF) Revenue, by Scenario (millions of 2024 dollars)

	1	2	3	4	5	6	7	8
2024	2,375	2,375	2,375	2,375	2,375	2,375	2,375	2,375
2025	2,397	2,397	2,397	2,444	2,435	2,379	2,478	2,478
2026	2,359	2,358	2,358	2,451	2,433	2,421	2,520	2,520
2027	2,299	2,299	2,299	2,436	2,409	2,439	2,539	2,539
2028	2,243	2,243	2,243	2,424	2,388	2,461	2,562	2,562
2029	2,188	2,188	2,188	2,411	2,366	2,483	2,591	2,583
2030	2,134	2,134	2,134	2,398	2,343	2,504	2,604	2,604
2031	2,088	2,088	2,088	2,393	2,328	2,633	2,633	2,633
2032	2,041	2,041	2,041	2,386	2,312	2,661	2,661	2,661
2033	1,995	1,995	1,995	2,379	2,295	2,688	2,688	2,688
2034	1,952	1,952	1,952	2,376	2,281	2,720	2,720	2,720
2035	1,912	1,912	1,912	2,374	2,269	2,754	2,754	2,754
2036	1,872	1,872	1,872	2,371	2,255	2,787	2,787	2,787
2037	1,831	1,831	1,831	2,367	2,240	2,818	2,818	2,818
2038	1,790	1,790	1,790	2,362	2,224	2,848	2,848	2,848
2039	1,749	1,749	1,749	2,356	2,206	2,877	2,877	2,877
2040	1,708	1,708	1,708	2,349	2,187	2,904	2,904	2,904

Table C12: Road Improvement Fee (RIF) Revenue, by Scenario (millions of 2024 dollars)

	1	2	3	4	5	6	7	8
2024	94	94	94	94	94	94	94	94
2025	116	111	105	113	113	119	114	108
2026	140	129	115	134	133	150	138	123
2027	169	149	125	157	156	187	164	138
2028	203	171	136	185	182	232	196	156
2029	244	197	148	218	214	289	233	175
2030	294	228	161	256	250	359	278	197
2031	354	262	176	301	293	446	331	222
2032	426	302	191	354	343	555	394	249
2033	512	348	208	416	401	690	470	280
2034	615	401	226	488	469	857	559	315
2035	739	462	246	574	548	1,065	666	355
2036	895	536	270	680	646	1,333	799	402
2037	1,084	622	296	805	761	1,668	958	455
2038	1,312	722	324	952	896	2,087	1,148	515
2039	1,587	836	354	1,127	1,055	2,610	1,376	583
2040	1,919	969	388	1,333	1,241	3,264	1,648	659

Proportion of Total Revenue from each Tax and Fee

This last set of tables presents the values used to construct the charts in Figure 10.

Table C13: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 1

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	58.40%	11.30%	10.84%	18.56%	0.90%
2026	58.35%	10.77%	10.89%	18.87%	1.12%
2027	58.17%	10.32%	10.96%	19.14%	1.41%
2028	57.78%	9.92%	11.03%	19.50%	1.77%
2029	57.55%	9.33%	10.81%	20.07%	2.24%
2030	57.46%	8.51%	10.19%	20.95%	2.89%
2031	57.57%	7.37%	9.00%	22.28%	3.78%
2032	57.65%	6.05%	7.41%	23.92%	4.99%
2033	57.19%	4.88%	5.88%	25.51%	6.54%
2034	55.82%	4.06%	4.79%	26.87%	8.47%
2035	53.40%	3.61%	4.19%	27.98%	10.82%
2036	49.85%	3.39%	3.94%	28.97%	13.86%
2037	44.98%	3.31%	3.91%	30.03%	17.78%
2038	38.38%	3.32%	4.01%	31.33%	22.96%
2039	29.32%	3.40%	4.21%	33.07%	30.01%
2040	16.49%	3.56%	4.52%	35.52%	39.91%

Table C14: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 2

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	58.42%	11.31%	10.85%	18.55%	0.86%
2026	58.41%	10.80%	10.92%	18.84%	1.03%
2027	58.29%	10.38%	11.03%	19.07%	1.23%
2028	57.99%	10.04%	11.18%	19.32%	1.48%
2029	57.85%	9.58%	11.14%	19.66%	1.77%
2030	57.87%	9.00%	10.88%	20.10%	2.14%
2031	58.08%	8.28%	10.35%	20.69%	2.60%
2032	58.28%	7.53%	9.70%	21.33%	3.16%
2033	58.15%	6.93%	9.18%	21.91%	3.83%
2034	57.54%	6.52%	8.88%	22.45%	4.62%
2035	56.44%	6.27%	8.80%	22.94%	5.55%
2036	54.90%	6.12%	8.87%	23.41%	6.71%
2037	52.92%	6.04%	9.03%	23.90%	8.12%
2038	50.41%	6.00%	9.26%	24.46%	9.86%
2039	47.27%	6.01%	9.56%	25.14%	12.02%
2040	43.29%	6.06%	9.93%	25.98%	14.74%

Table C15: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 3

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	58.43%	11.33%	10.87%	18.56%	0.81%
2026	58.44%	10.84%	10.97%	18.84%	0.92%
2027	58.33%	10.46%	11.12%	19.06%	1.04%
2028	58.01%	10.19%	11.37%	19.26%	1.17%
2029	57.77%	9.88%	11.52%	19.51%	1.32%
2030	57.51%	9.57%	11.65%	19.77%	1.50%
2031	57.27%	9.25%	11.73%	20.07%	1.69%
2032	56.97%	8.97%	11.82%	20.33%	1.90%
2033	56.57%	8.75%	11.99%	20.55%	2.14%
2034	56.09%	8.56%	12.16%	20.78%	2.41%
2035	55.55%	8.39%	12.35%	21.00%	2.70%
2036	54.97%	8.23%	12.54%	21.21%	3.06%
2037	54.32%	8.08%	12.73%	21.42%	3.46%
2038	53.59%	7.95%	12.93%	21.63%	3.91%
2039	52.77%	7.83%	13.14%	21.84%	4.42%
2040	51.85%	7.72%	13.35%	22.07%	5.01%

Table C16: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 4

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	58.06%	11.45%	11.01%	18.62%	0.86%
2026	57.67%	11.07%	11.24%	18.97%	1.04%
2027	57.19%	10.77%	11.52%	19.28%	1.25%
2028	56.52%	10.54%	11.85%	19.60%	1.50%
2029	56.02%	10.17%	11.97%	20.03%	1.81%
2030	55.69%	9.68%	11.87%	20.56%	2.19%
2031	55.57%	9.00%	11.47%	21.28%	2.67%
2032	55.47%	8.29%	10.92%	22.06%	3.27%
2033	55.03%	7.71%	10.50%	22.79%	3.98%
2034	54.10%	7.32%	10.31%	23.46%	4.82%
2035	52.65%	7.10%	10.36%	24.07%	5.82%
2036	50.74%	6.99%	10.57%	24.63%	7.06%
2037	48.38%	6.96%	10.90%	25.20%	8.56%
2038	45.51%	6.97%	11.30%	25.82%	10.41%
2039	42.03%	7.01%	11.76%	26.52%	12.68%
2040	37.77%	7.09%	12.30%	27.32%	15.51%

Table C17: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 5

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	57.98%	11.59%	11.15%	18.43%	0.85%
2026	57.52%	11.33%	11.54%	18.59%	1.02%
2027	56.96%	11.16%	11.98%	18.70%	1.21%
2028	56.22%	11.05%	12.48%	18.82%	1.44%
2029	55.67%	10.80%	12.79%	19.03%	1.72%
2030	55.32%	10.40%	12.86%	19.36%	2.07%
2031	55.23%	9.80%	12.62%	19.86%	2.50%
2032	55.20%	9.15%	12.21%	20.42%	3.03%
2033	54.85%	8.62%	11.93%	20.94%	3.66%
2034	54.00%	8.30%	11.91%	21.39%	4.40%
2035	52.62%	8.18%	12.17%	21.77%	5.26%
2036	50.77%	8.17%	12.62%	22.10%	6.33%
2037	48.46%	8.26%	13.23%	22.43%	7.62%
2038	45.65%	8.40%	13.95%	22.81%	9.19%
2039	42.22%	8.60%	14.79%	23.26%	11.12%
2040	38.03%	8.86%	15.76%	23.83%	13.52%

Table C18: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 6

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	58.23%	11.61%	11.18%	18.07%	0.91%
2026	57.59%	11.29%	11.49%	18.49%	1.14%
2027	56.90%	11.01%	11.81%	18.84%	1.44%
2028	56.15%	10.72%	12.10%	19.22%	1.81%
2029	55.86%	10.16%	11.99%	19.70%	2.29%
2030	56.24%	9.23%	11.34%	20.29%	2.91%
2031	56.93%	7.79%	9.86%	21.74%	3.68%
2032	58.31%	6.23%	8.03%	22.70%	4.73%
2033	58.88%	4.90%	6.36%	23.76%	6.10%
2034	57.97%	4.02%	5.24%	24.92%	7.85%
2035	55.45%	3.57%	4.70%	26.16%	10.12%
2036	51.36%	3.39%	4.57%	27.52%	13.16%
2037	45.58%	3.37%	4.70%	29.11%	17.23%
2038	37.63%	3.47%	5.02%	31.10%	22.79%
2039	26.56%	3.66%	5.50%	33.70%	30.58%
2040	10.63%	3.97%	6.19%	37.29%	41.91%

Table C19: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 7

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	57.78%	11.55%	11.12%	18.69%	0.86%
2026	57.12%	11.26%	11.46%	19.12%	1.04%
2027	56.36%	11.04%	11.85%	19.50%	1.26%
2028	55.40%	10.89%	12.30%	19.89%	1.52%
2029	54.60%	10.59%	12.54%	20.44%	1.84%
2030	54.03%	10.16%	12.56%	21.01%	2.24%
2031	53.66%	9.52%	12.26%	21.82%	2.74%
2032	53.31%	8.83%	11.79%	22.70%	3.36%
2033	52.63%	8.28%	11.45%	23.54%	4.11%
2034	51.44%	7.91%	11.34%	24.30%	5.00%
2035	49.74%	7.73%	11.50%	24.99%	6.04%
2036	47.58%	7.66%	11.83%	25.59%	7.34%
2037	44.97%	7.66%	12.28%	26.19%	8.90%
2038	41.88%	7.71%	12.80%	26.80%	10.80%
2039	38.23%	7.79%	13.39%	27.46%	13.13%
2040	33.88%	7.89%	14.04%	28.19%	16.00%

Table C20: Proportion of Total Revenue Raised from Each Tax and Fee for Scenario 8

	Gas tax	Diesel excise tax	Diesel sales tax	TIF	RIF
2024	58.62%	12.13%	10.74%	17.81%	0.71%
2025	57.79%	11.57%	11.14%	18.70%	0.82%
2026	57.15%	11.30%	11.50%	19.12%	0.93%
2027	56.40%	11.12%	11.94%	19.48%	1.06%
2028	55.42%	11.05%	12.50%	19.82%	1.20%
2029	54.53%	10.92%	12.97%	20.21%	1.37%
2030	53.63%	10.79%	13.42%	20.61%	1.56%
2031	52.74%	10.63%	13.82%	21.05%	1.77%
2032	51.79%	10.50%	14.25%	21.45%	2.01%
2033	50.73%	10.44%	14.77%	21.80%	2.27%
2034	49.60%	10.39%	15.30%	22.14%	2.57%
2035	48.40%	10.36%	15.87%	22.48%	2.89%
2036	47.16%	10.34%	16.44%	22.79%	3.28%
2037	45.86%	10.32%	17.02%	23.08%	3.73%
2038	44.48%	10.31%	17.62%	23.36%	4.22%
2039	43.03%	10.31%	18.23%	23.63%	4.79%
2040	41.50%	10.32%	18.85%	23.90%	5.43%

MTI MINETA TRANSPORTATION INSTITUTE