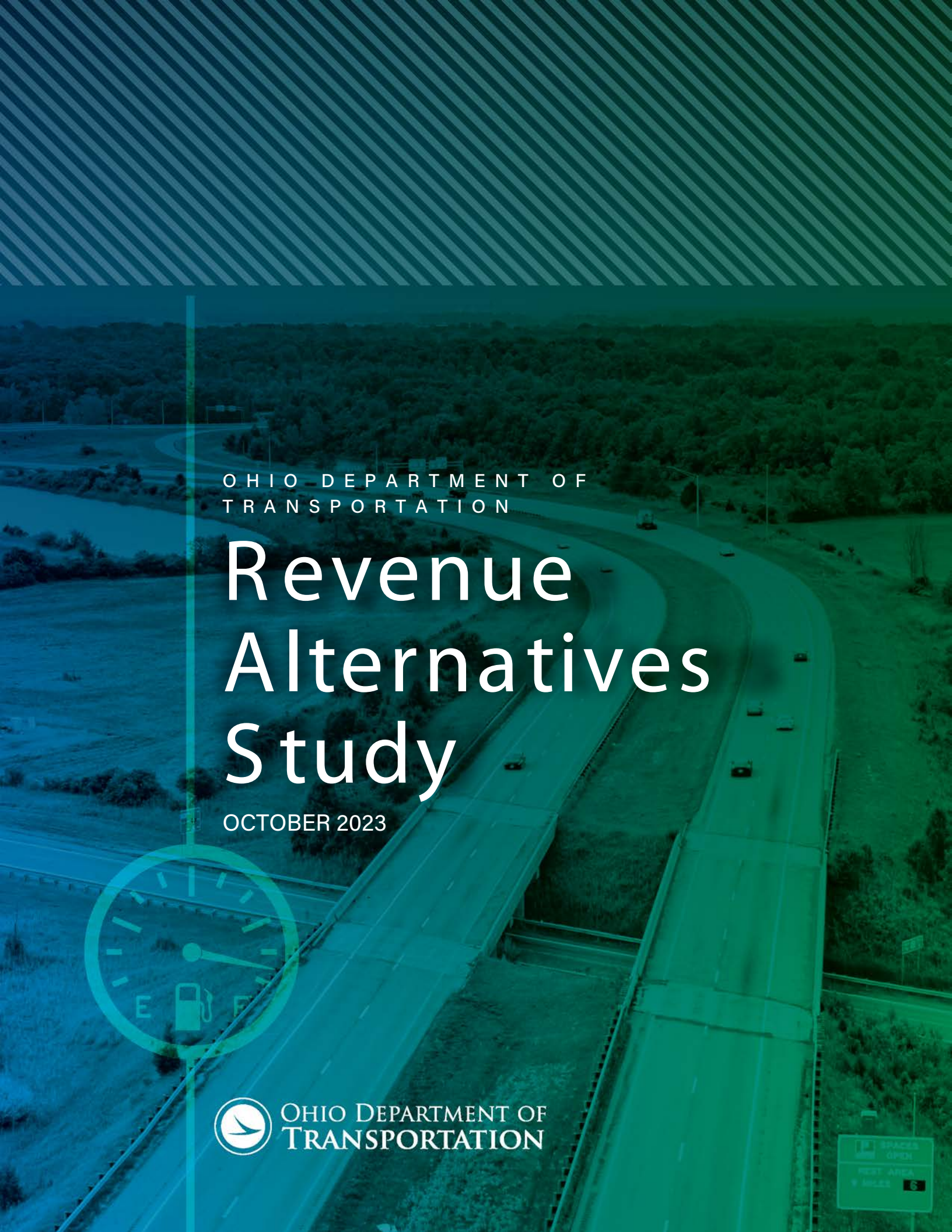

OHIO DEPARTMENT OF TRANSPORTATION

Revenue Alternatives Study

OCTOBER 2023

OHIO DEPARTMENT OF TRANSPORTATION

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Acronyms

ARM	Alternative Revenue Mechanisms
BMV	Bureau of Motor Vehicles
DOT	Departments of transportation
EAC	External Advisory Committee
EV	Electric Vehicle
FHWA	Federal Highway Administration
HB	House bill
IIJA	Infrastructure Investment and Jobs Act
MBUF	Mileage-based user fee
MFT	Motor fuel tax
ODOT	Ohio Department of Transportation
PHEV	Plug-in hybrid vehicles
STSFA	Surface Transportation System Funding Alternatives
TNC	Transportation network company
USDOT	U.S. Department of Transportation
VMT	Vehicle miles traveled

Executive Summary

Sustainable Funding for Ohio's Future

Ohio's transportation system provides essential connections for Ohioans as they travel to the people, places, and businesses that matter most. Funding this system is no easy feat. With nearly 50,000 lane miles and more than 27,000 bridges, there is a vast network to maintain.

Today, Ohio uses the motor fuel tax and vehicle registration fees to provide the bulk of funding for local, regional, and statewide transportation projects (Figure ES-1).

However, the state's largest source of funding – the state motor fuel tax – is forecast to generate less revenue as vehicles become more fuel efficient, and more electric vehicles are purchased – even as they continue to drive the same number of miles.

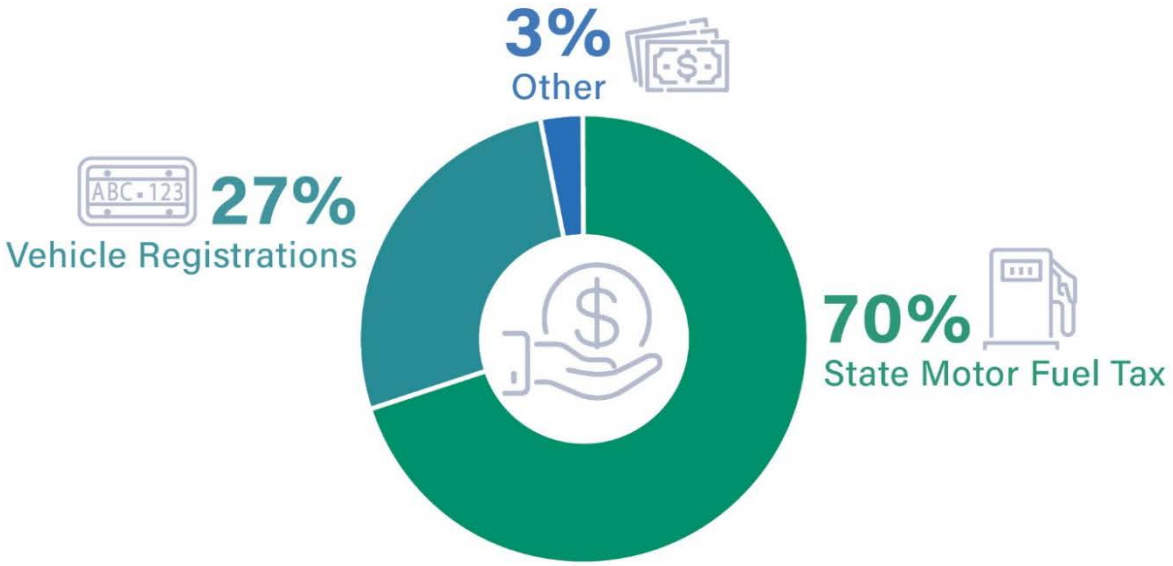

Figure ES-1: Transportation Funding Sources in Ohio

In 2019, Ohio raised the state motor fuel tax and imposed additional annual registration fees for electric and hybrid vehicles. These actions stabilized revenue and provided a mechanism to supplant motor fuel tax revenue lost to electric vehicle purchases. Over the long term, however, improved fuel efficiency will erode Ohio transportation program revenue. These long-term trends are illustrated in Figure ES-2.

To better understand how to meet this long-term challenge, the Ohio Department of Transportation (ODOT) applied for and received a federal grant to study potential funding alternatives to the motor fuel tax. Funded by the U.S. Department of Transportation's Surface Transportation System Funding Alternatives program, the grant provided funding to help states explore more sustainable alternative transportation revenue mechanisms. The process and results of the study, called the Ohio Revenue Alternatives Study, are the focus of this report.

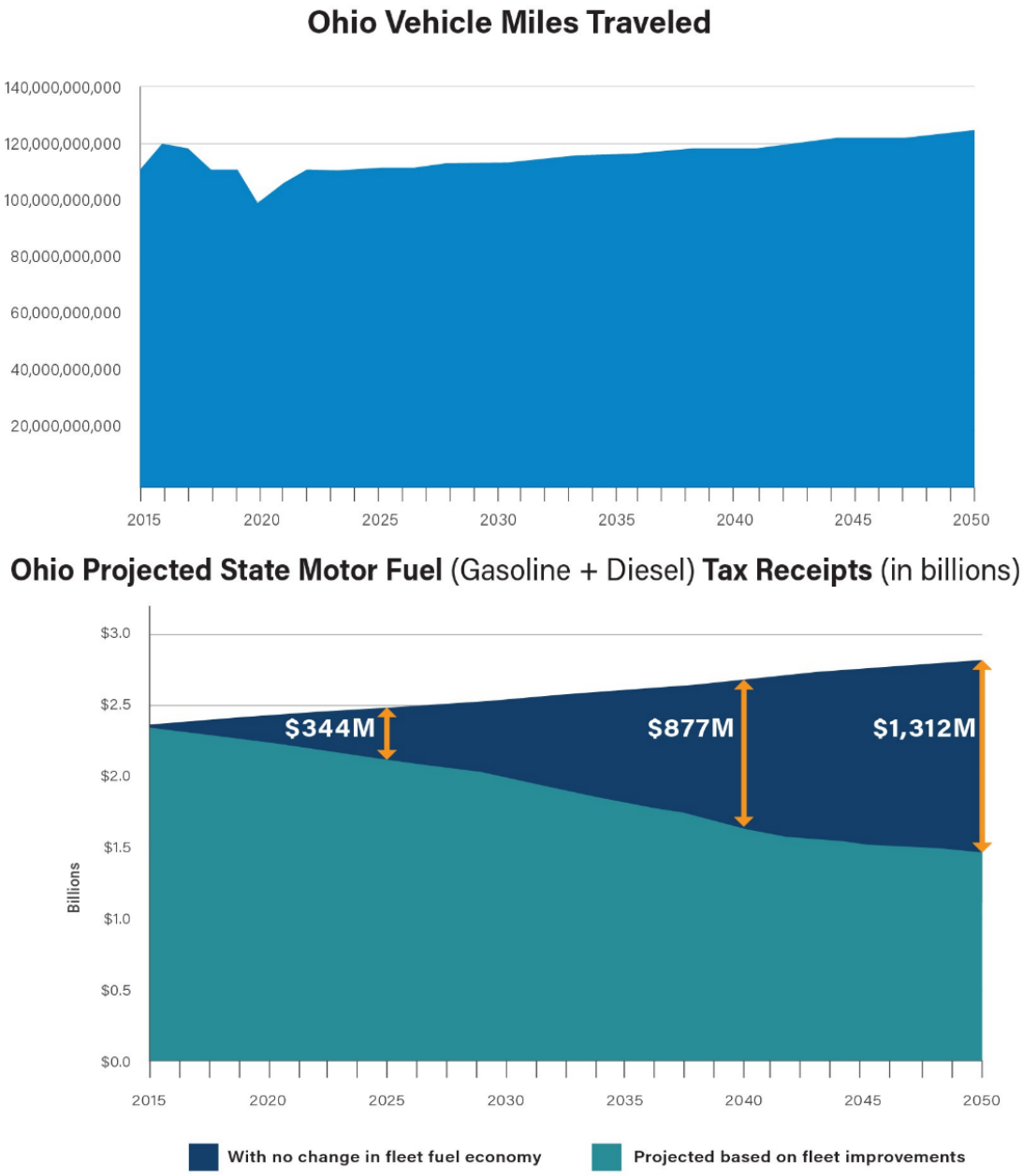

Figure ES-2: Ohio's Projected Transportation Revenue Shortfall

Study Activities

The Ohio Revenue Alternatives Study focused on three main activities:

1. **Formation of an External Advisory Committee (EAC)** to advise the Revenue Alternatives Study. The group was comprised of 17 members representing diverse industries and interests across Ohio and met 8 times over a 16-month period.
2. **Outreach to the general public and business leaders in Ohio**. This included public opinion research, a public awareness campaign, and legislative outreach to several key decision-makers in the Ohio General Assembly.
3. **Quantitative and qualitative analysis of 32 Alternative Revenue Mechanisms (ARMs)** to better understand how each performed in terms of stabilizing Ohio's transportation funding revenue into the future. This analysis serves as the main focal point of this report.

Evaluating the Alternative Revenue Mechanisms

An initial assessment of the potential revenue mechanisms that included both quantitative and qualitative analyses was conducted. The quantitative assessment included a preliminary forecast of each ARM's revenue generating potential over the period 2022 through 2040.

After forecasting the revenue generation potential, the project team measured the financial sustainability of each revenue mechanism. To determine this, the team compared each ARM's expected revenue stream over time against projected statewide Vehicle Miles Traveled (VMT), which represents roadway usage and serves as a proxy for long-term investment needs.

For the qualitative assessment, guiding principles were developed to assess the various revenue mechanisms' ability to accomplish critical policy objectives. Figure ES-3 describes the guiding principles in greater detail.

Figure ES-3: Guiding Principles for Evaluating Alternative Revenue Mechanisms

The 32 alternative revenue mechanisms initially considered for analysis can be grouped into six categories, as seen in Figure ES-4, and discussed below.

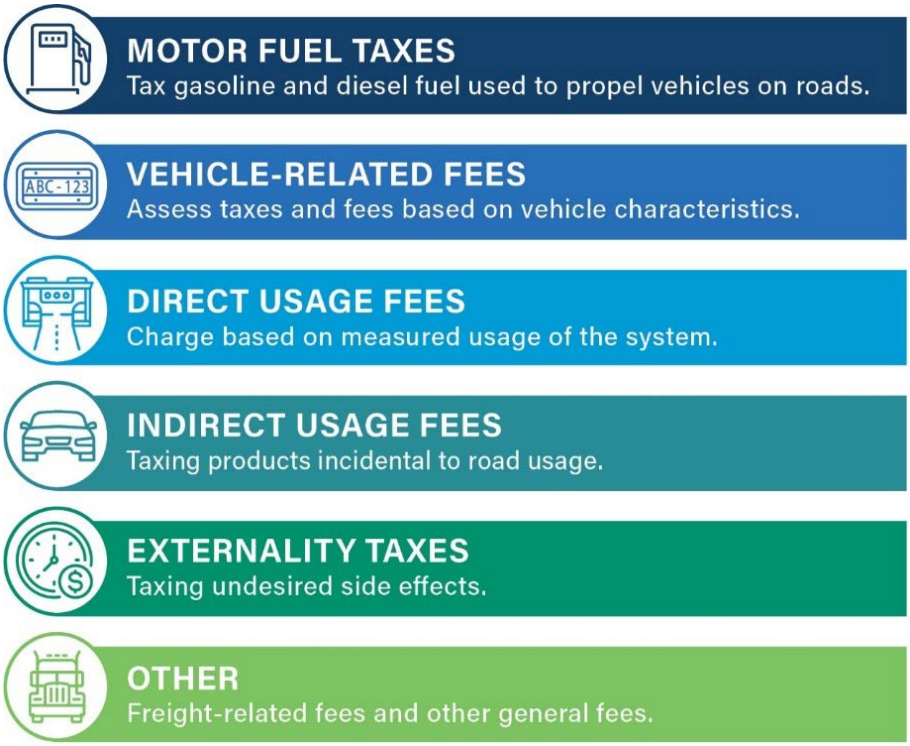

Figure ES-4: Categories of Alternative Revenue Mechanisms

1. ***Motor fuel taxes*** are the most common indirect usage fee and account for most of ODOT's revenue today. There are currently two forms of this tax collected in Ohio: a per-gallon tax for gasoline and a per-gallon tax for diesel. Motor fuel taxes studied include:
    - A **flat per-gallon excise tax**, which charges users a flat excise tax for each gallon of fuel purchased.
    - **An excise tax with inflation index**, which automatically adjusts the per-gallon fuel tax according to inflation levels.
    - An **excise tax with fuel efficiency index**, which charges a tax that is based on the state fleet's increasing average fuel efficiency.
    - A **sales tax on fuel**, which is an alternative to indexing the motor fuel tax rates to inflation or fuel economy and could be levied on top of the existing per-gallon excise tax.
    - A **variable-rate tax based on fuel price**, which is based on fuel price that varies with the price of gasoline or diesel.

2. ***Vehicle-related fees*** encompass a wide variety of revenue mechanisms generally tied to annual vehicle registration fees collected by the Ohio Bureau of Motor Vehicles. Vehicle-related fees studied include:
    - **Basic vehicle registration fees**, which are set by statute that must be amended to implement any changes.
    - An **engine type fee**, which can be levied on electric vehicles, plug-in hybrid vehicles, and hybrid vehicles.
    - A **vehicle value tax**, which is based on the value of a vehicle and is paid during registration.
    - A **vehicle weight fee**, which is based on vehicle weight class, as determined by the vehicle's gross vehicle weight rating, or its maximum weight class.
    - A **vehicle fuel efficiency fee**, which, like a registration surcharge on EVs and hybrids, seeks to recoup revenue lost due to increased fuel efficiency.
    - A **vehicle age fee**, which charges newer vehicles a higher fee than their older counterparts to account for increasing fuel efficiency with each model year.
3. ***Direct usage fees*** impose fees exclusively on the use of transportation infrastructure on a per-mile basis or some other measure of use. Tolling was not one of the usage fees analyzed in this study because the ability to implement tolling is geographically and legislatively limited; additionally, tolling is already well understood as a way to generate transportation revenues. Direct usage fees studied include:
    - A **light vehicle mileage-based user fee**, which charges passenger vehicle drivers based on miles driven.
    - A **heavy vehicle mileage-based user fee**, which charges heavy-duty vehicles based on miles driven.
4. Indirect usage fees approximate actual usage by taxing products that are incidental to the use of roadways. The indirect usage fees considered in the study relate to consumable products used during vehicle operation such as tires, batteries, or electricity, and include the following:
    - A **tire fee**, which is levied at the time of purchase and has administrative characteristics similar to the state sales tax.
    - A **battery fee**, which could be levied on batteries used in light vehicles powered by internal combustion engines.
    - An **electric vehicle, plug-in hybrid electric vehicle, or hybrid battery capacity fee**, which could also be applied to certain types of vehicle batteries (i.e., lithium-ion batteries).
    - An **electricity charging fee**, or a tax on electricity used to charge electric vehicle batteries.
5. ***Externality taxes*** are taxes on economic externalities from use of the transportation system. This type of tax is intended to raise revenue from costs not currently borne by road users and to reduce undesirable activities such as congestion or vehicle emissions. Externality taxes studied include:
    - A **congestion fee**, which is a tax levied on drivers in areas that experience a high level of traffic congestion and delay.
    - A **carbon tax**, which levies a fee based on the negative externalities from a vehicle's emissions, namely those relating to greenhouse gases and climate change.

6. ***Other taxes and fees*** include a variety of mechanisms that do not fit neatly into the other five categories. Other taxes and fees studied include:

   - A **dedication of auto sales tax,** which dedicates a portion of the state's auto sales tax collections specifically to transportation purposes.
   - A **delivery fee**, which is charged for the delivery of goods.
   - A **for-hire transportation fee**, which is charged for rides provided by transportation network companies such as Uber and Lyft.
   - A **fee on the value of trucking costs**, which would add a surcharge on goods movements as a function of the cost of moving those goods.
   - A **street utility fee**, which is a surcharge on residents and businesses based on the estimated roadway use impacts, which itself is based on property type.
   - A **payroll tax**, which is levied on wages for transportation purposes.
   - A **land use impact fee**, which is levied on new construction, on the basis that new residential or commercial buildings generate additional travel and therefore greater use of the road network.
   - A **general fund transfer**, which would rely on transfers from Ohio's General Revenue Fund to the ODOT budget instead of relying on explicitly transportation-related sources.

Figure ES-5 summarizes the scoring of the more than 30 mechanisms against the six guiding principles. A green score indicates that a mechanism is capable of strong alignment with the guiding principle, a red score indicates a mechanism is poorly aligned, and a yellow score indicates a mechanism has some alignment with the guiding principle.

	Alternative Revenue Mechanism (ARM)	Revenue Stability	Efficiency	Simplicity & Ease of Admin	User Equity	Social Equity	Transparency
MOTOR FUEL TAXES	Flat Per-Gallon Excise MFT: *Gasoline*	L	H	H	M	L	L
	Flat Per-Gallon Excise MFT: *Diesel*	L	H	H	M	M	M
	Excise MFT with Inflation Index: *Gasoline*	L	H	H	M	L	L
	Excise MFT with Inflation Index: *Diesel*	H	H	H	M	M	M
	Excise MFT with Fuel Efficiency Index: *Gasoline*	L	H	H	M	L	L
	Excise MFT with Fuel Efficiency Index: *Diesel*	H	H	H	M	M	M
	Sales Tax on Fuel Price: *Gasoline*	L	M	H	M	L	M
	Sales Tax on Fuel Price: *Diesel*	H	M	H	M	M	M
	Variable-Rate Tax Based on Fuel Price: *Gasoline*	L	H	H	M	L	L
	Variable-Rate Tax Based on Fuel Price: *Diesel*	H	H	H	M	M	M
VEHICLE-RELATED FEES	Basic Vehicle Registration Fees	H	M	H	M	L	H
	Engine Type (EV/PHEV/Hybrid) Fee	H	M	H	M	M	H
	Vehicle Value Tax	H	M	M	M	H	M
	Vehicle Weight Fee	H	M	M	H	M	H
	Vehicle Fuel Efficiency Fee	H	M	M	M	M	M
	Vehicle Age Fee	H	M	M	M	H	H
DIRECT USAGE FEES	Light Vehicle MBUF	H	M	M	H	M	H
	Heavy Vehicle MBUF	H	M	M	H	M	H
INDIRECT USAGE FEES	Tire Fee	H	M	M	M	L	M
	Battery Fee	L	M	M	M	L	M
	EV/PHEV/Hybrid Battery Capacity Fee	H	M	M	M	M	M
	Electricity Charging Fee	H	L	L	L	M	M
EXTERNALITY TAXES	Congestion Fee	H	L	L	H	M	H
	Carbon Tax	L	M	M	L	M	M
OTHER	Dedication of Auto Sales Tax	H	H	M	M	H	M
	Delivery Fee	H	M	M	M	M	M
	For-hire Transportation (TNC) Fee	H	H	M	M	M	M
	Fee On The Value Of Trucking Costs	H	L	L	M	M	L
	Street Utility Fee	M	L	L	L	M	M
	Payroll Tax	H	M	L	L	L	L
	Land Use Impact Fee	H	L	L	L	M	L
	General Fund Transfer	L	H	M	L	L	L

H High Alignment with ARM M Moderate Alignment with ARM L Low Alignment with ARM

Figure ES-5: Scoring of Alternative Revenue Mechanisms (ARMs) against the Guiding Principles

After the initial quantitative and qualitative assessments, the list of potential ARMs was narrowed down for further investigation. The prioritization process centered on evaluating whether the alternative revenue mechanisms aligned with key guiding principles, as well as the level of experience jurisdictions throughout the country have with implementing similar revenue sources. Through the prioritization process, the following 10 revenue mechanisms were chosen for further analysis:

1. Continued flat per-gallon excise motor fuel tax
2. Excise motor fuel tax with inflation index
3. Basic vehicle registration fee
4. Vehicle value tax
5. Engine type fee
6. Vehicle age fee
7. Delivery fee
8. For-hire transportation fee
9. Dedication of auto sales taxes
10. Mileage-based user fee

The analysis of the 10 prioritized revenue mechanisms focused on four core characteristics:

- **Operations** focused on the alternative revenue mechanism's design characteristics, steps for implementation, and agencies that may have a role in implementation.
- **Revenue potential** used revenue forecasting to estimate each mechanism's future revenue.
- **Cost of collection** described the state's cost to collect revenue for the mechanism.
- **Legal considerations** outlined how state laws relate to each of the revenue mechanisms.

The 10 alternative revenue mechanisms differ in terms of the legislative complexity required for their implementation. Figure ES-6 ranks the relative implementation complexity for each mechanism on a scale of one to three barricades, with three barricades being the most complex.

Alternative Revenue Mechanism	Implementation Complexity
Continued flat-per gallon excise MFT	
Excise MFT with inflation index	
Basic vehicle registration fee	
Vehicle value tax	
Engine type (EV/PHEV/hybrid) fee	
Vehicle age fee	
Delivery fee	
For-hire transportation (TNC) fee	
Dedication of auto sales taxes	
Mileage-based user fees	

least complex moderately complex most complex

Figure ES-6: Alternative Revenue Mechanism Implementation Complexity

While complexity is one factor in considering which mechanism to implement, there may be a tradeoff with the amount of revenue that could be collected; for example, while mileage-based user fees are indicated at three barricades to implement, the mechanism has the potential to bring in significant revenues, thus potentially making the additional effort worthwhile.

After completing this analysis of implementation complexity, the project team developed projected revenue values in real dollars to represent the true revenue generated after adjusting for inflation as seen in Figure ES- 7.

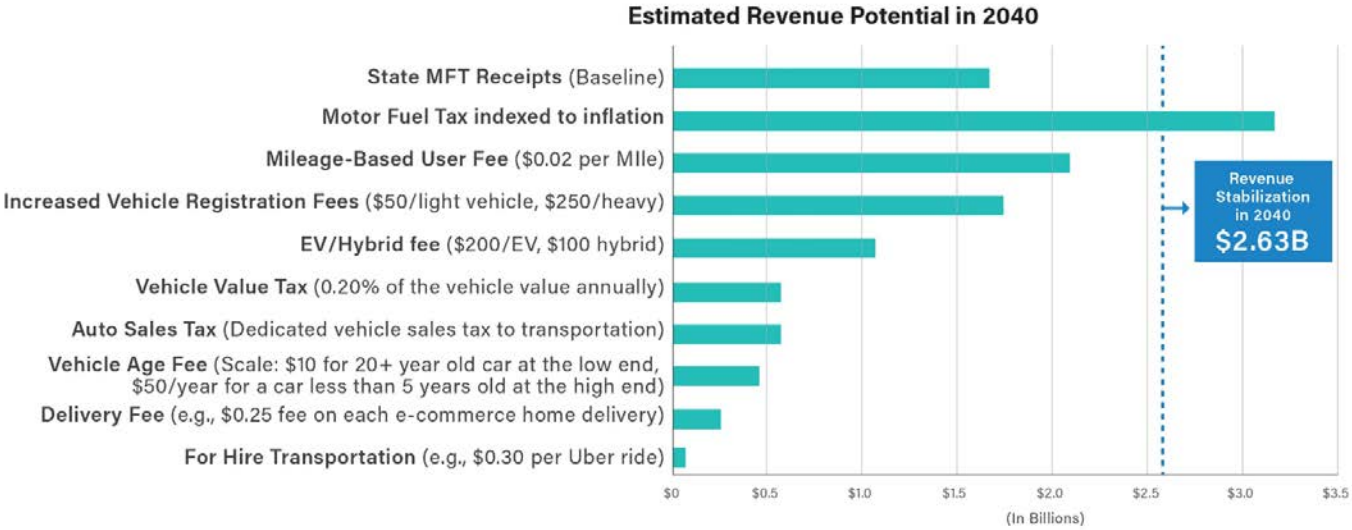

Figure ES- 7: Estimated Revenue Potential in 2040

Key Findings

The Ohio Revenue Alternatives Study resulted in the following key findings:

- The Revenue Alternative Study forecasts a decline in state motor fuel tax revenue due to electric vehicle adoption and improved fuel efficiency for cars and trucks.
- By 2040, the state MFT will generate $877 million less than it otherwise would, due to EVs and fuel efficiency measures.
- While the forecasted revenue decline is concerning, viable alternatives exist to counter future shortfalls.
- By 2040, Ohio's electric and hybrid vehicle registration fees are forecast to generate just over $1 billion, which will address any shortfall in motor fuel tax revenue.

1 Introduction

1.1 Background

Ohio's transportation system is made up of nearly 50,000 lane miles and more than 27,000 bridges and is the nation's fifth largest interstate system. To maintain this transportation network, Ohio relies on funding from the motor fuel tax (MFT) and vehicle registration fees for local, regional, and statewide transportation projects (Figure 1).

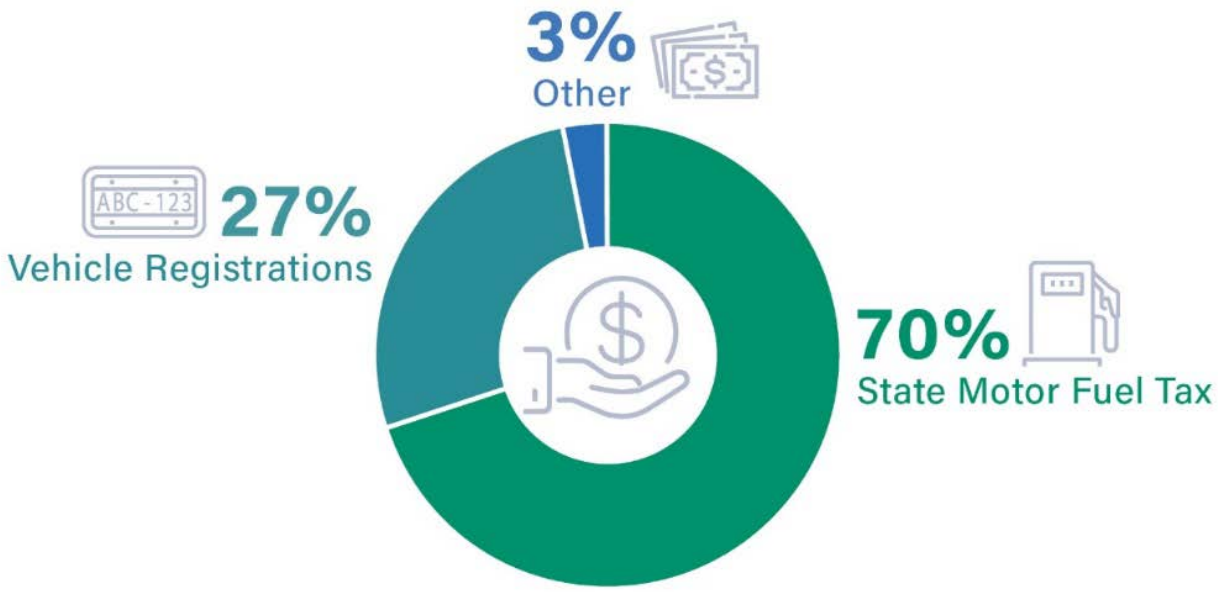

Figure 1: Transportation Funding Sources in Ohio

The MFT is the largest (70%) state funding source for Ohio's transportation system and is currently 38.5 cents per gallon for gas and 47 cents per gallon for diesel. In 2019, Ohio raised the state motor fuel tax through House Bill (HB) 62. Ohio's gas tax is a flat tax, meaning it does not adjust for inflation.

Vehicle registration fees are the second-largest transportation funding source. Ohioans pay vehicle registration fees that vary based on vehicle type. In 2019, HB 62 imposed an additional annual fee of $200 for electric vehicles (EVs) and $100 for hybrid vehicles. These fees were designed to help cover the cost of bridge and roadway maintenance as owners of EVs and hybrid vehicles pay little or no gas tax.

As vehicles become more fuel efficient and EVs more prevalent, the vehicles driven on Ohio's roads are increasingly using less fuel to travel the same number of miles—leading to less MFT revenue but with the same amount of maintenance required. As a result, the current MFT-dependent funding structure produces less funding for Ohio's roadway and bridge systems. If Ohio takes no action to account for these changes, it will have a $877 million funding gap by 2040 (Figure 2).

The forecasted revenue gap shown in Figure 2 is based on gasoline taxes only and is anticipated despite a projected growth in vehicle miles traveled (VMT) because of anticipated improvements in the fuel economy of the light vehicle fleet.

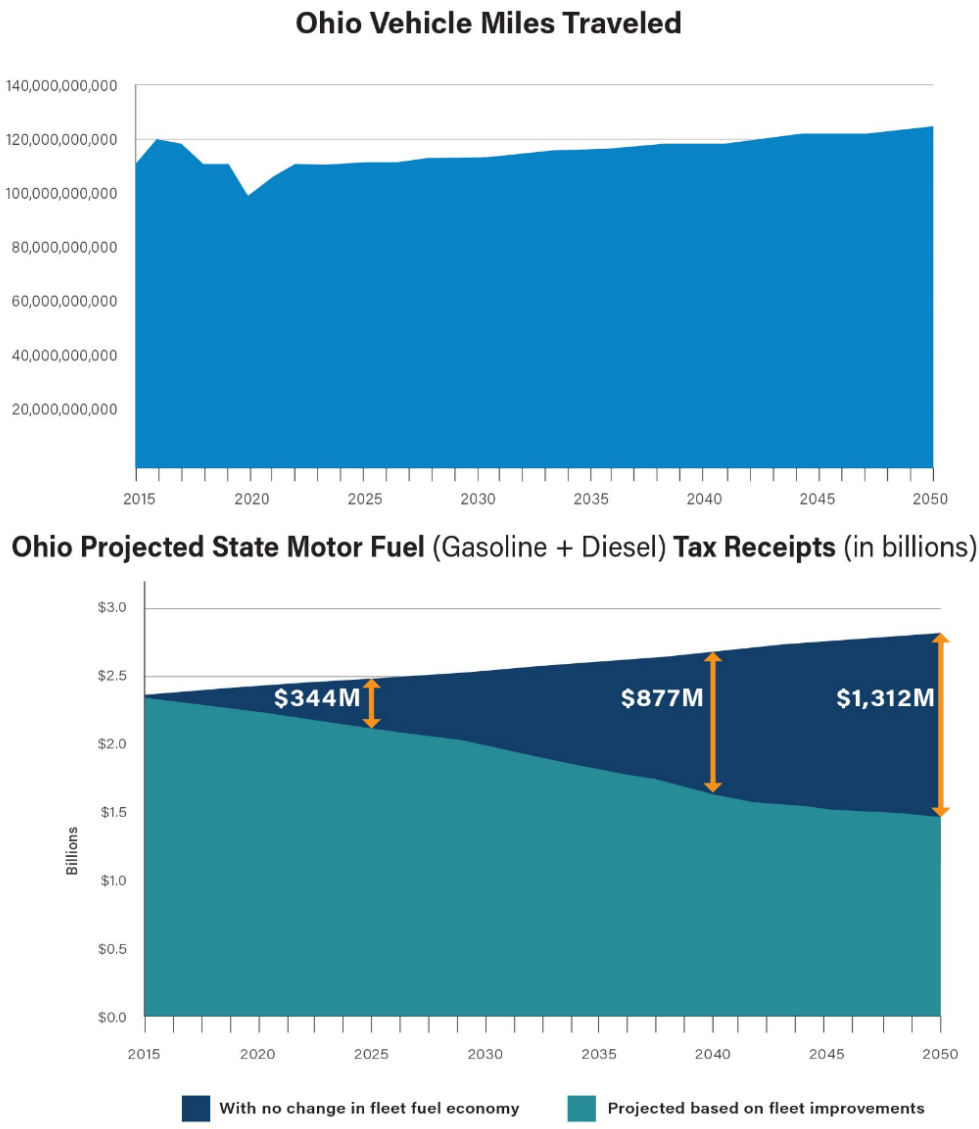

Figure 2: Ohio's Projected Transportation Revenue Shortfall

In 2016, the U.S. Department of Transportation (USDOT) established the Surface Transportation System Funding Alternatives (STSFA) grant program which provided funding to help states explore alternative transportation revenue mechanisms. With this federal funding, many states are exploring numerous alternative revenue mechanisms (ARMs) with the primary goal of ensuring long-term stability and predictability of funding. However, there has also been a renewed focus on other ancillary goals, such as ensuring that any revenue mechanism is socially, economically, and geographically equitable. Furthermore, states are also placing an emphasis on each mechanism's ability to align with environmental goals, such as reducing greenhouse gas emissions.

The recent passage of the Infrastructure Investment and Jobs Act (IIJA) has provided states with a short-term increase in funding for transportation infrastructure; however, the IIJA does not resolve the challenge of finding long-term, sustainable funding for our nation's transportation infrastructure.

Based on these trends, the Ohio General Assembly encouraged ODOT to conduct a study of transportation revenue alternatives. ODOT applied for and received a STSFA grant in 2021 and used this federal grant to study a variety of ARMs to stabilize transportation revenues well into the future.

1.2 Study Activities

The Ohio Revenue Alternatives Study focused on three main activities:

1. **Formation of an External Advisory Committee (EAC)** to advise the Revenue Alternatives Study. The group was comprised of 17 members representing diverse industries and interests across Ohio and met 8 times over a 16-month period. See Appendix A to learn more about this group's activities.
2. **Outreach to the general public and business leaders** in Ohio. This included public opinion research, a public awareness campaign, and legislative outreach to several key decision-makers in the Ohio General Assembly.
3. **Quantitative and qualitative analysis of 32 ARMs** to better understand how each performed in terms of stabilizing Ohio's transportation funding revenue into the future. The analysis of these 32 ARMs serves as the main focal point of this report.

2 Potential Alternative Revenue Mechanisms

This study identified more than 30 ARMs that could complement or replace the existing funding sources and stabilize current transportation revenues. These mechanisms were developed based on approaches taken in other states.

Over a 16-month period, several ARMs were identified that would work for Ohioans as well as the state's transportation funding goals. After assessing and prioritizing the ARMs, a list of 10 were identified as the most promising ARMs for further analysis.

The sections that follow discuss this evaluation process in further detail, including a discussion of the guiding principles that underlie the identification and prioritization of the ARMs, and the process for assessing and prioritizing the ARMs. The solution Ohio eventually adopts could include a combination of mechanisms.

2.1 Guiding Principles

To steer the ARM exploration process, guiding principles were developed to assess the various revenue mechanisms. These guiding principles were used to assess each ARM's ability to accomplish critical policy objectives. Figure 3 describes the guiding principles in greater detail.

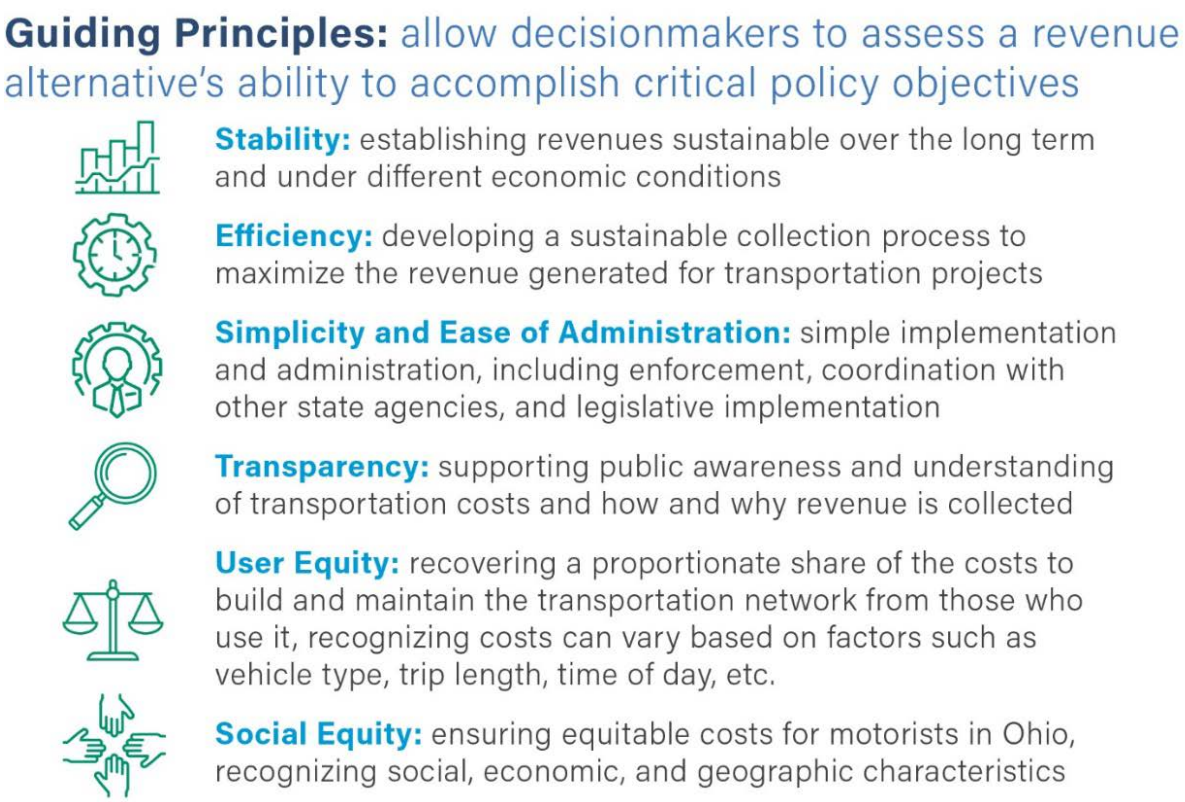

Figure 3: Guiding Principles for Evaluating Alternative Revenue Mechanisms

2.2 Potential Revenue Mechanisms

A total of 32 ARMs were identified for Ohio that could work to help stabilize revenues and achieve the state's transportation funding goals. These are discussed in the sections that follow.

2.2.1 Overview of Revenue Mechanisms by Category

The 32 alternative revenue mechanisms initially considered for analysis can be grouped into six categories, as seen in Figure 4, and discussed below.

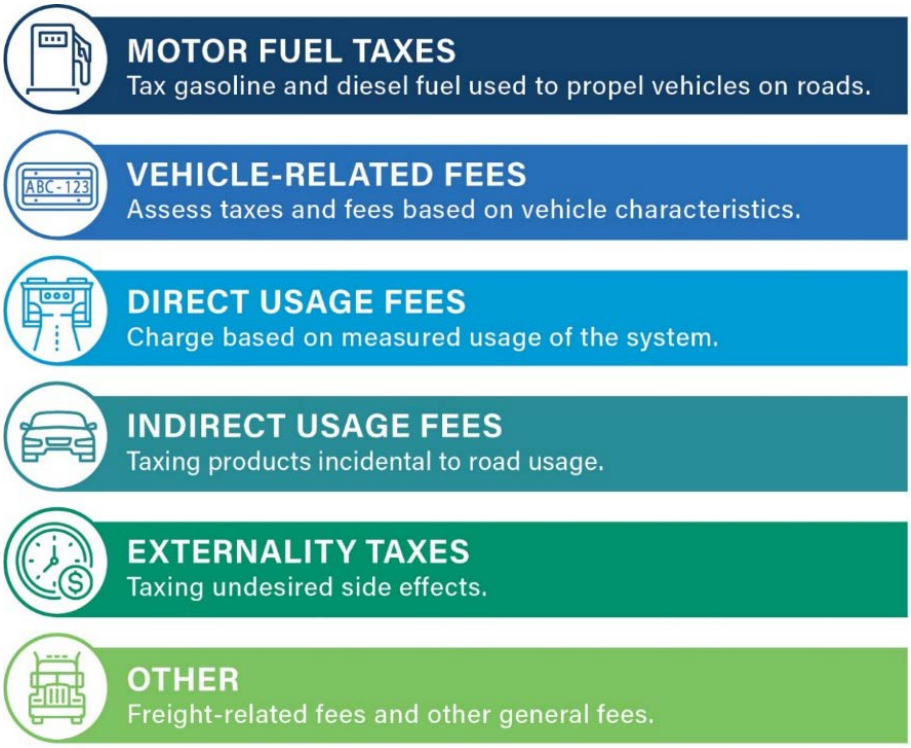

Figure 4: Categories of Alternative Revenue Mechanisms

1. **Motor fuel taxes** are the most common indirect usage fee and account for most of Ohio's transportation revenue today. For those reasons, they should be considered separately from the other types of indirect usage fees. There are currently two forms collected in Ohio: a per-gallon MFT for gasoline and a per-gallon MFT for diesel. Both rates are set by statute, and the Department of Taxation collects the proceeds from these taxes. All other ARMs in this category involve an increase to the current rates, whether that occurs once, repeatedly, or in conjunction with an index. MFTs studied include:
    - A **flat per-gallon excise tax**, which charges users a flat excise tax for each gallon of fuel purchased (currently in place in Ohio).
    - An **excise tax with inflation index**, which automatically adjusts the per-gallon fuel tax according to inflation levels.
    - An **excise tax with fuel efficiency index**, which charges a tax that is based on the state fleet's increasing average fuel efficiency.
    - A **sales tax on fuel**, which is an alternative to indexing the motor fuel tax rates to inflation or fuel economy and could be levied on top of the existing per-gallon excise tax.
    - A **variable-rate tax based on fuel price**, which is based on fuel price that varies with the price of gasoline or diesel.

2. **Vehicle-related fees** encompass a wide variety of ARMs that are generally tied to annual vehicle registration fees collected by the Ohio Bureau of Motor Vehicles (BMV). Vehicle-related fees studied include:
    - **Basic vehicle registration fees**, which are set by statute.
    - An **engine type fee**, which can be levied on electric vehicles, plug-in hybrid vehicles, and hybrid vehicles.
    - A **vehicle value tax**, which is based on the value of a vehicle and is paid during registration.
    - A **vehicle weight fee**, which is based on vehicle weight class, as determined by the vehicle's gross vehicle weight rating, or its maximum weight class.
    - A **vehicle fuel efficiency fee**, which, like a registration surcharge on EVs and hybrids, seeks to recoup revenue lost due to increased fuel efficiency.
    - A **vehicle age fee**, which charges newer vehicles a higher fee than their older counterparts to account for increasing fuel efficiency with each model year.
3. **Direct usage fees** impose fees exclusively on the use of transportation infrastructure on a per-mile basis or some other measure of use. An MBUF, for example, requires drivers to pay a set amount per mile driven and can be set at either a flat rate or indexed to inflation. Tolling was not one of the usage fees analyzed in this study because the ability to implement tolling is geographically and legislatively limited. Additionally, because tolling is already well understood as a way to generate transportation revenues, this study limits its focus to different forms of MBUF. Direct usage fees studied include:
    - A **light vehicle mileage-based user fee**, which charges passenger vehicle drivers based on miles driven.
    - A **heavy vehicle mileage-based user fee**, which charges heavy vehicles based on miles driven.
4. **Indirect usage fees** approximate actual usage by taxing products that are incidental to the use of roadways. The indirect usage fees considered in the study relate to consumable products used during vehicle operation such as tires, batteries, or electricity. Indirect usage fees studied include:
    - A **tire fee**, which is levied at the time of purchase and has administrative characteristics similar to the state sales tax.
    - A **battery fee**, which could be levied on batteries used in light vehicles powered by internal combustion engines.
    - An **electric vehicle**, **plug-in hybrid electric vehicle**, or **hybrid battery capacity fee**, which could also be applied to certain types of vehicle batteries (i.e., lithium-ion batteries).
    - An **electricity charging fee**, or a tax on electricity used to charge electric vehicle batteries.
5. **Externality taxes** are taxes on economic externalities from use of the transportation system. This type of tax is intended to raise revenue from costs not currently borne by road users. Externality taxes are typically implemented to produce behavioral change as well, such as reducing undesirable activities like congestion or vehicle emissions. Externality taxes studied include:
    - A **congestion fee**, which is a tax levied on drivers in areas that experience a high level of traffic congestion and delay.
    - A **carbon tax**, which levies a fee based on the negative externalities from a vehicle's emissions, namely those relating to greenhouse gases and climate change.

6. **Other taxes and fees** include a variety of mechanisms that do not fit neatly into the other five categories. Other taxes and fees studied include:

   - A **dedication of auto sales tax**, which dedicates a portion of the state's auto sales tax collections specifically to transportation purposes.
   - A **delivery fee**, which is charged for the delivery of goods.
   - A **for-hire transportation fee**, which is charged for rides provided by transportation network companies such as Uber and Lyft.
   - A **fee on the value of trucking costs**, which would add a surcharge on goods movements as a function of the cost of moving those goods.
   - A **street utility fee**, which is a surcharge on residents and businesses based on the estimated roadway use impacts, which itself is based on property type.
   - A **payroll tax**, which is levied on wages for transportation purposes.
   - A **land use impact fee**, which is levied on new construction, on the basis that new residential or commercial buildings generate additional travel and therefore greater use of the road network.
   - A **general fund transfer**, which would rely on transfers from Ohio's General Revenue Fund to the ODOT budget instead of relying on explicitly transportation-related sources.

Table 1 provides a comparison of each ARM evaluated in this study, including their use in Ohio and other states.

Table 1: Summary of Alternative Revenue Mechanisms and their Use in Ohio and Other States

Category	Type of Revenue Mechanism	Used in Ohio	No. of States in Use
MFTs	Flat Per-Gallon Excise MFT	Y	50 + Washington, DC
	Excise MFT with Inflation Index	N	12 + Washington, DC
	Excise MFT with Fuel Efficiency Index	N	1
	Sales Tax on Fuel	N	5
	Variable-Rate Tax Based on Fuel Price	N	12
Vehicle-related Fees	Basic Vehicle Registration Fees	Y	50 + Washington, DC
	Engine Type (EV/PHEV/Hybrid) Fee	Y	32
	Vehicle Value Tax	N	27
	Vehicle Weight Fee	N	14
	Vehicle Fuel Efficiency Fee	N	2
	Vehicle Age Fee	N	4
Direct Usage Fees	Light Vehicle MBUF	N	4
	Heavy Vehicle MBUF	N	5
Indirect Usage Fees	Tire Fee	Y	35
	Battery Fee	N	5
	EV/PHEV/Hybrid Battery Capacity Fee	N	0
	Electricity Charging Fee	N	6
Externality Taxes	Congestion Fee	N	0
	Carbon Tax	N	0
Other Taxes and Fees	Dedication of Auto Sales Tax	N	0
	Delivery Fee	N	1
	For-hire Transportation (TNC) Fee*	N	5 + Washington, DC
	Fee on Value of Trucking Costs	N	0
	Street Utility Fee	N	0
	Payroll Tax	N	0
	Land Use Impact Fee	N	0
	General Fund Transfer	Y	38

* Ohio assesses a state sales tax on TNCs, but this is not dedicated to transportation.

2.3 Quantitative and Qualitative Assessment

An initial assessment of the potential revenue mechanisms that included both quantitative and qualitative analyses was conducted.

2.3.1 Quantitative Assessment

First, a preliminary forecast of each ARM's revenue generating potential was prepared (Appendix E). Revenue potential measures the relative ability of a mechanism to generate sufficient revenue to fund Ohio's transportation needs at any given time. In contrast, financial sustainability measures the relative ability of a mechanism to keep pace with needs over long periods of time.

To assess each ARM's revenue potential, the project team developed a methodology to estimate the revenue anticipated from 2022 to 2040. For revenue sources already in place in Ohio (e.g., the fuel tax, vehicle registration fees, and the EV/PHEV/hybrid registration surcharges), current tax rates and fees were assumed to remain in place. For new mechanisms, a tax rate or fee level deemed reasonable was applied whenever possible and was based on existing practice or research from other states. The project team estimated the revenue generation potential over the period 2022 through 2040. The preliminary results were regularly updated during the project and some of the results have changed slightly as forecasting tools were refined.

After forecasting the revenue generation potential, the project team measured the financial sustainability of each revenue mechanism. To determine this, the team compared each ARM's expected revenue stream over time against projected statewide VMT, which represents roadway usage and serves as a proxy for long-term investment needs.

Revenue mechanisms that keep pace with or exceed this VMT growth are regarded as sustainable. In contrast, mechanisms that diverge from VMT, meaning they fall below, are regarded as unsustainable.

2.3.2 Qualitative Assessment

The project team assessed the qualitative performance of each mechanism relative to the guiding principles of stability, simplicity and ease of administration, efficiency, transparency, user equity, and social equity. Figure 5 summarizes the scoring of the 32 mechanisms against the six guiding principles.

A green score indicates that a mechanism has strong alignment with the guiding principle. For example, all fuel tax mechanisms are very easy to administer and enforce and therefore are well aligned with the simplicity principle.

In contrast, a red score indicates that a mechanism has poor alignment with a guiding principle. For example, a street utility fee is difficult to align with user equity given that it does not bear a direct relationship to road usage and does not fall on road users.

Finally, a yellow score indicates a mechanism has some alignment with the guiding principle. For example, the annual registration surcharge on electric and hybrid vehicles has some alignment with the social equity principle because EVs are typically newer.

Appendix F provides more details on the qualitative assessment and reasoning behind the scoring.

	Alternative Revenue Mechanism (ARM)	Revenue Stability	Efficiency	Simplicity & Ease of Admin	User Equity	Social Equity	Transparency
MOTOR FUEL TAXES	Flat Per-Gallon Excise MFT: *Gasoline*	L	H	H	M	L	L
	Flat Per-Gallon Excise MFT: *Diesel*	L	H	H	M	M	M
	Excise MFT with Inflation Index: *Gasoline*	L	H	H	M	L	L
	Excise MFT with Inflation Index: *Diesel*	H	H	H	M	M	M
	Excise MFT with Fuel Efficiency Index: *Gasoline*	L	H	H	M	L	L
	Excise MFT with Fuel Efficiency Index: *Diesel*	H	H	H	M	M	M
	Sales Tax on Fuel Price: *Gasoline*	L	M	H	M	L	M
	Sales Tax on Fuel Price: *Diesel*	H	M	H	M	M	M
	Variable-Rate Tax Based on Fuel Price: *Gasoline*	L	H	H	M	L	L
	Variable-Rate Tax Based on Fuel Price: *Diesel*	H	H	H	M	M	M
VEHICLE-RELATED FEES	Basic Vehicle Registration Fees	H	M	H	M	L	H
	Engine Type (EV/PHEV/Hybrid) Fee	H	M	H	M	M	H
	Vehicle Value Tax	H	M	M	M	H	M
	Vehicle Weight Fee	H	M	M	H	M	H
	Vehicle Fuel Efficiency Fee	H	M	M	M	M	M
	Vehicle Age Fee	H	M	M	M	H	H
DIRECT USAGE FEES	Light Vehicle MBUF	H	M	M	H	M	H
	Heavy Vehicle MBUF	H	M	M	H	M	H
INDIRECT USAGE FEES	Tire Fee	H	M	M	M	L	M
	Battery Fee	L	M	M	M	L	M
	EV/PHEV/Hybrid Battery Capacity Fee	H	M	M	M	M	M
	Electricity Charging Fee	H	L	L	L	M	M
EXTERNALITY TAXES	Congestion Fee	H	L	L	H	M	H
	Carbon Tax	L	M	M	L	M	M
OTHER	Dedication of Auto Sales Tax	H	H	M	M	H	M
	Delivery Fee	H	M	M	M	M	M
	For-hire Transportation (TNC) Fee	H	H	M	M	M	M
	Fee On The Value Of Trucking Costs	H	L	L	M	M	L
	Street Utility Fee	M	L	L	L	M	M
	Payroll Tax	H	M	L	L	L	L
	Land Use Impact Fee	H	L	L	L	M	L
	General Fund Transfer	L	H	M	L	L	L

H High Alignment with ARM M Moderate Alignment with ARM L Low Alignment with ARM

Figure 5: Scoring of Alternative Revenue Mechanisms (ARMs) against the Guiding Principles

2.3.3 Outreach

Incorporating public input in the decision-making process is critical as ODOT explores a more sustainable transportation funding strategy. In this study, public opinion research helped determine Ohioans' baseline opinions about transportation funding and the potential ARMs. This research aimed to do the following:

- Learn Ohioans knowledge and opinions about the current transportation funding structure.
- Gain insight into the public's attitude toward various ARMs.
- Test which messages around transportation funding are most effective.
- Understand how the public would like to receive information about any changes to transportation funding.

As shown in Figure 6, the public opinion efforts included three waves of research activities: focus groups with citizens across five regions (Appendix B), interviews with citizens and transportation industry business leaders, and a survey of more than 1,000 citizens (Appendix C).

Figure 6: Waves of Public Opinion Research Activities

Because asking participants about over 30 ARMs would likely overwhelm them, the three waves of research focused on understanding attitudes about familiar revenue mechanisms, like registration fees and the fuel tax, and less familiar ARMs, like establishing a mileage-based user fee (MBUF).

This research showed the general public and business leaders have distinct views and varied levels of awareness about transportation funding and the need for sustainable transportation revenue alternatives (Figure 7).

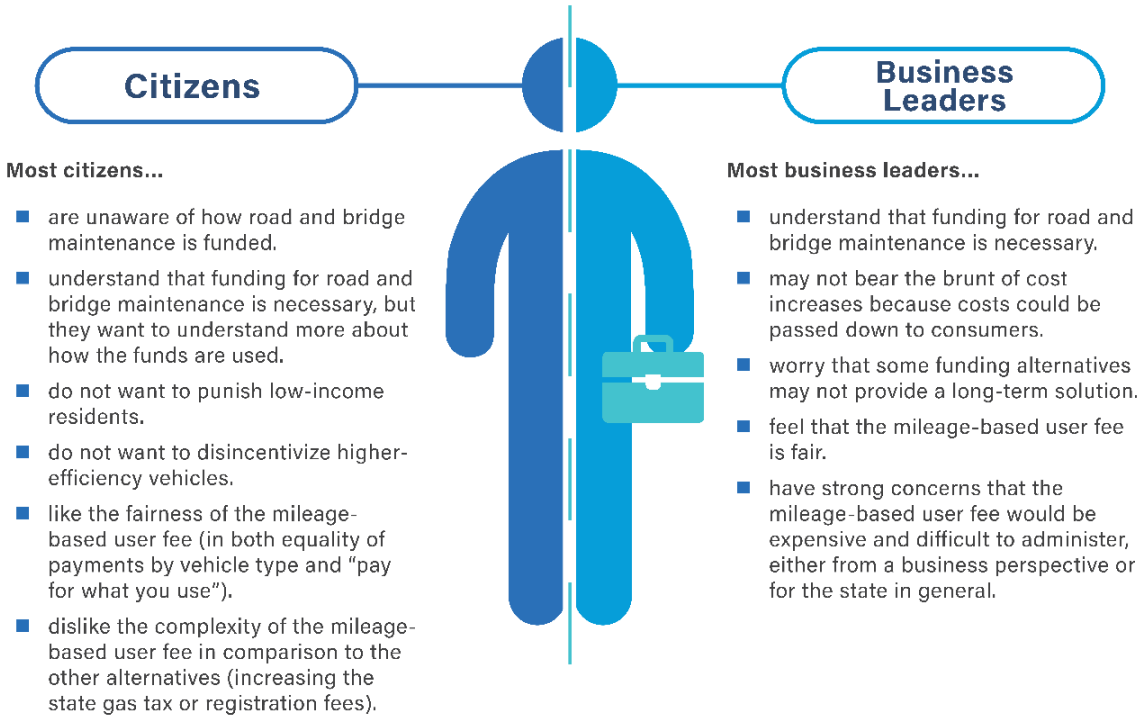

Figure 7: Citizens and Business Leaders' View on Road Funding

Additionally, the public opinion research emphasized the need for a nuanced approach to engaging with Ohioans about funding for state roads and bridges. Findings from this research include the following:

- **The public has a knowledge gap when it comes to transportation funding.** Most members of the public are not aware of how maintenance is funded, and therefore, may need more information about why alternative revenue mechanisms are needed.
- **Fairness is a primary concern of both individuals and business leaders in the transportation industry.** The public voiced concerns that certain funding mechanisms could negatively impact low-income residents, electric and high-efficiency vehicles, or rural drivers. Business leaders want to ensure their businesses are not paying more than their fair share.
- **Both the public and business leaders think a mileage-based user fee (MBUF) is fair—and both have concerns about it.** In general, the public had positive views of MBUF as a fair funding mechanism. Their concerns about MBUF lay mostly in its perceived complexity when compared to other alternatives, like increasing the state gas tax or registration fees. Business leaders also saw an MBUF as fair. Additionally, these business leaders expressed strong concerns that an MBUF would be more costly to administer for the state and businesses.

Using insights gained from these findings , the project team developed a public awareness campaign designed to engage Ohioans about the current funding landscape and alternative funding options. This campaign ran from January 1 through March 31, 2023, and focused on Ohioans aged 18 to 70. Additionally, legislative outreach was conducted during this timeframe. See Appendix D for more details on these efforts.

2.4 Prioritization of Revenue Mechanisms

After the initial quantitative and qualitative assessments, the list of potential ARMs was narrowed down for further investigation. A more focused list would allow Ohio decision-makers to more easily explore the most viable alternative revenue options for Ohio.

The prioritization process centered on evaluating whether the ARMs aligned with key guiding principles, as well as the level of experience jurisdictions throughout the country have with implementing similar revenue sources. Several revenue mechanisms were deprioritized because of poor alignment with key guiding principles or the lack of jurisdictional experience around the country. Other mechanisms, such as congestion charging, street utility fees, and land use impact fees, were deprioritized because they were more appropriate as revenue sources for local governments rather than the state.

Through the prioritization process, the following 10 ARMs were identified for further analysis:

1. Continued flat per-gallon excise MFT
2. Excise MFT with inflation index
3. Basic vehicle registration fee
4. Vehicle value tax
5. Engine type (EV/PHEV/hybrid) fee
6. Vehicle age fee
7. Delivery fee
8. For-hire transportation (TNC) fee
9. Dedication of auto sales taxes
10. MBUF

The following section describes the deeper analysis the project team performed on these 10 ARMs.

3 Prioritized Revenue Mechanisms

3.1 Focused Analysis of the Refined List

The analysis of the 10 prioritized ARMs focused on four core characteristics:

1. **Operations** focused on the ARM's design characteristics, steps for implementation, and agencies that may have a role in implementation.
2. **Revenue potential** used revenue forecasting to estimate each ARM's future revenue.
3. **Cost of collection** described the state's cost to collect revenue for the ARM.
4. **Legal considerations** outlined how state laws relate to each of the ARMs.

The following sections provide an overview of this analysis.

3.1.1 Operations

To analyze operations requirements for the ARMs, the project team focused its analysis on each ARM's design characteristics, steps for implementation, and agencies that may be involved with implementation. This operations analysis forms a foundational understanding for how each of the revenue mechanisms may move forward within the existing governmental structure.

It is important to note that the ARMs each have many aspects that could be customized to adapt to future policy decisions, creating multiple possible pathways for implementation. For the operations analysis described in the following sections, the project team focused on a single pathway to provide decision-makers with streamlined information to consider as they move concepts forward.

3.1.1.1 Design Characteristics

To understand the impact of design characteristics on operations, it is important to determine the state's level of effort for implementation. ARMs that use existing administrative processes would be easier to implement than mechanisms requiring new processes.

The 10 prioritized ARMs include existing mechanisms that Ohio already administers and new mechanisms that the state does not currently administer:

Existing Revenue Mechanisms

- Flat per-gallon excise MFT
- Basic vehicle registration fee
- Engine type (EV/PHEV/hybrid) fee
- For-hire transportation (TNC) fee (dedication needed)
- Dedication of auto sales tax (dedication needed)

New Revenue Mechanisms

- Excise MFT with inflation index
- Vehicle value tax
- Vehicle age fee
- Delivery fee
- MBUF

The discussion in this section focuses on new mechanisms for Ohio. Three of the new mechanisms closely resemble existing programs: excise fuel tax inflation indexing, vehicle registration fees using a vehicle value tax, and vehicle registration fees using a vehicle age fee.

Various states have implemented many different **excise MFT inflation indexing** configurations, which provide Ohio options if this mechanism is pursued. As seen in Figure 8, inflation and fuel prices are the most common indexing methods used in other states. In some states, indexing relies on more than one measure.

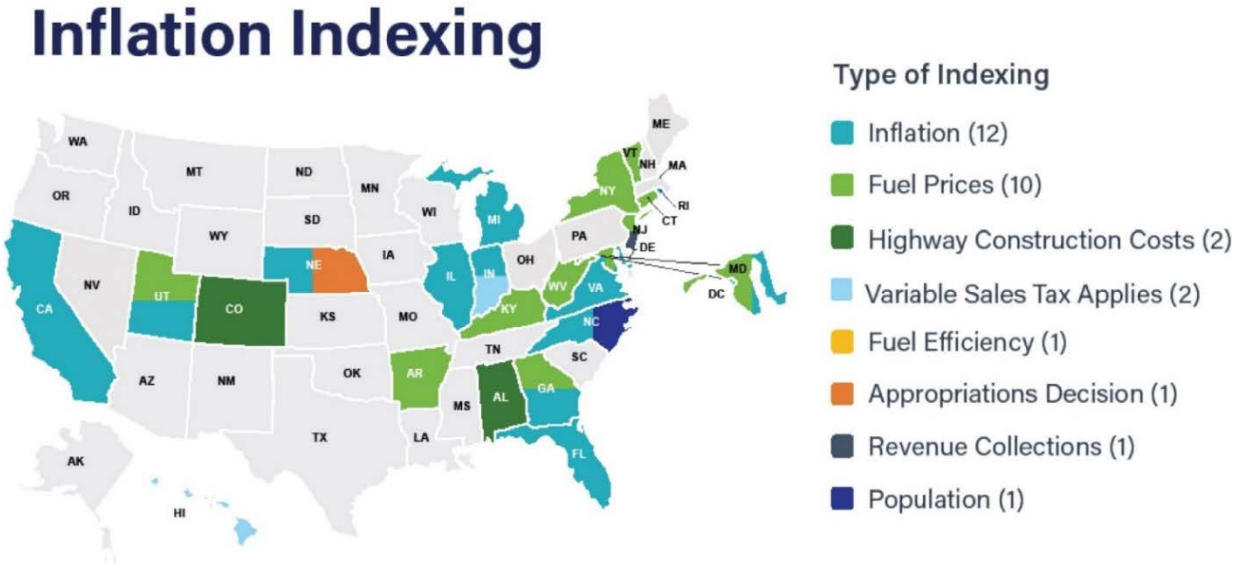

Figure 8: Excise Fuel Tax Inflation Indexing by State

Several states use vehicle registration fees that include either a vehicle value tax or a vehicle age fee, with newer vehicles often charged higher registration fees. If Ohio pursued similar registration fee models, many other states could serve as examples (Figure 9).

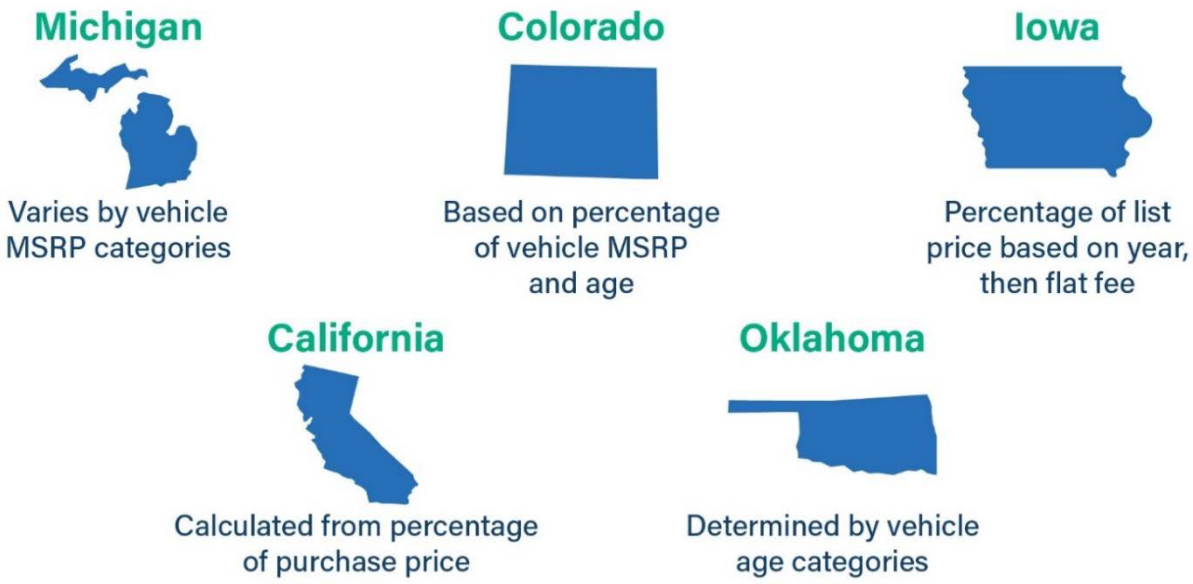

Figure 9: Examples of States Using Value- and Vehicle Age-Based Registration Rates

Two ARMs, a delivery fee on tangible goods and a light vehicle MBUF, represent completely new areas of exploration for Ohio.

A delivery fee on tangible goods is currently used in one state, Colorado, which assesses 27 cents on every delivered purchase. The Colorado fee is modeled after a sales tax and requires the fee to be itemized at the point of sale, with a requirement that the fee be listed separately on bills. Since the fee's implementation in July 2022, Colorado is considering changes that would allow companies to absorb the fee and provide small business exemptions. They learned from the rollout that it is important to provide businesses time to get up to speed, and it is necessary to provide education about the new fee for affected businesses.

Discussions with the Ohio Department of Taxation provided insights into the potential considerations of a delivery fee. The Department of Taxation noted that currently, Ohio charges a sales tax on shipping and handling and delivery fees. This sales tax could be perceived as a delivery fee; however, users of membership sites that offer free delivery options (such as Amazon Prime and Walmart+) would only pay sales tax on their annual membership, which is not necessarily tied to deliveries. The Department of Taxation noted that if the delivery fee were constructed as an excise tax, this might avoid some of the challenges with the Streamlined Sales and Use Tax Agreement (which Ohio has adopted, and Colorado has not). That would help minimize the burden of sales and use tax collection on states and retailers.

An MBUF—also called road usage charge, VMT tax, and distance-based fee—has been implemented in Oregon, Utah, and Virginia for light vehicles and in five states for heavy vehicles (Appendix G includes case studies of MBUF programs in the United States and New Zealand). Many more states have explored MBUF through research and pilots. After analyzing the existing MBUF programs and research across the country, the project team identified several points of consideration for decision-makers. These include eligible vehicle determination, rate setting, account manager(s), mileage reporting method, and payment (Figure 10).

Figure 10: Mileage-Based User Fee Program Design Policy Considerations

3.1.1.2 Implementation Steps

Identifying the key steps needed for implementation allows decision-makers to consider the strategies that will be necessary for bringing a new revenue mechanism into existence. To this end, the project team explored the potential implementation steps needed for each of the 10 prioritized ARMs. This section focuses on the general legislative steps government agencies would need to take before and after legislation is implemented, with greater detail provided in Appendix G.

The 10 ARMs differ in terms of the legislative complexity required for their implementation. Figure 11 ranks the relative implementation complexity for each mechanism on a scale of one to three barricades, with three barricades being the most complex. The ARMs with the greatest degree of complexity are new policies that would require additional research, rulemaking, and changes or additional legislative authority to implement; they may also represent significant changes in status quo. Less complex ARMs tend to either exist in some form already or draw from existing policies. ***While complexity is one factor in considering which mechanism to implement, there may be a tradeoff with the amount of revenue that may be collected***; for example, while MBUFs are indicated at three barricades to implement, the mechanism has the potential to bring in significant revenues—potentially making the additional effort worthwhile.

Alternative Revenue Mechanism	Implementation Complexity
Continued flat-per gallon excise MFT	
Excise MFT with inflation index	
Basic vehicle registration fee	
Vehicle value tax	
Engine type (EV/PHEV/hybrid) fee	
Vehicle age fee	
Delivery fee	
For-hire transportation (TNC) fee	
Dedication of auto sales taxes	
Mileage-based user fees	

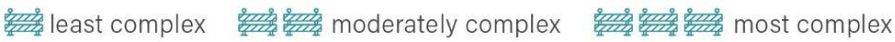

Figure 11: Alternative Revenue Mechanism Implementation Complexity

Before implementation, some pre-legislative work is required. Research may be needed to determine specific program structure or resource needs. This is especially important for new programs, such as delivery fees or MBUFs, that can vary greatly in how they can be brought to life. Pre-legislative work may also include additional outreach to stakeholders or working with legislators to draft policy. Nearly all mechanisms need some pre-legislative work as decision-makers define the rate structure to ensure funding level needs are met. After legislation is passed, the state must work to advance the revenue mechanism by issuing any administrative rules needed to implement the program, identifying the agencies responsible, implementing the program, and rolling out the program to the public.

3.1.1.3 Identification of Agencies

Identifying the lead implementing agency and supporting agencies is critical to the successful implementation of any revenue mechanism. There is significant variation in the number of agencies needed to implement different programs, which plays a part in the implementation complexity. Existing programs tend to have clearly defined roles, and as a result, typically include fewer agencies. On the other end of the spectrum, completely new programs would require Ohio to establish the responsible agencies.

Table 2 details the state agencies that could have a role in implementation. Some ARMs may require fewer agencies than listed in the table, as the level of coordination would depend on discussions held with the agencies, resource availability, and the language in the implementing legislation. Importantly, Table 2 includes a high-level view of all the agencies potentially involved before, during, and after legislation. Each distinct step could be completed by a different agency during implementation, with a clear hand off to the next agency as appropriate. Appendix G provides greater detail about the implementation steps and how they relate to Ohio agencies.

Table 2: Agencies Involved in Implementation of Each Alternative Revenue Mechanism

Alternative Revenue Mechanism	Department of Transportation	Department of Taxation	State Treasurer	Department of Public Safety	State Highway Patrol	Department of Administrative Services	Ohio Turnpike and Infrastructure Commission
Continued flat per-gallon excise MFT	X	X	X				
Excise MFT with inflation index	X	X	X				
Basic vehicle registration fee	X		X	X			
Vehicle value tax	X		X	X		X	
Engine type (EV/PHEV/ hybrid) fee	X		X	X			
Vehicle age fee	X		X	X		X	
Delivery fee	X	X					
For-hire transportation (TNC) fee	X	X					
Dedication of auto sales taxes	X	X					
MBUFs	X	X	X	X	X	X	X

3.1.2 Revenue Potential

Financial performance is a critical element of the revenue mechanism evaluation. Building on the preliminary quantitative assessment described in Section 2.3.1, the project team prepared refined estimates of revenue potential for the refined list of ARMs. Using a revenue forecasting model based primarily on data from Ohio, each mechanism was evaluated for its revenue potential in the short term (2025) and in the long term (2040).

The project team defined assumptions to determine reasonable tax or fee rates. For example, two types of fuel tax increases were evaluated: a step increase of five cents every three years and an inflation indexing mechanism assuming 2.5% per year. For registration fees, a $50 increase on light vehicles and $250 increase on heavy vehicles were assumed. Those study rates were based on experience from other states and were intended to provide a starting point for discussion only.

The project team developed projected revenue values in real dollars which represent the true revenue generated after adjusting for inflation.

To review these revenue alternatives, as shown in Figure 12 the State MFT will generate $877 million less revenue in 2040 due to improved vehicle fuel efficiency and the adoption of hybrid and electric vehicles. As discussed below, the alternatives analyzed in Figure 12 could be implemented individually or in various combinations to make up this shortfall.

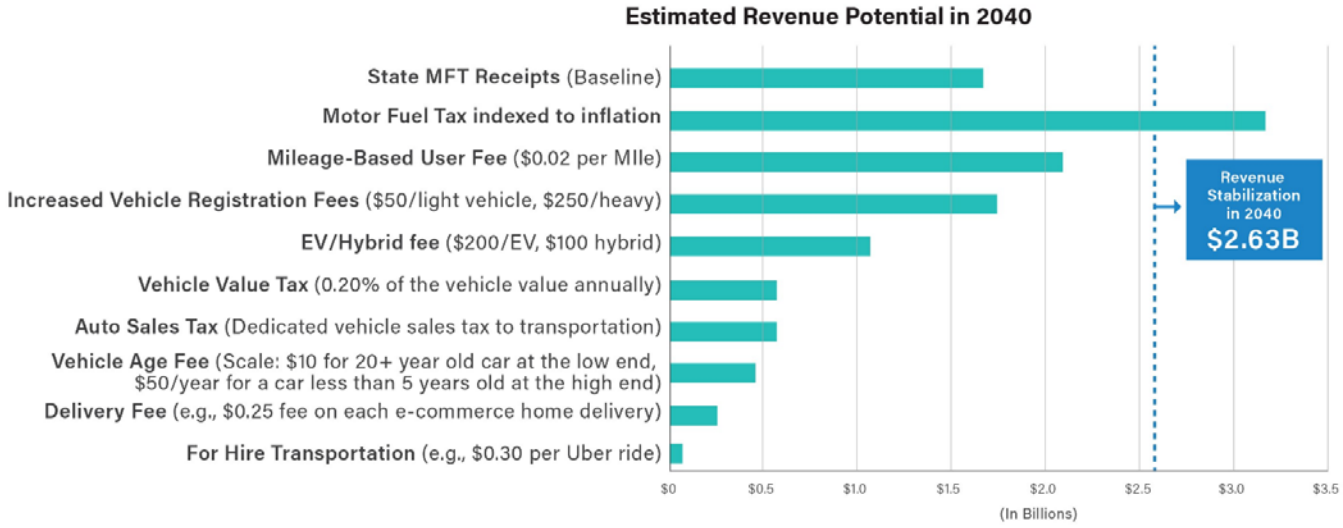

Figure 12: Estimated Revenue Potential in 2040

High Fee Generation Alternatives

The following four revenue alternatives could generate adequate revenue to make up the $877 million revenue shortfall, though some require slightly higher rates than assumed in Figure 12 or if applied in combination with the existing state MFT:

- Indexing the state MFT to inflation, starting today (at an annual inflation adjustment of 2.5%), would generate more than $3.1 billion in 2040. This alternative would eclipse the forecasted shortfall in MFT revenue. While indexing appears to be a viable revenue alternative, there are currently no discussions in the Ohio General Assembly to enact such a measure.
- A Mileage-Based User Fee of $0.02 per mile would generate more than $2 billion, which would generate more than the existing state MFT, but a higher per-mile rate would be needed to generate adequate revenue.
- Increasing vehicle registration fees ($50 on cars, $250 on trucks) would generate more than $1.7 billion, which would generate adequate revenue if implemented in combination with the existing state MFT.
- Ohio's existing EV/PHEV fees are forecast to generate more than $1 billion in 2040, which would generate adequate revenue if implemented in combination with the existing state MFT.

Other Fee Generation Alternatives

Of the five remaining revenue alternatives, none are independently capable of making up the $877 million MFT revenue shortfall in 2040. Policymakers would either have to combine one or more of these alternatives, or modify them (e.g., by increasing tax rate or fee) to generate sufficient revenue.

3.1.3 Cost of Collection

The project team conducted a systematic review of publicly available sources to provide a cost of collection and administration baseline for each of the 10 prioritized ARMs. For each ARM, cost benchmarks are provided as a percent of gross revenue collected.

MOTOR FUEL TAX

Among the states that share the same point of taxation as Ohio (i.e., at the distributor level), the average MFT administrative cost is 0.44% of net revenues available for distribution. In Ohio, the cost of collection over the last three years was about 0.17% of MFT revenues.

TNC FEE

The cost to collect and administer a TNC fee is generally low. For example, the South Carolina Office of Regulatory Staff retains 1% of gross revenues reported by TNCs at the end of the year to cover the expenses. In Colorado, the state retains 0.25% of revenue.

VEHICLE REGISTRATION FEES

Data from the Ohio Office of Budget and Management indicate that operating expenses for all BMV services accounts for, on average, 16% of revenues collected by the agency. The Ohio BMV does not separate the administrative cost to collect vehicle registration fees from other BMV functions.

DEDICATION OF AUTO SALES TAX

The administration cost of collecting sales and use tax in Ohio is low, estimated at less than 1% of revenue collected. Similarly, the local sales tax administration cost is on average 0.9% of local sales and use tax revenues,

DELIVERY FEE

Delivery fees on tangible goods is a new concept in the United States, having been introduced in Colorado in 2021. Expenditures to administer the new fees are estimated at approximately $250,000 per year, close to 0.15% of revenues.

MBUF

There are three MBUF programs in the U.S.: Oregon's OReGO Program, established in July 2015; Utah's Road Usage Charge Program, established in January 2020; and Virginia's Mileage Choice Program, established in July 2022. Since enrollment in these programs is less than 5,000 vehicles, there is not good data on administrative costs. While there is little existing information on MBUF administrative costs in the United States, a Washington State study estimated that such costs would range from 16% to 4% of revenue, depending on the scale of deployment. New Zealand provides a real-world example of an MBUF that has existed more than 40 years; there, MBUF administrative costs are estimated to be 1% of revenue.

3.1.4 Legal Considerations

To assess the viability of any mechanism, any legal constraints that the policy may encounter are important to consider. For this reason, the project team conducted a review of the legal issues associated with each ARM to help inform future policy decisions. While some ARMs may involve differing levels of complexity to administer and have various constraints, none of the ARMs offer significant statutory or constitutional hurdles to implement.

MOTOR FUEL TAX

The current tax on gasoline in Ohio is 38.5 cents per gallon, while the tax on diesel is 47 cents per gallon. Adjusting the fuel tax, either through an increase in the base rate or through indexing, involves a straightforward statutory change.

TNC FEE

Ohio law requires TNCs to register and pay for a permit. All TNC rides are also subject to 5.75% Ohio sales tax. An increase in either of these fees to generate additional revenue would not be complex.

VEHICLE REGISTRATION FEES

In Ohio, vehicle registration for light-duty vehicles is $31. Registration is an additional $100 for hybrid vehicles and an additional $200 for EVs and PHEVs. Increasing these fees involves relatively low complexity because it involves a straightforward statutory adjustment.

DEDICATION OF AUTO SALES TAX

ODOT funds transportation projects with a small portion of the sales tax, approximately $78 million. This number represents 1.45% of the total transportation budget. Directing more sales tax or other general fund dollars is at the discretion of the Ohio General Assembly.

DELIVERY FEE

There is not currently a delivery fee on tangible goods in Ohio. Implementing such a fee may involve modest administrative complexity.

MBUF

Though Ohio does not currently have an MBUF, an MBUF would likely be used as an eventual replacement to the MFT. Implementation of an MBUF would require new legislation and the level of complexity would be dependent on how the policy is structured.

4 Conclusion

The Ohio Revenue Alternatives Study set out to better understand the benefits and challenges of more than 30 ARMs for the future of transportation revenue in Ohio. This study and its findings provide important data for decision-makers as they seek long-term revenue solutions to fund Ohio's transportation system.

The key issue for transportation policymakers is the reduction in MFT revenue due to the adoption of EVs and more fuel-efficient vehicles. The study forecasts that the state MFT will generate $877 million less in 2040 than it would with no change in fuel efficiency or EV adoption.

While the forecasted reduction in state MFT revenue is concerning for Ohio's transportation stakeholders, the study finds several revenue alternatives that can make up for any future shortfall. Foremost among those alternatives is the existing electric and hybrid vehicle registration fees, which are forecast to generate just over $1 billion in 2040, addressing any shortfall in MFT revenue.

As with any study, the revenue forecast in this report provides the best estimate based on current information. Changes in EV/PHEV adoption, fuel efficiency, VMT, or a host of other factors could change the forecast and require policy responses. Fortunately, changes in vehicle technology are generally slow enough to avoid sharp revenue declines, thus allowing state policymakers to respond appropriately. This study provides those policymakers with information on several ARMs, implemented in other states, that can be reexamined to address revenue declines in the future.

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