Oregon Transportation Commission
HB2017 Section 75 Study

STUDY REPORT

PREPARED BY:

ECONorthwest
ECONOMICS • FINANCE • PLANNING

PORTLAND, OR
KOIN CENTER
222 SW COLUMBIA
STREET, SUITE 1600
PORTLAND, OR 97201

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1.0 INTRODUCTION

1.1 Background

The Oregon Department of Transportation is engaged in a process of determining the proportionate share that users of vehicles that are powered by different means should pay for the costs of maintenance, operation, and improvement of the highways. Based on that determination, the Department will assess whether users of vehicles that are powered by different means are paying that share.

The proportionate share that passenger vehicles powered by different means (electric, plugin-hybrid, hybrid, and all other passenger vehicles) should pay for costs of maintenance, operation, and improvement of the highways in Oregon is dependent on the costs they impose. There is a long tradition of highway cost allocation based on cost responsibility in the state of Oregon, and this study builds on that tradition.

The task of estimating the costs that vehicles impose is dependent on the availability of suitable information about the inventory of vehicles, and their use. The methods of analysis used in this study are tailored to the available information. As a result, we believe that the methodology used may evolve over time as new information becomes available.

1.2 Section 75 Study

In 2017 the Oregon Legislature passed HB2017, which increased transportation user fees in order to pay for transportation investments. HB2017 set in motion a phased set of increases to the Weight-Mile Tax on heavy vehicles, the tax on motor fuels, and fees for the registration of vehicles in the state of Oregon. HB2017 also included a requirement for studying whether the registration fee structure was equitable from the perspective of cost responsibility. Section 75 of the Bill states:

(1) The Oregon Transportation Commission shall conduct a study. The purpose of the study is to determine:

(a) The proportionate share that users of vehicles that are powered by different means should pay for the costs of maintenance, operation, and improvement of the highways in this state; and

(b) Whether users of vehicles that are powered by different means are paying that share.

(2) If the commission determines that users are not paying a proportionate share, then the commission may include in the report recommendations for legislation.

(3) This section applies to users paying the vehicle registration fee under ORS 803.420 (6)(a).

(4) The commission shall report the results of the study to the Joint Committee on Transportation established under section 26 of this 2017 Act, in the manner provided by ORS 192.245, no later than September 15, 2023.

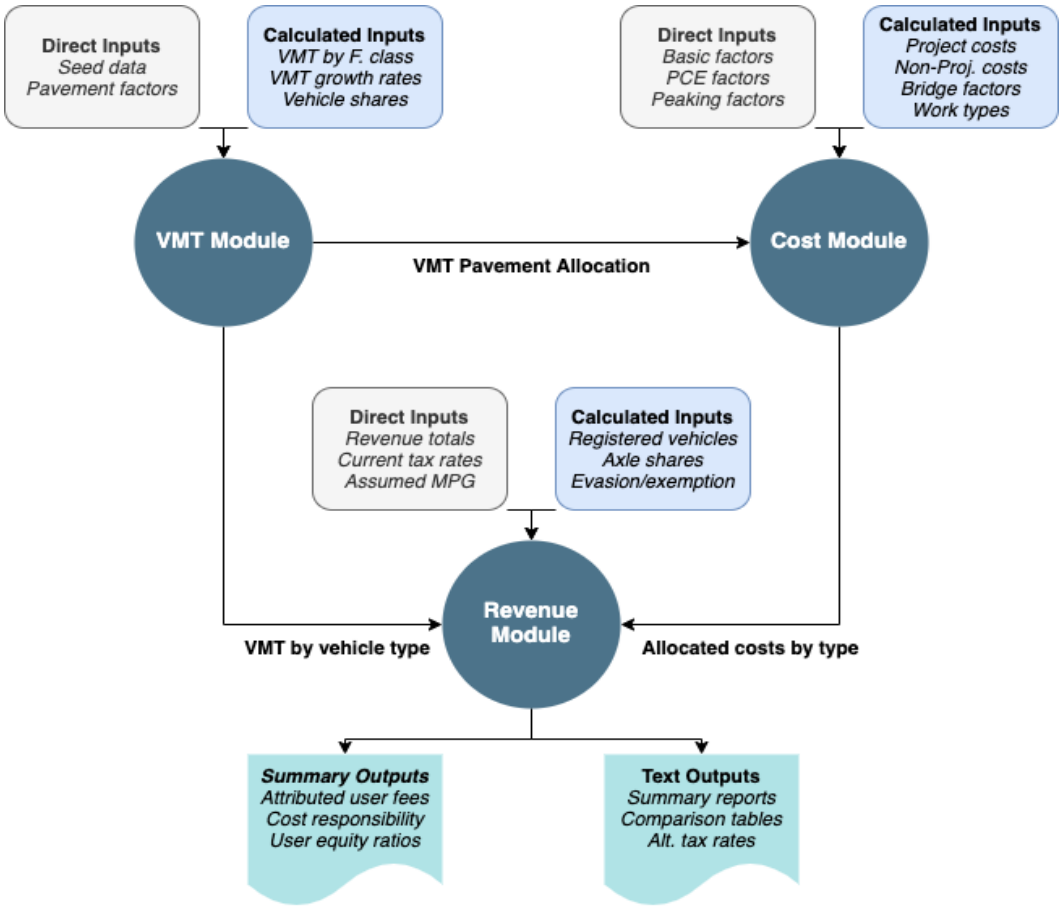
This report is a partial fulfillment of the Section 75 requirement. The report was prepared by ECONorthwest under the guidance of a technical review team comprising Mazen Malik of the Oregon Legislative Revenue Office, Mark McMullen of the Oregon Office of Economic Analysis, Daniel Porter, ODOT's Economic & Financial Analysis Manager, and Satenik Donaca, ODOT Senior Economist.

1.3 HCAS Framework

For more than 70 years, Oregon has based the financing of its highways on the principle of cost responsibility. Cost responsibility implies that those who use the public roads should pay for them and, more specifically, that users should pay in proportion to the road costs for which they are responsible. Cost responsibility requires each category of highway users to contribute to highway revenues in proportion to the costs they impose on the highway system. The State of Oregon uses the cost allocation process to apportion the costs of highway work to vehicles that impose those costs.

This study builds on the Highway Cost Allocation Study (HCAS) tradition and methods. The most recent HCAS report is the 2023 Oregon Highway Cost Allocation Study. A detailed description of methods employed for the HCAS study is contained in that report. In general, the Oregon HCAS employs an incremental, cost-occasioned, prospective analysis—considering costs that will be expended over the upcoming biennium. An overview of the HCAS methods is depicted in Exhibit 1 below:

Exhibit 1: Highway Cost Allocation Analysis Overview



Source: Highway Cost Allocation Study, ECONorthwest

1.4 Highway User Fees

Oregon governs the State Highway Fund using the concept of cost responsibility. The State collects a fair share of revenue from each highway user class primarily through three highway user charges: **vehicle registration fees**, **motor vehicle fuel taxes** (primarily the gasoline tax), **and motor carrier fees** (primarily the weight-mile tax).

1.4.1 Registration and Title Fees

The vehicle registration fee is generally levied on a biennial basis for all road users, based on the type and weight of the vehicle being registered. The registration fee is considered payment for the fixed or non-use related costs of providing a highway system. The fee was initially levied against motor vehicles to cover the cost of registration. A one-time fee of $3.00 was instituted in 1905. Because this fee proved to be a productive source of revenue, the state soon annualized the fee and began to increase the rates and use the proceeds to finance highways. These fees currently produce nearly 30 percent of statewide user fees.

Starting in 2020, additional registration fees were based on the fuel efficiency of registered vehicles, with increasing fees for high-efficiency vehicles. Current registration fees are as follows:

Exhibit 2: Statewide and County Annualized Registration Fees

Registration/Renewal	Vehicle year is 1999 or older	$63
	Vehicle year 2000 or newer, has a combined rating of 0-19 MPG	$63
	Vehicle year 2000 or newer, has a combined rating of 20-39 MPG	$68
	Vehicle year 2000 or newer, has a combined rating of 40 MPG or higher	$78
	Vehicle is all electric	$158
County	You reside and/or the vehicle stays in Multnomah County	$56
	You reside and/or the vehicle stays in Washington or Clackamas County	$30

Source: https://www.oregon.gov/odot/dmv/pages/fees/vehicle.aspx

1.4.2 Fuel Tax

The fuel tax applies to gasoline or diesel fuel purchased from an authorized seller who collects the taxes at the time of sale. In 1919, Oregon became the first state in the nation to enact a fuel tax on gasoline. It was regarded as a "true" road user tax because those who used the roads more paid more. The state fuel tax was extended to diesel and other fuels in 1943. Since that time, the tax on diesel and other fuels, referred to as a "use fuel" tax, has been at the same rate per gallon as the tax on gasoline. On January 1, 2022 the Oregon Legislature increased the fuel tax and use tax rates to $0.38/gallon. The rates will increase by an additional $0.02 to $0.40 in 2024. Fuel tax

revenues constitute over 40 percent of statewide user fees. As a point of comparison, state fuel taxes in California are $0.58, and in Washington are $0.49.

1.4.3 Motor Carrier Fees

The primary motor carrier fee is the weight-mile tax, which applies to all commercial motor vehicles with declared gross weights of more than 26,000 pounds. It is based on the declared weight of the vehicle and the distance it travels in Oregon. The weight-mile tax is a usage tax that takes the place of the fuel tax on heavy vehicles. Vehicles subject to the weight-mile tax are not subject to the state fuel tax. The Oregon weight-mile tax system consists of a set of schedules and alternate flat fee rates. There are separate schedules for vehicles with declared weights of 26,001 to 80,000 pounds and those over 80,000 pounds. Additionally, log, sand and gravel, and wood-chip haulers have the option to pay flat monthly fees in lieu of the mileage tax. Weight-mile taxes comprise approximately 90 percent of total motor carrier collected revenues and represent just under 30 percent of total gross revenues collected by the three major sources.

2.0 DATA AND METHODS

2.1 Primary Sources of Vehicle Data

The analysis implemented as part of this Section 75 Study principally relied upon administrative data from the ODOT Driver and Motor Vehicle Division (DMV). The study team was provided DMV registration data covering all registered vehicles in the state of Oregon from 2019 to 2022. This 14-million-row dataset includes information about vehicle and fuel types. Approximately 30 percent of records contain multiple observations of vehicle mileage, allowing for vehicle usage over time to be inferred. This dataset is the primary data source used in the analysis.

The study team also made use of available data from the OReGO program. OReGO participants pay 1.9 cents for each mile they drive on Oregon roads. That money goes into the State Highway Fund for the construction, maintenance, and preservation of roads and bridges. OReGO participants receive a credit for the 38-cents-per-gallon fuel tax they pay. Fuel consumption is reported by an in-car device or computed by the account manager based on average miles-per-gallon and miles driven. The study team also used data from the Puget Sound Regional Council (PSRC) travel survey to inform an understanding of household-level vehicle usage.

The study reviewed available literature on light-duty vehicle use and propulsion as part of understanding trends in vehicle adoption and utilization which may impact revenue attribution and cost allocation. Two areas of empirical uncertainty are of interest. First, existing studies offer conflicting evidence on whether owners of electric vehicles drive more or less than their internal combustion engine counterparts. Second, there is evidence that the manner of use of plug-in hybrid electric vehicles results in higher than EPA-labeled fuel consumption.

2.1.1 DMV Administrative Data

The ODOT Driver and Motor Vehicle Division (DMV) administers the registration and title of motor vehicles in the state of Oregon. The Division is responsible for identifying vehicles that must pay either the standard

registration fee or the enhanced registration fees that are based on vehicle fuel economy. The data made available to the study from the Division included registration records between 2019 and 2022. This data contains records where vehicle odometer readings are reported at select points in time, such as when there is a title transaction. As a result, there is a subset of vehicle records where there is more than one odometer reading per vehicle. These records can be used to estimate average vehicle use over time for various types of registered vehicles. This dataset also provides the count of registered vehicles and their average fuel economy, by registration category in the year 2022. These statistics are used in this study as inputs in the Highway Cost Allocation methodology that is used to estimate cost allocation and revenue attribution.

2.1.2 OReGO Data

OReGO is the state's road usage charging program. With the OReGO pay-per-mile system, Oregonians pay for the miles they drive instead of gallons consumed, or fees for registration. ODOT launched the OReGO program in 2015. Through OReGO, Oregon is demonstrating a new way to fund road maintenance, preservation, and improvements. The OReGO program staff provided the study team data on the composition of participating vehicles and their road usage. Due to the small sample size and self-selection into the program, this data was not used in the development of inputs or assumptions for the Section 75 Study.

2.1.3 Puget Sound Regional Council Household Survey

The Puget Sound Regional Travel Study is a household-based survey implemented as a three-wave, six-year data collection effort. The study collected household- and person-level activity and travel pattern information from residents throughout the central Puget Sound four-county region. The overarching goal of the multiyear program is to maintain an updated source of household travel behavior data that supports transportation and land-use modeling and planning needs through trend analysis over time. This study uses this data as a source of insights into household-level vehicle usage.

2.2 Methods

Data exploration and analysis has been done in Python with the intent of maintaining transparency and replicability. And the final equity analysis makes use of the Highway Cost Allocation Study modeling framework. This model is well-known to ODOT and a version of the model is maintained by ODOT staff. This analysis did not involve rewriting any of the model's code in order to accommodate additional basic vehicle equity analysis. Instead, this work involved pre-processing of inputs to the HCAS model, and post-processing of equity ratio tables using intermediate outputs of the HCAS model.

2.3 Key Assumptions

Several assumptions form a starting point for the analysis. The first assumption addresses a requirement of the Section 75 mandate, which asks for the proportionate share that vehicles powered by different means should pay for the costs of highway operations and maintenance. Passenger vehicles powered by different means should pay an equal share in relation to one another. While the question of the long-term cost responsibility of electric vehicles (EVs) in contrast to internal combustion engine vehicles (ICEs) in regard to carbon emissions and impacts on the electrical grid remains crucial, this study addresses only the impact of EVs and ICEs on highway costs.

Next, we adopt a vehicle class aggregate, point-in-time analysis similar to the basic HCAS approach. The temporal period of the analysis is the 2023-25 biennium. The future fleet composition is addressed in a sensitivity analysis. A more formal forecast of EV market penetration is beyond the scope of this current study. This aggregated analysis applies averages by vehicle class across the state, calculating average fixed and variable fees incurred by each vehicle class, and assuming average fuel economies implied by registration data. This approach allows for a transparent evaluation of revenue parity between traditional ICE vehicles, hybrids, and electric vehicles.

The study evaluates basic vehicle cost allocation and revenue attribution based on the existing vehicle classification used in applying tiered registration fees. That classification is based on miles-per-gallon ratings. In practice, determining MPG ratings in the field is not always straightforward, resulting in a share of vehicles receiving a lower MPG rating by default to ensure that customers do not pay more than is appropriate. So, as an alternative, we also evaluate cost responsibility and revenue attribution based on a classification of basic vehicles according to motive power. Respectively, registration counts, average vehicle miles traveled, and average miles per gallon rating assumptions are displayed in Exhibit 3 below. These assumptions are based on the evaluation of the DMV administrative data for vehicles with an active registration on the last day of 2022. When applied in the HCAS model, the VMT assumptions here are scaled to the forecast of VMT for the 2023-2025 biennium.

Exhibit 3: Registrations by Current Classification

Current Classification	Registrations	MPG	VMT/month
Basic, 0-19 MPG	1,403,203	16	676
Basic, 20 - 39 MPG	1,933,959	26	716
Basic, 40+ MPG	110,251	46	771
Basic, Battery Electric Vehicle	40,516	N/A	674

Motive Power Classification	Registrations	MPG	VMT/month
Basic, ICE Vehicle	3,297,382	21	698
Basic, Hybrid	129,610	42	777
Basic, Plug-in Hybrid (PHEV)	20,421	93	747
Basic, Battery Electric Vehicle	40,516	N/A	674

Source: ODOT, DMV, ECONorthwest

2.4 Costs

Within the HCAS logic, most costs allocated to basic (light-duty) vehicles are allocated proportional to vehicle miles traveled (VMT). Since all the vehicle classes included in this analysis are 2-axle vehicles weighing under 10,000 lbs., all costs—including pavement costs—scale with miles traveled. Some costs that are assigned a cost allocator that reflects miles traveled under congested conditions will vary according to VMT associated with the functional class of the road network. For this analysis, it is assumed that each basic vehicle class is associated with the same extent of congested road utilization. A relaxation of this assumption could be a topic of future analysis as data is gathered to support alternative assumptions.

Ideally, costs are efficiently recovered from those users who specifically occasion the costs. For example, those users who burden capacity should shoulder the costs of adding to road capacity or otherwise relieving congestion. The costs a vehicle imposes on other vehicles by taking up space on a particular facility at a particular time are a function of the value of other travelers' time and the amount by which the vehicle slows traffic. Congestion-related costs can vary greatly over the road network and the course of a day. To promote efficient use of the facility, congestion fees would be imposed that reflect those costs by varying with actual traffic volumes and roadway capacities.

Many costs of the highway system can be seen as varying with highway usage, reflecting cost conditions that may vary by location and time of day. Administrative costs of highway agency activities could also be recovered from users in proportion to their use of the highway systems through a per-mile rate for overhead. An emissions component of a fee could recover the costs imposed through the emissions produced by the vehicle. In the case of electric vehicles, it may include the emissions produced in generating the electricity used to charge the vehicle. The concept for any other fees is the same as with emissions. To be included, the externality must be quantifiable, there must be a defined relationship between the quantity of travel and the quantity of the externality produced, and there must be a defined cost per unit of externality.

2.5 Revenues

The revenues generated by each type of vehicle include flat fees, primarily registration and titles, and variable fees, primarily fuel tax. Vehicles currently pay different registration fees and per-mile fuel taxes based on their MPG. These fees are described above and attributed based on vehicle class fuel efficiency and vehicle miles traveled.

3.0 RESULTS AND FINDINGS

The primary findings of the Section 75 Study relate to whether motor vehicles that are powered by different means are paying their fair share for the costs of maintenance, operation, and improvement of the highways in Oregon. Those findings are presented later in this section of the report. Prior to making a determination on the share of costs paid by various vehicle categories, we first investigate vehicle usage and fuel economy associated with the current Oregon vehicle fleet using administrative data from the DMV. This analysis supplies the inputs to the HCAS model. Next, we examine the Puget Sound Regional Council household survey for insights into household-level driving behavior that reflects ownership of various alternately powered vehicles. That analysis provides insights into how cost responsibility and revenue attribution might vary across other dimensions of the basic vehicle fleet. And finally, this section of the report summarizes the findings of applying the HCAS model methodology to categories of basic motor vehicles that are powered by different means.

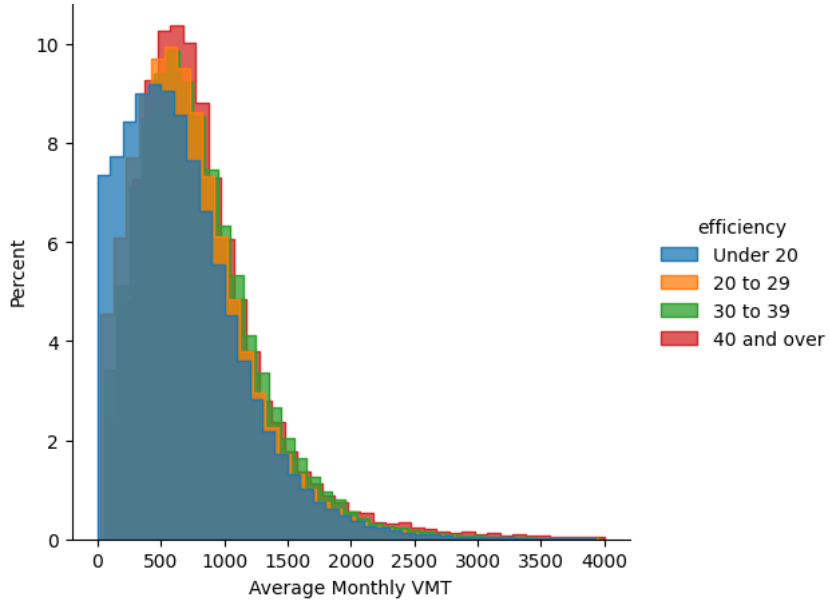
3.1 Vehicle Characteristics and Usage Based on DMV Data

This study is evaluating basic vehicle cost allocation and revenue attribution based on the existing vehicle classification used in applying tiered registration fees. That classification is based on miles-per-gallon ratings. As mentioned previously, determining MPG ratings in the field is not always straightforward, resulting in a share of vehicles receiving a lower MPG rating by default in order to ensure that customers do not pay more than is

appropriate. As an alternative, we have additionally evaluated cost responsibility and revenue attribution based on a classification of basic vehicles according to motive power.

In general, we find evidence that as vehicle fuel economy increases, so does vehicle usage. The causes of this relationship are likely numerous, but in part reflect that higher fuel economy decreases the costs of vehicle operations. Exhibit 4 displays the VMT distributions for vehicles based on MPG classification. All distributions follow a log-normal distribution but with higher mean values for vehicle categories with a higher MPG rating. It is worth noting that within any vehicle classification, there is a high degree of variability in vehicle usage, confirming that aggregation of vehicles into large categories will always result in an equity finding that is only accurately applied to the average vehicle in that category.

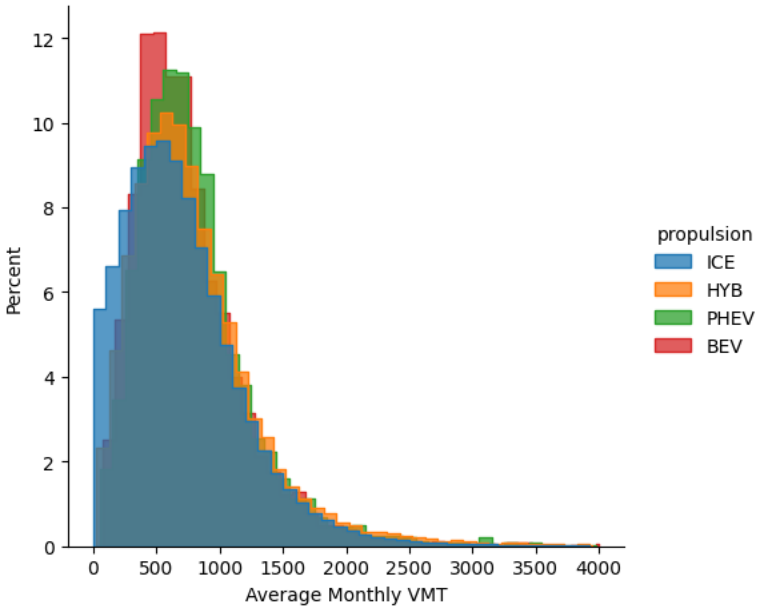
Exhibit 4: VMT Distributions by MPG Classification



Source: ODOT, DMV, ECONorthwest

Exhibit 5 displays the VMT distributions for vehicles based on motive power. Again, alternatively-powered vehicles are used more on average than their internal combustion engine counterparts.

Exhibit 5: VMT Distributions by Motive Power, 2022



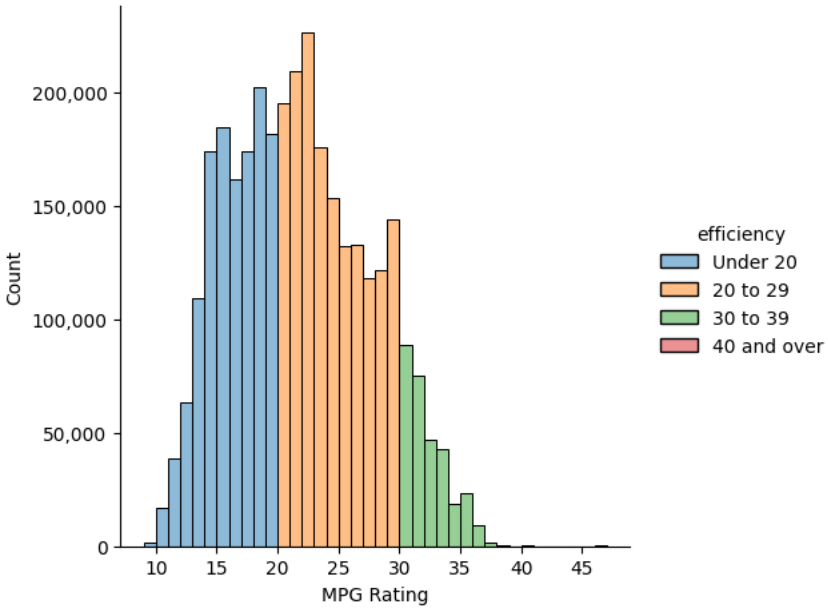
Source: ODOT, DMV, ECONorthwest

Also of interest are the distributions of MPG ratings for various types of vehicle categories. MPG ratings for hybrid, plug-in hybrid, and battery electric vehicles often reflect MPG-equivalent values (MPGe) and are not always consistent with internal combustion engine MPG ratings. This is especially true for plug-in hybrid, and battery-electric vehicles. As a result, we display the distribution of MPG ratings for internal combustion engine and hybrid engine vehicles in Exhibits 6 and 7 below.

Unless noted, all the MPG rating findings in this report reflect a post-processed MPG rating lookup procedure developed by ODOT staff. This procedure is based on each vehicle's unique vehicle identification number, a VIN decoder, and a probabilistic match between each vehicle and an MPG rating. This approach produces results that are likely highly accurate overall but with a small risk of misclassifying any specific vehicle.

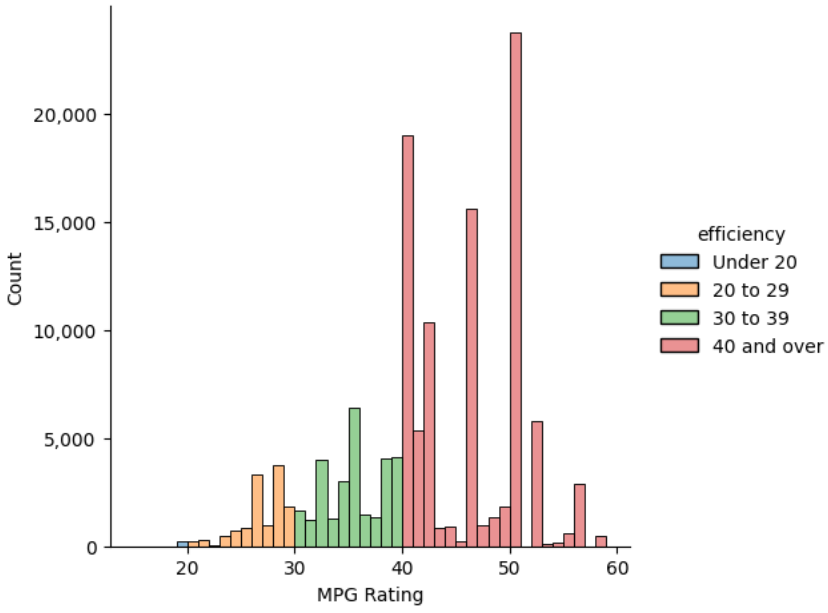
In contrast, ODOT's Driver and Motor Vehicle (DMV) Division implements an MPG rating process that makes use of multiple sources for vehicle MPG ratings. The first source is a vendor VIN (vehicle identification number) decoder that provides one or more MPG ratings. The second source is information provided directly by auto dealerships when they submit title and registration paperwork to DMV. The third source is the OReGO program which provides MPG ratings to DMV for OReGO enrolled drivers. In order to avoid any chance of overcharging a customer by misclassifying a vehicle as having a higher MPG rating, the Division accepts a much higher incidence of misclassification of vehicles as having a lower MPG rating than is actually the case. The result is a loss in potential revenue which is discussed later in this report.

Exhibit 6: Internal Combustion Engine MPG Distribution, 2022



Source: ODOT, DMV, ECONorthwest

Exhibit 7: Hybrid Engine MPG Distributions, 2022



Source: ODOT, DMV, ECONorthwest

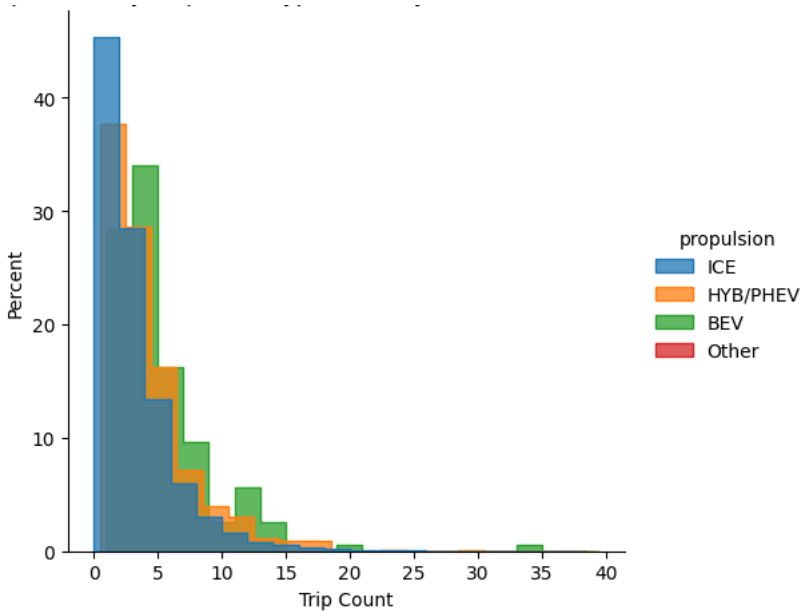
3.1.1 PSRC Survey Analysis Findings

The Puget Sound Regional Council implements a household survey program that collects travel data across King, Kitsap, Pierce, and Snohomish counties of Washington State using an online and smartphone app-based survey. The program includes three waves of survey respondents between 2017-2021. Additional details about the program are available at https://www.psrc.org/household-travel-survey-program. Study participants were recruited using address-based sampling (ABS), and certain household types were oversampled. The study involved all household members over the age of five reporting all of their travel information during the survey period. Adults provided information on behalf of children between the ages of 5 and 17.

While the survey is not an Oregon-based survey, it is a source of representative information about household travel behavior from the Pacific Northwest which allows the analyst to control for household characteristics. Of particular interest to the Section 75 Study is that the survey collects information about household vehicles used in travel, making it a source of information about how household vehicle composition (including motive power) may influence travel behavior.

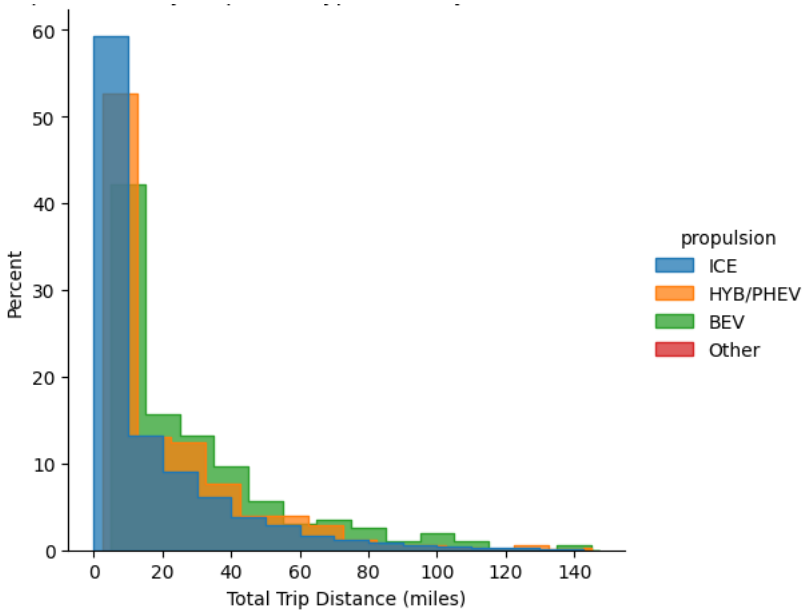
Survey records were assembled such that descriptive information about vehicle use by vehicle type could be analyzed. This descriptive analysis was then followed by linear regression analysis where vehicle use was regressed against characteristics of the household. Exhibit 8 displays the count of trips for each vehicle in the survey by propulsion type. Exhibit 9 displays the total distance traveled for each vehicle by propulsion type. Respondents recorded their trips over two days of participation. The findings from the household survey are consistent with the pattern of vehicle usage observed in the Oregon DMV dataset.

Exhibit 8: PSRC HH Survey, Two-Day Trip Counts by Propulsion Type, 2017-2021



Source: PSRC Household Survey, ECONorthwest

Exhibit 9: PSRC HH Survey, Two-Day Trip Distance by Propulsion Type, 2017-2021



Source: PSRC Household Survey, ECONorthwest

The purpose of the regression analysis is to determine whether the relationships between vehicle propulsion and driving behavior still hold after controlling for household characteristics. Absent this kind of analysis, it is difficult to determine whether a higher degree of vehicle usage is associated with vehicle propulsion technology or whether both of these factors are associated with some other characteristic of the household such as income, household location, household size, or other characteristic. The regression analysis isolates the contribution of each of these household characteristics on vehicle usage. Exhibit 10 below displays the regression model specification and model results.

Exhibit 10. Regression Analysis Specification and Results

Dep. Variable:	np.log1p(miles_total)	R-squared:	0.179		
Model:	OLS	Adj. R-squared:	0.178		
Method:	Least Squares	F-statistic:	113.5		
Date:	Fri, 18 Aug 2023	Prob (F-statistic	1.96e-214		
Time:	14:57:26	Log-Likelihood:	-9317.8		
No. Observations:	5208	AIC:	1.866e+04		
Df Residuals:	5197	BIC:	1.873e+04		
Df Model:	10				
Covariance Type:	nonrobust				

		coef.	Std. err	t	P>|t|	[0.025	0.975]
Intercept		1.9032	0.068	27.868	0.000	1.769	2.037
home_outside_seattle		0.2870	0.048	5.987	0.000	0.193	0.381
vehicles_total == 2		0.7424	0.050	14.772	0.000	0.644	0.841
vehicles_total > 2		0.9413	0.078	12.122	0.000	0.789	1.094
vehicles_BEV > 0		0.3281	0.147	2.225	0.026	0.039	0.617
hhincome_under25k	-0.2673	0.086	-3.109	0.002	-0.436	-0.099	
hhincome_over100k	-0.0821	0.045	-1.820	0.069	-0.171	0.006	
hhincome_no_answer	-0.2762	0.083	-3.318	0.001	-0.439	-0.113	
I(numadults + numchildren)	0.0993	0.024	4.106	0.000	0.052	0.147	
numworkers		0.2096	0.030	6.913	0.000	0.150	0.269
pop_density		-0.0171	0.002	-7.786	0.000	-0.021	-0.013

Omnibus:	249.792	Durbin-Watson:	1.925		
Prob(Omnibus):	0.000	Jarque-Bera (JB):	185.397		
Skew:	-0.365	Prob(JB):	5.51e-41		
Kurtosis:	2.434	Cond. No.	117.		

Source: PSRC Household Survey, ECONorthwest

The dependent variable is the natural log of the total two-day vehicle miles driven by the household. The independent variables in the model are characteristics of those households, including:

- The household resides outside of Seattle
- There are 2 vehicles in the household
- There are greater than 2 vehicles in the household
- There is at least one battery electric vehicle in the household
- The household income is under $25,000
- The household income is greater than $100,000
- The household refused to provide income information
- The number of persons in the household
- The number of workers in the household
- The population density of the census tract in which the household resides

By using the natural log of the dependent variable, the model coefficients can be interpreted as the percent change in the dependent variable associated with a unit increase in each independent variable, holding all else constant. The average household in the survey reported a two-day vehicle use of just over 80 vehicle miles driven. All variables except one are significant at the 95th percentile. The variable household income is greater than $100,000 is significant at the 90th percentile. All variables have coefficients of the expected sign. Greater vehicle use is

associated with households with more vehicles, more workers, and more persons in the household. Households located in Seattle and in neighborhoods with higher population density drive less. Households with lower incomes and higher incomes drive less than the average household. And households with one or more electric vehicles drive about 30 percent more than households that don't have an electric vehicle. This finding holds true even after controlling for household size, location, and income.

An alternative specification of the model examines households with only electric vehicles, only hybrid engine vehicles, and only internal combustion engine vehicles. Only the all-electric vehicle household variable, of these three variables, was significant at the 95th percentile. All other aspects of the model were the same and the other variables remained significant and with stable coefficients.

3.2 Equity Findings

The principal findings from the HCAS analysis are equity ratios. We calculate equity ratios for each vehicle class: each vehicle class's share of attributed revenues is divided by its share of allocated expenditures, such that:

Ratio = 1.0 means perfect equity for users

Ratio > 1.0 means users are paying more than their fair share

Ratio < 1.0 means users are paying less than their fair share

The Baseline condition is the existing legislatively set taxes and fees. Under this fee structure, there is a set of equity-ratio findings that reflect current revenue and spending policy. We have then evaluated a number of alternative rate structures designed to achieve greater parity across basic vehicle classes. Each alternative rate structure only adjusts the registration fees that currently vary by MPG. Other taxes and fees are held constant.

As background, it is important to keep in mind that based on the 2023 HCAS Study, basic vehicles as a whole have an equity ratio of 0.878. In other words, basic vehicles as an entire class are not currently expected to pay their fair share of user fees. This equity ratio (0.878) is the point of comparison for each of the basic vehicle sub-classes.

The initial finding of the Section 75 Study is that basic vehicles with a rating of less than 20 MPG are paying more than their fair share of user fees. Their equity ratio is 1.057. All other categories of basic vehicles are paying less than their fair share of user fees. These results are displayed in exhibit 11 below. Also displayed are equity results when considering all internal combustion engine (ICE) vehicles together and compared with alternative powered vehicle categories. The ICE equity ratio is 0.896, only slightly higher than the basic vehicle equity ratio of 0.878.

Exhibit 11. Basic Vehicle VMT, Cost Responsibility, Revenue, and Equity Ratios

		Baseline				
Vehicle Class		Annual VMT	Annual Cost Responsibility	Annual User Fees	Scaled Equity Ratio	Registration Fees
N/A	Under 20 MPG	12,530,963,470	644,263,495	476,073,558	1.0568	$63
N/A	20 to 39 MPG	18,303,174,025	941,034,334	512,016,447	0.7781	$68
N/A	40 MPG and over	1,124,166,558	57,797,589	23,776,496	0.5883	$78
EV	N/A	361,068,523	18,563,877	8,651,039	0.6664	$158
Basic Vehicle Subtotal		32,319,372,576	1,661,659,295	1,020,517,540		
All Vehicle Total		35,186,214,962	2,285,477,300	1,598,121,340		

		Baseline				
Vehicle Class		Annual VMT	Annual Cost Responsibility	Annual User Fees	Scaled Equity Ratio	Registration Fees
ICE	N/A	30,426,380,723	1,564,333,535	978,836,742	0.8948	$66
HYB	N/A	1,330,366,521	68,399,097	29,581,188	0.6185	$75
PHEV	N/A	201,556,810	10,362,786	3,448,572	0.4759	$78
EV	N/A	361,068,523	18,563,877	8,651,039	0.6664	$158
Basic Vehicle Subtotal		32,319,372,576	1,661,659,295	1,020,517,540		
All Vehicle Total		35,186,214,962	2,285,477,300	1,598,121,340		

Source: ECONorthwest

The first alternative rate scenario that was analyzed is a scenario where all the basic vehicle annual registration fees are adjusted to try to achieve parity across basic vehicles while targeting no increase or decrease in total user fee revenues. These results are displayed in Exhibit 12 below.

Exhibit 12. Scenario 1: Target Revenue Neutral

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
N/A	Under 20 MPG	476,073,558	1.0568	$63	398,551,946	0.8847	$0
N/A	20 to 39 MPG	512,016,447	0.7781	$68	575,095,091	0.8740	$105
N/A	40 MPG and over	23,776,496	0.5883	$78	35,474,388	0.8778	$199
EV	N/A	8,651,039	0.6664	$158	11,396,114	0.8779	$235
Basic Vehicle Subtotal		1,020,517,540			1,020,517,540		
All Vehicle Total		1,598,121,340			1,598,121,340		

Source: ECONorthwest

In this scenario, Under-20-MPG annual registration rates are reduced to zero and all other registration rates are increased. Reducing the registration fees to zero for Under-20-MPG is a product of achieving something close to equity while generating similar total revenue from user fees, and may run counter to ODOT's commitments to reduce carbon emissions from transportation. All other categories of basic vehicles see registration fees increase by between 200 and 300 percent.

A second alternative rate scenario involves keeping the Under-20-MPG tier annual registration rate constant and adjusting all other registration rates. This scenario does not target revenue neutrality, and as a consequence of rate increases, it yields more revenue than the Baseline condition.

Exhibit 13. Scenario 2: No Rate Reductions, Not Revenue Neutral

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
N/A	Under 20 MPG	476,073,558	1.0568	$63	476,073,558	0.9355	$63
N/A	20 to 39 MPG	512,016,447	0.7781	$68	695,249,001	0.9353	$176
N/A	40 MPG and over	23,776,496	0.5883	$78	42,688,291	0.9350	$274
EV	N/A	8,651,039	0.6664	$158	13,710,764	0.9350	$300
Basic Vehicle Subtotal		1,020,517,540			1,227,721,614		
All Vehicle Total		1,598,121,340			1,805,325,413		

Source: ECONorthwest

Under this scenario, basic vehicle parity is achieved while generating additional user fee revenue. It should be noted that the additional revenue from basic vehicles as a whole could be the basis of achieving greater equity between basic and heavy vehicles across the entire statewide vehicle fleet. This shift in equity would be achieved by adjusting weight-mile tax rates on heavy vehicles.

Two variations on this second scenario were also tested. The first variant explored whether the assumed rate of utilization for electric vehicles has any substantial influence over the equity ratio findings. Currently, EVs are driven slightly less than other vehicles on a monthly or annualized basis. This observation is based on a relatively small sample size, and there is uncertainty about this finding. In fact, the PSRC household survey suggests that EV usage could even be higher than for other vehicles. It is likely that as EV use becomes more widespread, and as battery range improves, this difference will no longer be observed.

Exhibit 14. Scenario 2 (Variant A): Higher Level of EV Use

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
N/A	Under 20 MPG	476,073,558	1.0581	$63	475,386,013	0.9353	$62
N/A	20 to 39 MPG	512,016,447	0.7791	$68	694,467,333	0.9354	$176
N/A	40 MPG and over	23,776,496	0.5890	$78	42,635,085	0.9350	$273
EV	N/A	8,651,039	0.5998	$158	15,233,183	0.9350	$343
Basic Vehicle Subtotal		1,020,517,540			1,227,721,614		
All Vehicle Total		1,598,121,340			1,805,325,414		

Source: ECONorthwest

In Variant A of Scenario 2, EVs are assumed to be driven an average of 750 miles per month compared with the observed average value of 674 miles per month. As a result, they impose a slightly higher share of costs and require a higher alternative annual registration fee rate in order to achieve parity with other basic vehicle classes.

The second variation on Scenario 2 makes use of a projection for the future vehicle fleet mix in Oregon to see how this future mix of vehicles might influence the equity ratios and implied alternative rates that achieve parity. Variant B tests the consequences of an evolving vehicle fleet mix. For this test, the study made use of an ODOT-generated projection of registered vehicles for the year 2035. In 2035, ICE vehicles are projected to comprise 62 percent of the vehicle fleet, down from 94 percent in 2022. The share of hybrid vehicles in 2035 is projected to be 15 percent, and the projected share of EVs is 23 percent. Along with changes in vehicle propulsion, the future fleet of ICE vehicles has a higher average MPG. These changes in vehicle fleet also imply that revenues from the tax on motor fuels will be lower than expected for the 2023-25 biennium. All other factors in the Scenario 2 analysis, such as spending and average vehicle usage, are held constant. The alternative rates were set to achieve basic vehicle parity while also generating similar revenues to Scenario 2.

Exhibit 15. Scenario 2 (Variant B): 2035 Projected Vehicle Fleet

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
N/A	Under 20 MPG	223,559,425	1.1476	$63	234,686,527	0.9305	$81
N/A	20 to 39 MPG	362,550,866	0.7729	$68	561,231,298	0.9242	$208
N/A	40 MPG and over	62,157,516	0.5511	$78	136,154,298	0.9324	$312
EV	N/A	165,533,319	0.6828	$158	291,729,001	0.9294	$339
Basic Vehicle Subtotal		813,801,126			1,223,801,125		
All Vehicle Total		1,391,404,926			1,801,404,925		

Source: ECONorthwest

In Variant B of Scenario 2, annual registration rates increase beyond the rates implied in Scenario 2 under the existing vehicle fleet mix. The general increase in fuel efficiency of the fleet results in lower fuel-tax revenues and requires higher registration fees across all vehicle categories, especially for vehicles with the greatest fuel economy. The high rate of these fixed user fees suggests that a road usage charge that is levied directly on the amount of vehicle usage and collected more frequently could be a more direct means of achieving transportation user fee equity across basic vehicle categories.

3.3 Revenue Loss Due to Vehicle Misclassification

The current tiered registration fee system based on MPG ratings results in a high rate of vehicle misclassification. A review of the DMV registration fee system indicates that there is a non-trivial rate of error in the MPG ratings used by the DMV as the basis for title and registration fees. In total, the DMV under-collected approximately $1.7 million in fees from the transactions that were reviewed. A current rate of vehicle misclassification results in a fairly low rate of revenue loss, principally due to the relatively small fee increments associated with higher MPG-rated vehicles. Should the tiered fee structure be adjusted to include larger enhanced registration fees, the revenue losses would be correspondingly larger. Approximating the current DMV MPG rating practices in the HCAS model suggests that current revenue losses due to vehicle misclassification might be on the order of $7 million per year, representing a loss of about 2 percent of revenue from registration and title fees. Under an enhanced fee program with enhanced registration rates similar to those tested under Scenario 2, this revenue loss would increase to over $70 million, or approximately 13 percent of registration and title fee revenues.

3.4 Registration Fees Based on Motive Power

An alternative to the MPG-based tiered registration fee system could be a classification of vehicles based on the means of supplying power to the vehicle engine, or motive power. Applying tiered fees based on motive power would minimize the misclassification of vehicles that currently occurs with fees based on MPG ratings. Fees based on motive power would involve a fee tier that applies to hybrid vehicles, and another tier applied to plug-in hybrid vehicles. Each of these vehicle classes includes a very small number of vehicles currently. As a result, the internal combustion engine vehicle category is large and includes a range of vehicles with a wide MPG rating spread. As a test of this alternative approach to structuring the registration fee system, the alternate rate scenarios examined above are also reviewed below under a fee system based on motive power. Under this approach, internal combustion engines are the lowest tier in the fee structure. Internal combustion engines as a whole have a higher fuel economy than the Under-20 MPG group and as a result, there is less of a difference in equity ratios between vehicle categories in the baseline condition. ICE registration rates are slightly lower than current Under-20-MPG rates, and all other registration rates are increased. The alternative rates that would need to be applied to achieve equity across these basic vehicle categories while generating revenues that are similar to the baseline condition are displayed in Exhibit 16 below.

Exhibit 16. Scenario 1: Target Revenue Neutral (Fees Based on Motive Power)

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
ICE	N/A	978,836,742	0.8948	$66	960,764,424	0.8783	$60
HYB	N/A	29,581,188	0.6185	$75	41,993,757	0.8780	$184
PHEV	N/A	3,448,572	0.4759	$78	6,362,165	0.8780	$241
EV	N/A	8,651,039	0.6664	$158	11,397,194	0.8780	$235
Basic Vehicle Subtotal		1,020,517,540			1,020,517,540		
All Vehicle Total		1,598,121,340			1,598,121,340		

Source: ECONorthwes

Scenario 2 relaxes the revenue-neutral constraint while the rates applied to vehicles based on motive power are set to result in equity across basic vehicles while generating revenue similar to the revenue generated in Scenario 2 under a fee system based on MPG ratings. These alternative rates are displayed in Exhibit 17 below.

Exhibit 17. Scenario 2: No Rate Reductions, Not Revenue Neutral (Fees Based on Motive Power)

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
ICE	N/A	978,836,742	0.8948	$66	1,155,838,979	0.9354	$127
HYB	N/A	29,581,188	0.6185	$75	50,518,254	0.9350	$259
PHEV	N/A	3,448,572	0.4759	$78	7,653,638	0.9350	$313
EV	N/A	8,651,039	0.6664	$158	13,710,743	0.9350	$300
Basic Vehicle Subtotal		1,020,517,540			1,227,721,614		
All Vehicle Total		1,598,121,340			1,805,325,414		

Source: ECONorthwest

Exhibits 18 and 19 display the variants of Scenario 2, with higher EV usage and the projected 2035 vehicle fleet mix respectively. Under a system where the fees are based on motive power and the current fleet mix the user fees revenues are largely determined by the rate that is set for internal combustion engine vehicles. This outcome is due to the fact that currently, ICE vehicles account for 95 percent of the basic vehicle registrations. In Variant B of Scenario 2, this is no longer the case, with ICE vehicles comprising only 60 percent of basic vehicles in the 2035 vehicle fleet. With a corresponding increase in total fleet MPG with this fleet mix, Variant 2 results in lower fuel-tax revenues and requires higher registration fees across all vehicle categories to achieve its revenue target.

Exhibit 18. Scenario 2 (Variant A): Higher Level of EV Use (Fees Based on Motive Power)

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
ICE	N/A	978,836,742	0.8960	$66	1,154,389,826	0.9354	$127
HYB	N/A	29,581,188	0.6193	$75	50,454,862	0.9350	$259
PHEV	N/A	3,448,572	0.4765	$78	7,644,032	0.9350	$312
EV	N/A	8,651,039	0.5998	$158	15,233,101	0.9350	$343
Basic Vehicle Subtotal		1,020,517,540			1,227,721,821		
All Vehicle Total		1,598,121,340			1,805,325,621		

Source: ECONorthwest

Exhibit 19. Scenario 2 (Variant B): 2035 Projected Vehicle Fleet (Fees Based on Motive Power)

		Baseline			Alternative Rates		
Vehicle Class		Annual User Fees	Scaled Equity Ratio	Registration Fees	Annual User Fees	Scaled Equity Ratio	Registration Fees
ICE	N/A	552,839,029	0.8990	$66	737,219,516	0.9267	$163
HYB	N/A	71,932,891	0.6578	$75	132,075,542	0.9335	$274
PHEV	N/A	28,006,213	0.5168	$78	65,499,910	0.9343	$318
EV	N/A	165,533,319	0.6798	$158	293,516,854	0.9317	$341
Basic Vehicle Subtotal		818,311,452			1,228,311,822		
All Vehicle Total		1,395,915,252			1,805,915,622		

Source: ECONorthwest

4.0 CONCLUSIONS

This report of the Section 75 Study includes conclusions that reflect data and methods that are currently available. As with any HCAS-based equity analysis, the conclusions reflect existing tax rates and spending policies. But since the costs allocated to various categories of basic vehicles are similar on a miles-traveled basis, the conclusions should be relatively unaffected by changes in spending from one biennium to another. As additional information on trends in vehicle use and fleet evolution becomes available, that information may support other conclusions about how user fees in Oregon might be adjusted over time to maintain equity across various classes of basic vehicles. Conclusions from the analysis completed to date include the following:

1.1. A principal conclusion of this work is that vehicles with higher fuel efficiency do not currently pay their fair share of transportation user fees for the maintenance, operation, and improvement of roads. This finding is true in spite of the tiered registration fees that levy higher fees on more fuel-efficient vehicles.

1.2. In order to achieve parity across all classes of basic vehicles, the Legislature could consider increasing registration fees for vehicles with fuel economy ratings equal to or greater than 20 mpg. This would have the additional advantage of improving equity between light-duty vehicles and trucks.

1.3. Conversion to a registration-fee system based on motive power, as opposed to fuel economy, would not obviate the inequities, but it could offer a simpler approach to vehicle classification that minimizes revenue losses associated with the misclassification of vehicles based on MPG ratings.

1.4. Over time, as the vehicle fleet evolves through the purchase of new vehicles with higher fuel economy and alternative power systems, these inequities will persist. Maintaining equity will require periodic rate adjustments.

1.5. As improvements in fuel economy occur, it will become increasingly difficult to maintain equity across vehicle classes through adjustments to the tax on fuels and registration fees. At some point, an alternative to these taxes and fees, such as a per-mile road usage charge, could be instituted in order to maintain transportation user fee equity. Implementing a RUC would ensure that each vehicle pays the same amount per mile for the maintenance, operation, and improvement of Oregon's roads.

This first Section 75 Study cannot provide a definitive answer as to how the state of Oregon maintains cost and fee equity across the various classes of basic vehicles as the vehicle fleet evolves. As with the broader HCAS, this study is a snapshot in time that reflects current vehicle registrations and planned expenditures during the upcoming biennium. The purpose of the Section 75 Study is to evaluate if vehicles powered by different means are paying a proportionate share in user fees of the costs to build and maintain the transportation system. Vehicle use imposes social costs as well, such as congestion, accidents, and carbon emissions. These costs are not currently included in HCAS or this study. Previous HCAS reports have examined an efficient fee approach to cost recovery and such an approach could be extended to any future Section 75 analysis. Given these limitations, this study should be regularly updated in order to continue to address equity concerns. Some issues to consider as part of that regular update of this study are as follows:

2.1. The Section 75 Study could be incorporated into the regular HCAS methodology and work plan. This integration would require updates to the HCAS model but would formalize the methods employed for this study. Once the model is updated in this manner, the HCAS will yield equity findings for the various classes of basic vehicles.

2.2. The frequency of registration fee rate adjustments is a matter of policy that should be considered by the Commission and Legislature. If the Section 75 Study methods are incorporated into the HCAS model, then fuel efficiency or motive power registration fee rate adjustments could be considered on a similar schedule with other user fees.

2.3. Key inputs to this analysis, and to any future implementation of similar methods, are the number of vehicles registered in each vehicle class, accurate estimates of vehicle fuel economy, and the amount (and potentially location) of vehicle usage. Each of these data can be improved upon with specific efforts, but existing sources of data and estimates of vehicle usage permit the development of reasonable findings at this time.