Financial Plan – Future Funding & Finance

Note: All information based on data available as of April 2021

Current and future funding for transportation infrastructure must help ensure that revenues can continue to address West Virginia's growing and changing transportation needs. Through considering different internal and external trends and the potential of alternative revenue sources, we can determine how these factors will affect funding and impact how WVDOT keeps the transportation system safe and reliable.

1. Introduction

Purpose

This ***Financial Plan*** summarizes future baseline state highway revenue trends and a suite of alternative outcomes and sources to evaluate revenue risks and options to offset risks and help meet future needs. Parallel 2050 LRTP resources to this Plan include the ***Funding & Finance Fact Sheet*** and the ***Needs Assessment.*** These documents present detail on current revenue sources and existing and forecasted multimodal transportation needs to provide a foundation to estimate future revenues. The Plan adjusts revenues alongside operating expenses inside the West Virginia Division of Highways (WVDOH) as the primary operator and maintainer of the majority of roadways and bridges for the West Virginia Department of Transportation (WVDOT).[1]

These planning-level revenue estimates, combined with the conclusions presented in the 2050 LRTP ***Gap Assessment*** can help guide revenue policy and investment priorities. Stakeholders and decision makers from WVDOH and partner agencies help guide analyses, validate inputs, and shape priorities to ensure immediate relevance, applicability, and adaptability for WVDOT and WVDOH leadership and as valuable information for transportation planning partners.

Process

The process of building an accurate, relevant, and applicable revenue forecast starts with examining all available financial and operational documents including WVDOH audited financial statements, consolidated annual financial reports (CAFR), and official statements, as well as rating agency reports from WVDOH bond issuances to fully comprehend in-house financial operations. Studying financial documents from affiliated agencies and departments, including materials on the WV Turnpike from the West Virginia Parkways Authority, provides a full financial picture for additional operational context behind non-WVDOH transportation revenues and funding sources (see ***Funding & Finance Fact Sheet***).

Input from each WVDOT division and other state departments like the West Virginia Department of Revenue further explain context behind the numbers and validation forecast methodologies as well as escalation methods through 2030 and 2050 (**Figure 1**).

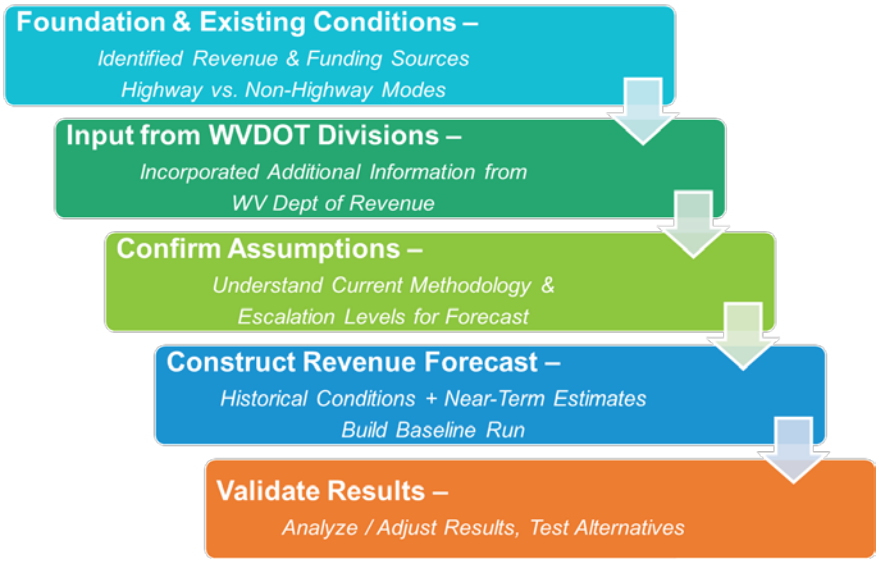


Figure 1 – Revenue Forecast Process

[1] The West Virginia Parkways Authority owns and operates the 87-mile WV Turnpike using toll revenues collected from motorists.

Research, methodology development, and assumptions behind how future revenues were estimated is discussed in **Section 2: Forecasting Future Revenues**. Building a full baseline forecast and subsequent population growth tests are explained in **Section 3: Baseline Revenue Forecast**. The 2050 LRTP project team also explored alternative revenue outcomes (scenarios) and the risks created for existing sources (see **Section 4: Alternative Revenue Scenarios**). With the alternative revenue outcomes and risks in mind, revenue potential from a suite of existing and new revenue sources was analyzed (see **Section 5: Alternative Revenue Sources**). Strategies for using results, findings, and framework are described in **Section 6: Implementation, Recommendations, and Moving Forward** to guide future policy decisions and upcoming cycles of STIP development.

Existing Revenues

Explained in detail on the ***Funding & Finance Fact Sheet***, WVDOH's roadway funding comes from a combination of motor fuel taxes as well as revenues from fees used to operate, maintain, and improve the State's extensive public roadway system (**Figure 2**). WVDOT receives **Federal funds**[2] as reimbursements towards Federal GARVEE bond debt service and Federal-aid eligible roadways and bridges statewide. However, most of WVDOH's work is funded from the **State Road Fund** which receives revenues from **motor fuel taxes (MFT)**[3] on fuel purchases, consumer sales taxes from vehicle sales and service taxes from vehicle leases (**privilege taxes**[4]), as well as **vehicle registration and license fees**[5] paid when vehicles are registered.[6]

Limitations

WVDOH has limited "revenue-raising" abilities and must seek legislative approval for current as well as additional revenues like tax and fee rates.[7] Furthermore, while WVDOH can raise some revenues from issuing bonds like General Obligation Bonds as part of the Governor's Roads to Prosperity Program, GO Bonds must be approved by public referendum and bonds can only be issued if sufficient State Road Funds exist to repay bondholders.[8]

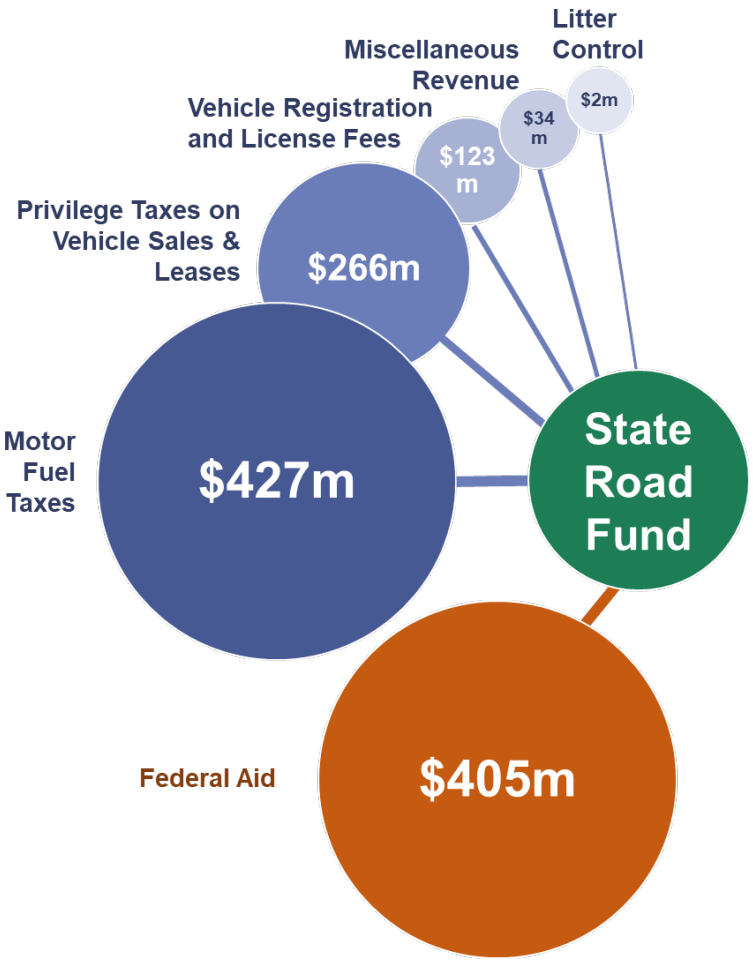


Figure 2 – WVDOH Annual Revenue FY2020
$1.257 billion (audited)

[2] Supports Federal-aid eligible highway investments and FHWA GARVEE bond debt service.
[3] (See **Figure 3**) Flat rate ($0.205 per gallon) and Variable rate ($0.152 per gallon based on 5% of motor fuel average wholesale price). Page 13: "The West Virginia Tax Commissioner calculates the average wholesale price and variable tax rate from sales data from the previous July through October, and the calculated tax rate goes into effect for the next calendar year. The average wholesale price may not deviate by more than 10% from the average wholesale price of motor fuel as determined by the Tax Commissioner for the previous calendar year." State of West Virginia 2019 $600M General Obligation State Road Bonds Final Official Statement (OS).
[4] Applied at time of sale/lease of vehicles purchases in or out of state but registered in state; charged on vehicle net sale price (6% on purchased vehicles, 5% on leased vehicles). West Virginia Legislature. West Virginia Code. Chapter 17a. Motor Vehicle Administration, Registration, Title of Certificate, and Antitheft Provisions. http://www.wvlegislature.gov/wvcode/ChapterEntire.cfm?chap=17A&art=3&section=4
[5] Annual fee: $51.50 registration, $200 EV fee, $100 plug-in-hybrid.
[6] Miscellaneous and Litter Control revenues come from map and permit sales, tonnage fees, interest earned on investments, and litter control fee ($1 of each vehicle registration fee). Page 6 and 8. West Virginia Commissioner of Highways 2018 $78M Special Obligation Notes Official Statement (OS).
[7] Except for issuing General Obligation (GO) bonds which must be approved by public referendum and are backed by the faith and credit of the State of West Virginia. If the State Road Fund balance is insufficient to pay bond debt service, the WV General Fund must make debt service payments.
[8] WVDOH expects to issue $200 million in General Obligation Bonds as part of the Roads to Prosperity Program in June 2021, but future bond issuances are limited after June 2021 given current revenue forecasts. West Virginia Department of Transportation Roads to Prosperity Program: https://transportation.wv.gov/driveforwardwv/projects/pages/default.aspx.

Given these limitations, there is no "quick-fix" to the core state revenue sources that does not require legislative action and/or successful public referendum. WVDOT can work with stakeholders and leadership to highlight the need and rationale and build the case with elected officials to support new revenue initiatives. WVDOT can raise additional funds from selling more bonds, however that is only possible once additional revenue raising mechanisms are in place.

The WV Parkways Authority can issue bonds backed by current toll rates if additional capital funds are needed for improvements and/or toll revenues are sufficient to allow for additional revenue sharing to WVDOH through the Roads to Prosperity Program.[9] The WV Parkways Authority can also raise toll rates if Traffic and Revenue (T+R) Forecasts anticipate minimal traffic losses, and would commission a new toll revenue study to evaluate traffic projections to inform this decision.[10] Despite reduced toll traffic from the COVID-19 pandemic, the WV Parkways Authority has been able to maintain ample debt service coverage ratios alongside continuing to share revenues with WVDOH and expects to issue an additional $333 million of Toll Road Revenue Bonds in 2021.

Macroeconomic Context

The strength of West Virginia's economy, including total population and total jobs, is the strongest driver of revenues. WVDOH's largest revenue sources are directly tied to individual fuel and vehicle purchases along with drivers' licenses. While fuel prices have shown to have marginal effect on travel levels and related purchases, employment levels and overall economic activity strongly influence overall travel, thereby influencing fuel and vehicle purchases and ultimately transportation revenues. Since State revenue sources are not tied to individual travel patterns, revenues increase and decrease alongside these purchase levels instead of with roadway travel. As a result, revenues have not kept pace with road preservation, maintenance, and operation costs (which have also been impacted by increasing costs of materials) and needs of an aging transportation system. Furthermore, as vehicle fleets continue to shift to hybrid and electric propulsion technologies, taxation on fuel consumption continues to decline relative to total travel activity.

Growing sectors of chemical and pharmaceutical manufacturing with strong outdoor tourism and hospitality industries are shaping travel patterns and overall demand. Freight and logistics shifts coupled with technological advancements like broadband and mobility-as-a-service (MAAS) have changed statewide movement and affected how transportation is used. Large US employer expansions in West Virginia like Clorox and Facebook will strongly impact future population, employment, and economic activity as well as spur continued investment in technology, training, and education to increase overall state output and further dictate transportation use.

Constraints

The 2050 LRTP Financial Plan acknowledges the potential for two distinct policy changes: 1) adjusting revenue sources to increase consistent with inflation, and 2) revising revenue sources to address changes in travel behavior. **The Financial Plan provides information as well as analytical results but does not make policy recommendations.** Stakeholders recognize that travel behavior has and continues to change, but revising a legislative framework spelling out new policies and processes takes time and sometimes multiple administrations to ensure widespread public input and approval. Second, while a useful tool, forecasting is inherently based on assumptions behind growth rates and external factors to produce estimated results that are intended to inform, not make, decisions. Third, societal changes in travel behavior, population, and employment coupled with macroeconomic industrial shifts alongside local legal, regulatory, and political barriers collectively complicate collecting, let alone raising, revenues.

[9] While WVDOH does not operate the Turnpike, WVDOH maintains a partnership with the WV Parkways Authority for certain roadway and bridge capital improvement projects which allows certain funds to be interchangeable between both agencies through the Roads to Prosperity Program. Proceeds from the state's 2018 General Obligation (GO) Bonds are financing the I-77/I-64 Turnpike widening project included within the Roads to Prosperity program, while proceeds from the 2018 Turnpike Bonds have been deposited into the State Road Fund.

[10] WV Turnpike toll rates were increased on June 30, 2019 and will be increased again on January 1, 2022 (5% for EZPass users and 1.6% for cash users). EZPass toll rates are effective for the following three years while cash toll rates will increase an additional 1.6% in the second and 1.6% in the third year, for a total approx. 5% increase. Page 79. West Virginia Parkways Authority 2019 Comprehensive Annual Financial Report (CAFR) and Page 5. West Virginia Parkways Authority 2018 $166M Senior Lien Turnpike Toll Revenue Bonds.

2. Forecasting Future Revenues

Purpose & Adaptability

A *Highway Revenue Forecasting Model* was developed in conjunction with future transportation needs estimates to assist in distributing funds among categories of need. The revenue model includes a **Constrained Revenue Forecast to illustrate capital improvement funds available for highway investments** and can be adjusted to reflect changes in funding sources, economic growth levels, and individual drivers such as vehicle technology, vehicle miles traveled (VMT) per capita, and commercial vehicle travel (**Figure 3**).

Constrained Revenues = Annual **Revenues** – **Basic Operating Expenses** **(Road Maintenance, Administration, Debt Service)**

Constrained Revenue estimate excludes DMV, Claims, Courtesy Patrol, and Admin Hearings

Figure 3 – Constrained Revenue Forecast

Building the revenue model required identifying where funds (revenues) come from, how funds are being spent (expenses), and factors causing annual increases or decreases. Analyzing five years of historical audited financial results creates a starting point for forecasting future estimates under various economic scenarios out to 2050. The results of the forecasts can help plan upcoming capital improvement programs as well as support long-range financial planning in line with the 2050 LRTP goals and objectives.

Controls & Validation

The revenue model forecasts revenues directly received by WVDOH and excludes other revenues like tolls from the WV Parkways Authority. WVDOH and the West Virginia Department of Revenue (WV Dept. of Revenue) provided vital historical data on gallons of fuel consumed and taxed by fuel type, numbers of licenses and vehicle titles and registrations, as well as historic and current tax and fee rates (**Figure 4**) to assist with analyses and overall forecasting. WVDOH and the WV Dept. of Revenue also confirmed in-use and upcoming tax and fee escalation methods and frequencies to ensure the revenue model took upcoming policy changes into account as well as used growth assumptions in line with historical precedents.

Motor Fuel Taxes = **Motor Excise Tax*** ***($0.357/gallon)*** + **Motor Carrier Tax**** ***($0.205/gallon)***

Motor Excise Tax = $0.205/gal (flat) gasoline, kerosene, & diesel + $0.152/gal (variable)
Motor Carrier Tax = $0.205/gal for gasoline, kerosene, & diesel

*Motor Excise Tax: Flat Tax + Variable Tax, charged on all fuel purchases in-state for all motor vehicles (see **Footnote 3**)
**Motor Carrier Tax: Charged on all fuel purchases in WV powering 2+ axle vehicles weighing over 26,000 lbs. & 3+ axle vehicles of any weight

Figure 4 – Motor Fuel Tax Formula

Methodology

Validating and aligning forecasted revenue streams from historical revenues and near-term insights assist in developing a revenue model able to withstand subsequent analyses testing alternative scenarios across outcomes and sources. Preliminary statistical inquiries looking at gallons consumed, VMT, fuel prices, population, employment and household income levels, and overall economic output illustrate that population change is the best baseline predictor of future revenues from current revenue sources. This is consistent with expectations as the majority of WVDOH's current revenues come from taxes and fees associated with vehicle ownership and travel (which are tied to population).

Uncertainty

Many factors impact current and future revenues like new technology including electric vehicles, economic fluctuations, public health, construction cost inflation, and energy costs, as well as system shocks caused by weather and/or system deterioration. The 2050 LRTP focuses on detailing risks to existing revenue sources and programs to provide options for mitigating these risks and guidance for future revenue source direction.

3. Baseline Revenue Forecast

Foundational Framework

Statistical analysis provides a starting point to understand how key macroeconomic factors (population, fuel price, VMT, and gallons consumed/purchased) influence WVDOH's primary revenue sources (State taxes and fees). Further study and detailed input from WVDOH on the relationships between historical expenses and revenues explain why past financial fluctuations occur. Assessing existing revenues and individual drivers helped arrive at specific growth factors within escalation assumptions to test revenues against basic operating expenses (Administrative, Debt Service, and Maintenance costs) and give a foundational **Baseline Revenue Forecast**.

The Baseline Revenue Forecast uses statewide population change estimates (approximately 1.6 million by 2050) to estimate future available revenues from existing tax and fee sources escalating at roughly 2 percent annual, other revenues in line with consumer price index changes (CPI), and subtracting basic expenses grown higher than CPI (4 percent) given near-term increases in materials and labor costs.[11] All future values are also discounted 2 percent annually to bring revenues and expenses to 2020 dollars in line with the ***Needs Assessment.*** This forecasting approach shows that available funding for capital highway investments (green) slowly declines relative to total revenues (purple) against increases in basic operating expenses (orange) (see **Figure 5**).

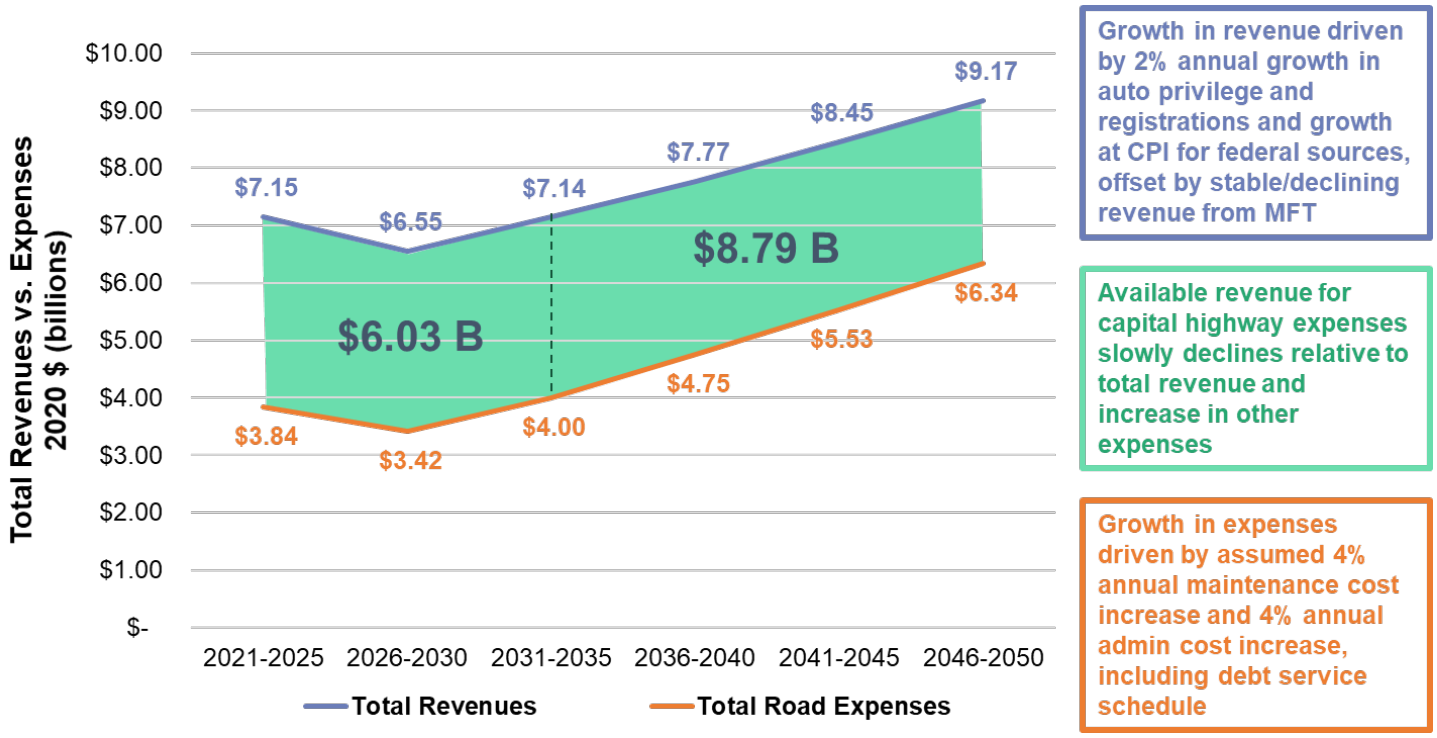


Figure 5 – Baseline Revenue Forecast Results

Testing Population Growth

The ***Demographics White Paper*** explores West Virginia's population decline over the past decade. Comparing the population trend to revenue trends helps confirm the relationship between population change and State revenue sources. Upon linking population to tax and fee revenues, five future population levels are tested in addition to current baseline population estimates to assess the effect on future revenues from existing revenue sources against basic operating expenses under moderate growth assumptions (**Figure 6** and **Figure 7**).

[11] Basic operating expenses are fixed debt service payments, variable administrative costs, and variable road maintenance costs. Debt service payments are defined in bond issuance documents and are known through 2050 including a planned $200 million issuance of General Obligation Bonds in June 2021.

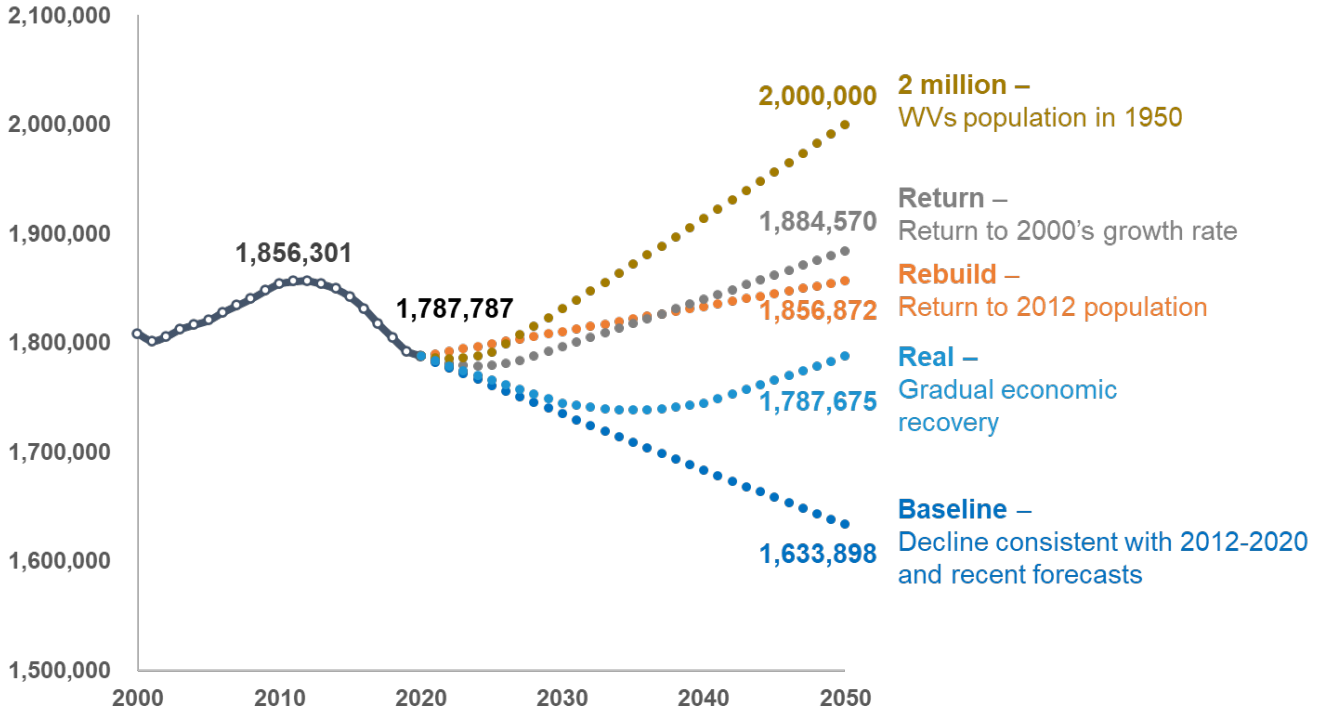


Figure 6 – Potential Statewide Future Population

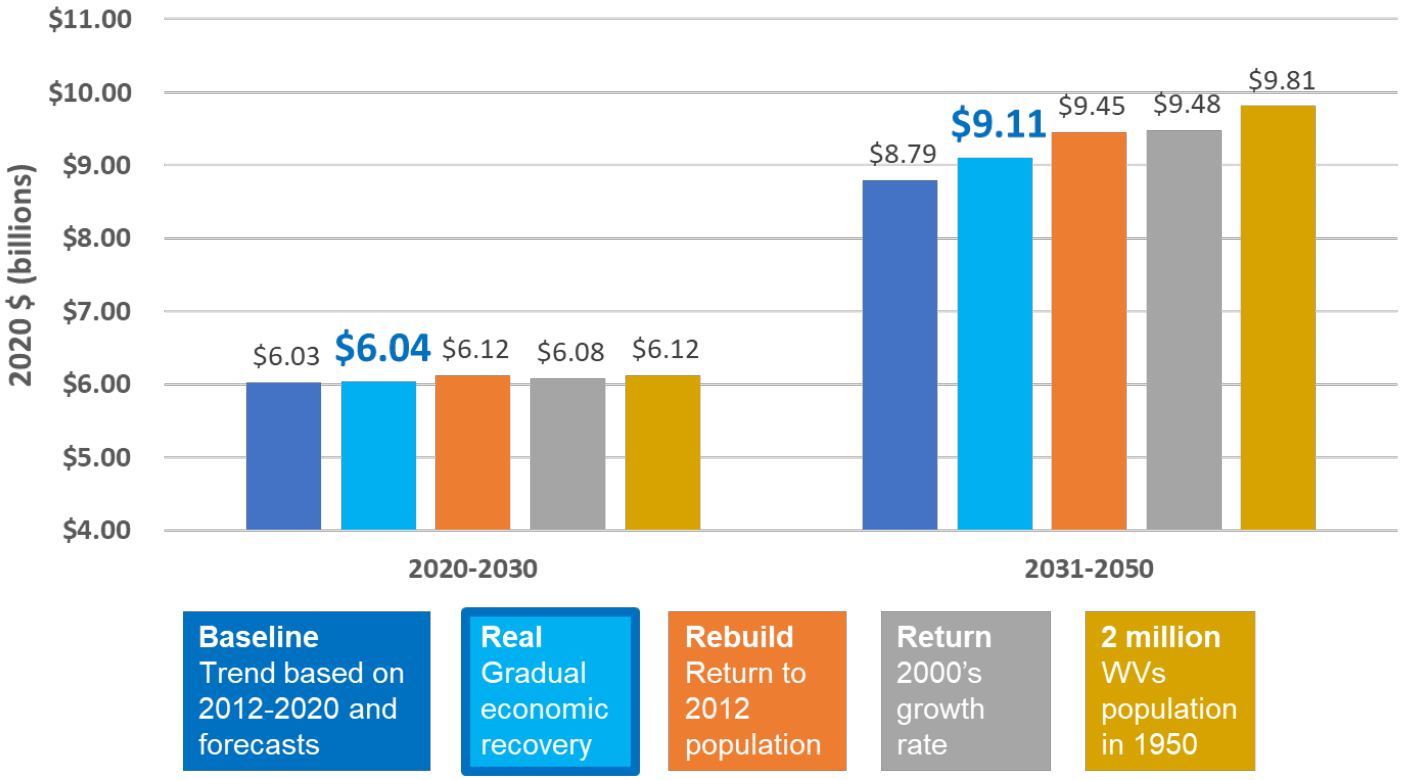


Figure 7 – Estimated Revenues from Future Population Scenarios

Analyzing Results

Estimated revenues from different future populations (**Figure 7**) are anticipated to affect long-term future revenues (2031 through 2050) more than near-term revenues (2020-2030). Feedback from WVDOH and key stakeholders validates the analytical approach and confirms that using the "Real" Population growth scenario, following a gradual economic recovery with roughly 1.78M people and roughly $330M more transportation revenues by 2050, is the best foundation base-level forecast for the future macroeconomic and micro-systematic tests.[12]

Figure 8 details how the components of the Finance Plan work together to communicate a complete picture of revenue considerations through 2050. The **Alternative Revenue Scenarios** (**Section 4**) evaluates potential macroeconomic outcomes following shifts in fleet type, travel, freight, and crisis, while **Alternative Revenue Sources** (**Section 5**) study individual potential revenue sources to see how different options could affect bottom line future available revenues. The scenarios and sources aim to match changes in travel, living, and lifestyle adjustments following how individuals move, use, and rely on transportation systems to provide guidance on adjusting current revenue sources in line with future transportation needs. Collectively the findings of this analysis inform the 2050 LRTP Finance Plan conclusions and are summarized in more detail relative to needs in the ***Gap Assessment***.

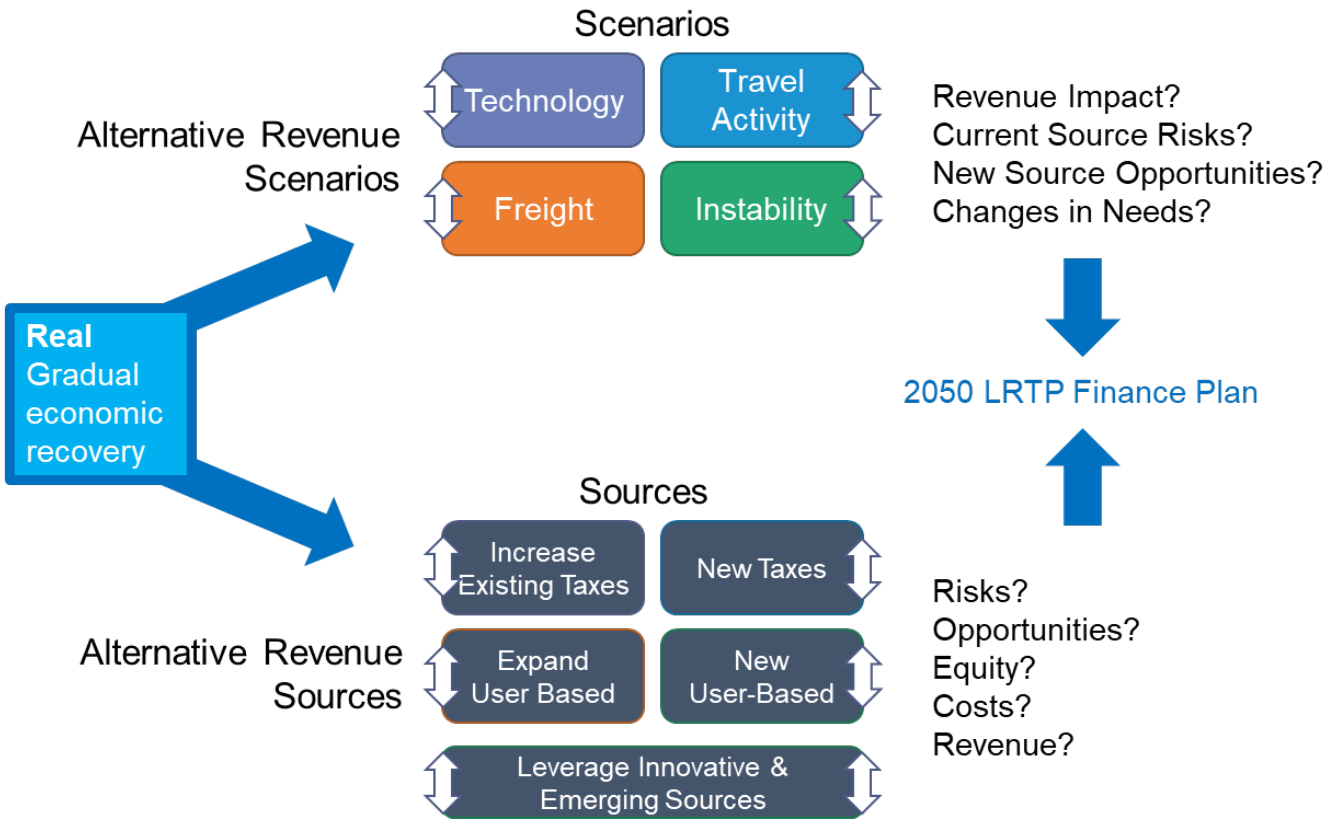


Figure 8 – Complete Revenue Picture Within the Finance Plan

[12] "Real" Population Growth assumes people continue future travel at same 2020 and pre-2020 rates and gradually move into a more efficient fleet following current Federal fuel economy standards known through 2025.

4. Alternative Revenue Scenarios

Objective

Using the "Real" Population growth as the new foundation base level forecast to estimate revenues, four Alternative Revenue Scenarios are developed based on future uncertain outcomes that could impact current WVDOH funding sources. Specific sensitivity tests are applied to each scenario with up to three intensity levels (conservative, medium, and aggressive outcomes) to show possible revenue outcomes in estimated ranges for each scenario and across all four scenarios (**Figure 9**).[13] All four scenarios and associated sensitivity tests are then "ramped-up" to give the near-term impact through 2030 and longer-term impact from 2031 to 2050 on future revenues relative to "Real" Population estimates and base source assumptions.[14]

Results

Results are summarized by time-period, total cumulative revenue impact, and percent change from the constrained baseline revenue forecast (based on the "Real" population growth scenario). These results provide a planning-level assessment of revenue impacts relative to the baseline. There are significant uncertainties across all four scenarios as well as the assumptions underlying the analysis. The results provide insight into the significance of the risk that these scenarios pose to West Virginia's motor fuel tax receipts, based on current rates, through 2030 and 2050. The motor fuel tax represents roughly 1/3rd of total revenue for WVDOH (including Federal sources) and half of total revenue for WVDOH from state sources.

	WVDOH Baseline Revenue Impact (Millions)			% Change from Baseline MFT		
	2021 - 2030	2031 - 2050	Total	2021 - 2030	2031 - 2050	Total
Scenario 1 – Technology	**Increasing Vehicle Fuel Efficiency and Electric Vehicle Market Share**					
Conservative	$(480)	$(2,548)	$(3,028)	-11%	-31%	-24%
Medium	$(526)	$(3,250)	$(3,776)	-12%	-39%	-30%
Aggressive	$(835)	$(4,290)	$(5,125)	-20%	-52%	-41%
Scenario 2 – Travel Activity	**Decreases in Average Passenger Vehicle Travel**					
Medium Option A*	$(28)	$(180)	$(208)	-1%	-2%	-2%
Aggressive Option A*	$(69)	$(464)	$(533)	-2%	-6%	-4%
Medium Option B**	$(7)	$(65)	$(72)	0%	-1%	-1%
Aggressive Option B**	$(21)	$(142)	$(162)	0%	-2%	-1%
Scenario 3 – Freight	**Increases or Decreases in Commercial Vehicle Activity**					
High Growth	$34	$323	$358	1%	4%	3%
Low Growth	$(34)	$(323)	$(358)	-1%	-4%	-3%
Scenario 4 – Instability	**External Forces Impacting Revenue and Costs**					
Medium	$(255)	$(931)	$(1,186)	-6%	-11%	-9%
Aggressive	$(575)	$(2,293)	$(2,868)	-14%	-28%	-23%

***** Option A only includes the potential VMT impact resulting from extensive telework and widespread mobility as a service providers.

****** Option B includes all assumptions in Option A, plus the impact of widespread deployment and availability of connected and autonomous vehicles (CAV). Initial research indicates that widespread CAV deployment could act to increase mobility and VMT through more efficient highway systems and more on-demand access to vehicles.

Figure 9 – Summary Results of Alternative Revenue Outcomes

[13] "MaaS" stands for Mobility-as-a-Service for sharing vehicles like cars, bicycles, and scooters.
[14] Except for the freight-focused scenario.

The results show significant risks to DOHs primary state revenue source (motor fuel taxes) through 2030 and 2050. Impacts to other state revenue sources, like privilege taxes and vehicle registration fees are less tied to the impacts of these scenarios (which primarily impact types of vehicle technologies operating on the road and the amount of vehicle travel). Privilege tax and registration fee revenues are most strongly connected to population change, which is not anticipated to be impacted by these scenarios.

Headline results of the four scenarios include:

- **The impact of improving vehicle efficiency, through continuing improvements to internal combustion technologies as well as more widespread, reliable, and lower cost electric technologies, could decrease revenue from the motor fuels tax by 11 to 20 percent through 2030 and as high as 52 percent by 2050**. These decreases are based on tax rates per gallon that remain constant with current rates. It is expected that these decreases would be offset by increases in annual fees for electric vehicle owners.
- **Changes in travel behavior are less certain and less widespread given West Virginia's economic conditions and geography.** Decreases in VMT or car ownership resulting from more teleworking, more remote retail and health care, and new mobility options would primarily impact travel bahavior in urban areas, and could reduce statewide revenue as high as **4 percent** over the next three decades.
- **The majority of freight in West Virginia will continue to be moved by trucks. The growth of truck travel relative to West Virginia's economy could impact revenue in both positive and negative ways.** This scenario assumes that truck freight movement could either grow faster or slower than current and forecasted trends detailed in the Statewide Freight Plan, resulting in increases or decreases in motor carrier fuel tax receipts by as much as **3 percent**. There are other aspects of the change in highway freight movement such as continued decline of the coal industry, freight logistics pattern shifts, new manufacturing industries, or more available freight rail capacity that could increase state revenues through other non-transportation taxes and fees.
- **There are many other external factors or events that could impact available revenue for capital transportation investments in West Virginia, including recurring severe weather, economic recessions, pandemics or other economy-wide shocks, and high inflation.** The combination of these factors and events could create significant impacts on revenue, approaching a **20 percent** decrease through 2050.

Studying Alternative Revenue Scenarios provides multiple perspectives to analyze different future outcomes following changes in travel behavior, freight movement, and larger macroeconomic shifts as shown in **Figure 10**. Looking at each scenario individually as well as all four scenarios collectively helps to provide insight and guidance on future policy decisions as changes occur knowing that political, social, and technological shifts will continue to adjust outcomes and travel behavior.

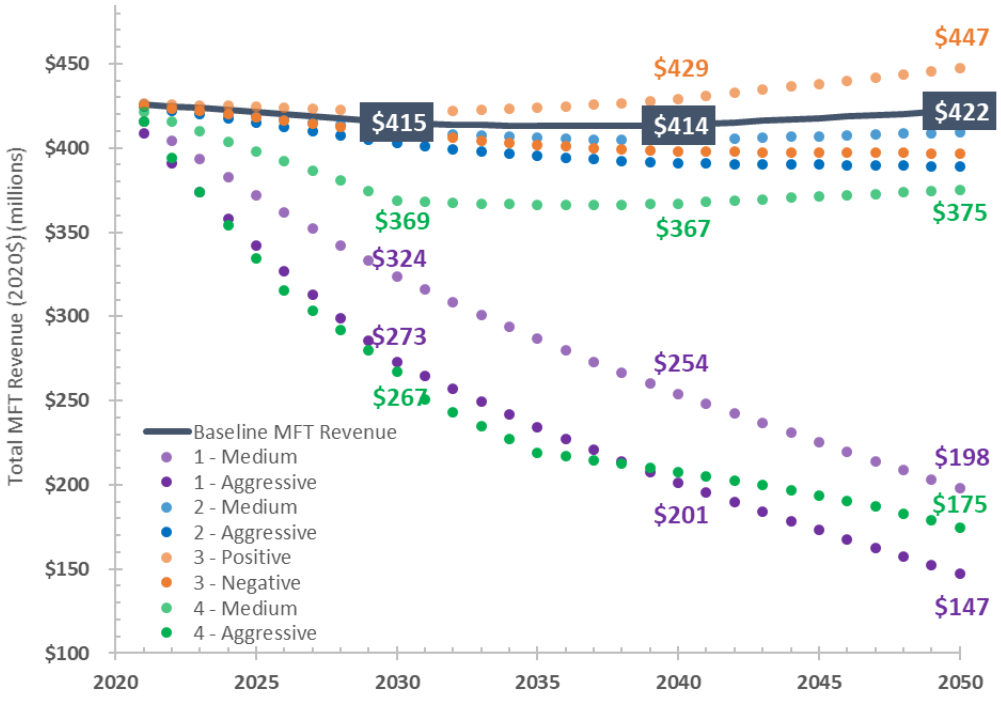


Figure 10 – Annual Summary of Alternative Revenue Outcomes

Scenario 1: Vehicle Technology

The vehicle technology scenario examines what could happen to revenues if fuel-efficient passenger and commercial vehicles dominate vehicular traffic (**Figure 11**). Tests look at impact of existing Federal fuel economy standards and market shifts to more alternative fuel vehicle technologies such as plug-in hybrid (PHEV) and battery electric vehicles (BEV). Note, in 2020, average fleet fuel efficiency (in miles per gallon, mpg) is 24.0 mpg for light-duty cars and trucks, 14.0 mpg for commercial light trucks, and 7.2 mpg for freight trucks.[15] **Figure 12** presents the assumptions behind the scenario test in-terms of share of electric vehicle VMT and average fleet fuel efficiency.

Scenario 1: Vehicle Technology Sensitivity Tests

Conservative
US Department of Energy (DOE) fleet forecasts through Annual Energy Outlook 2021 (AEO) reference case

Medium
High-end fleet technology forecast consistent with AEO high technology case

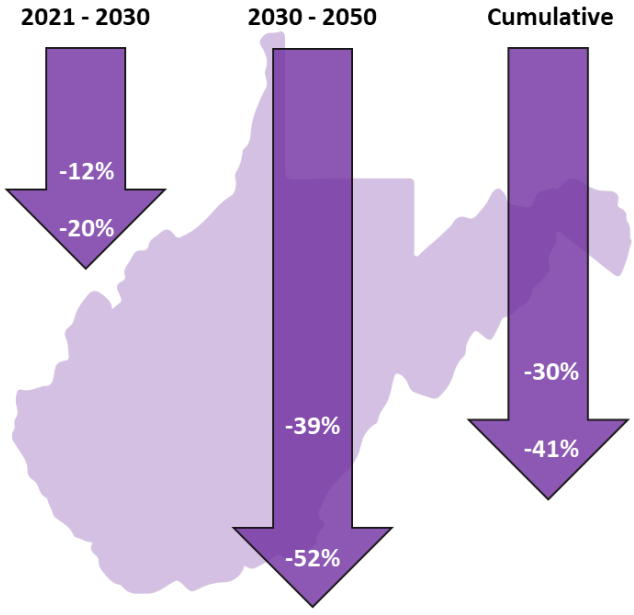
Aggressive
Stretch electric vehicle (EV) market share, reaching 80% by 2050 consistent with forecasts from the BloomburgNEF 2020 electric vehicle outlook: https://about.bnef.com/electric-vehicle-outlook/

Figure 11 – Scenario 1: Vehicle Technology Sensitivity Tests

	2030			2050		
	Conservative	Medium	Aggressive	Conservative	Medium	Aggressive
Vehicle Technology	**Electric Vehicle VMT Share**					
Passenger Vehicles	5.2%	6.0%	12.0%	15.0%	19.1%	40%
Commercial Vehicles	0.1%	0.20%	0.30%	0.5%	0.70%	2%
Vehicle Technology	**Average Fleet Vehicle Fuel Efficiency (miles per gallon)**					
Light duty vehicles & trucks	28.6	29.1	32.9	32.3	33.9	42.1
Commercial light trucks	15.7	16.0	16.3	16.6	17.5	23.4
Freight trucks	8.4	8.4	8.4	10.0	10.2	11.5

Figure 12 – Scenario 1 Results: Vehicle Technology Sensitivity Tests

The results show ranges of change in motor vehicle fuel tax revenues (based on current rates) relative to trend forecasts of total vehicle miles traveled and population through 2030 and 2050. The technology scenario has the greatest potential impact on motor fuel tax revenue of the four scenarios tested.



As noted in the ***Transportation Technologies Fact Sheet and White Paper***, emerging technologies can disrupt traditional planning and programming processes by offering innovative ways to address existing and future transportation challenges including safety, mobility, efficiency, and environmental concerns. Auto manufacturers and the Federal government are making strong investments in electric vehicles, as evidenced by a recent announcement by General Motors committing to exclusively offering electric vehicles by 2035.

[15] Annual Energy Outlook 2021 https://www.eia.gov/outlooks/aeo/.

Scenario 2: Travel Activity

The travel activity scenario explores how revenues could decline following lower growth in passenger travel activity and vehicle ownership on a per capita basis (**Figure 13**). Trends considered include high travel costs, continued post-COVID commitment to telework, increased virtual economies (particularly retail), more ridesharing/mobility as a service, and continued urban area growth alongside rural declines, which all collectively result in shorter trip distances and more alternative mode use. The scenario also acknowledges uncertainty regarding the impact that connected and autonomous vehicles (CAV) will have on overall mobility. Recent research indicates that widespread CAV combined with mobility as a service options could act to increase VMT.

Scenario 2: Travel Activity Sensitivity Tests

Conservative
Continued statewide local travel activity trend with a slight annual VMT per capita increase.

Medium
Combination of the impact of different economic shocks on VMT per capita, including 2020 outcomes, prior recession/high fuel price conditions, and a long-term impact of sustained telework.

Aggressive
Nexus of multiple drivers coming together to reduce passenger VMT per capita, including telework, virtual economy, mobility as a service (MAAS), and changes in land use

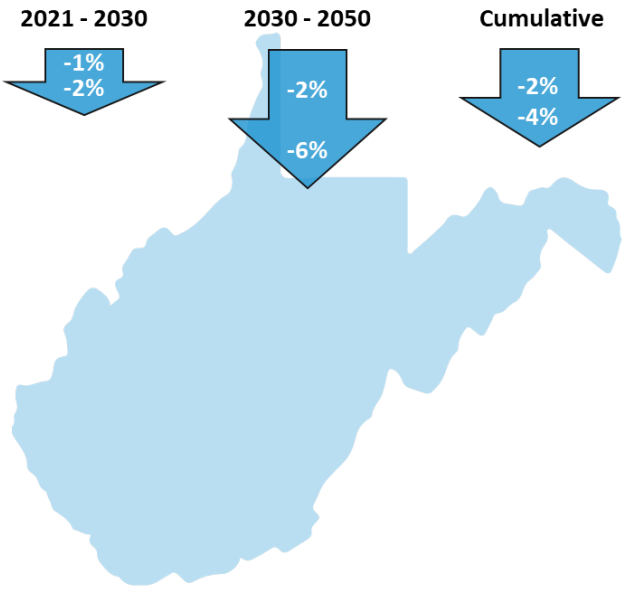
Figure 8 – Scenario 2: Travel Activity Sensitivity Tests

Similar to Scenario 1, results show different changes in motor fuel tax revenues relative to trend forecasts of total vehicle miles traveled. While not modeled this scenario is likely to also result in decreases in privilege taxes and registration fees from lower vehicle ownership. **Figure 14** presents the assumptions behind the scenario test in-terms of VMT decreases resulting from the combination of multiple factors.

	2030			2050		
	Baseline	**Medium**	**Aggressive**	**Baseline**	**Medium**	**Aggressive**
Travel Activity	**Change in Vehicle Miles Traveled per Person**					
Passenger Travel Change from Baseline (w/CAV and new mobility options)	Average annual VMT growth of 0.1% through 2030	-0.5%	-1.5%	Average annual VMT growth of 0.4% through 2050	-2.0%	-4.0%
Passenger Travel Change from Baseline (w/o CAV and new mobility options)		-2.0%	-5.0%		-5.0%	-13.0%

Figure 9 – Scenario 2 Results: Travel Activity Sensitivity Tests

The results show ranges of change in motor vehicle fuel tax revenues (based on current rates) relative to trend forecasts of total vehicle miles traveled and population through 2030 and 2050. The travel activity scenario has a lower potential impact on motor fuel tax revenue compared to the other three scenarios tested, although there is also significant uncertainty, especially given unknown impacts of CAVs.



As noted in the ***Demographics Fact Sheet and White Paper***, travel behavior is greatly shaped by current and future demographic and social patterns. West Virginia's aging population will continue to impact travel patterns as will continue declines in rural area population. Combined with continued telework, with as high as 40 percent of the workforce working from home 5 days a week during the height of the COVID-19 pandemic, the reduction in total travel could also be higher (see Scenario 4: Instability).

Scenario 3: Freight Movement

The freight movement scenario evaluates how revenues could shift up or down following different logistic patterns and changes in statewide freight movement (**Figure 15**). Trucking could continue to expand and accelerate growth alongside economic development from higher distribution needs. Manufacturing could also shift to smaller, distributed systems like more localized 3D printing and development of materials. Alternatively, if the economy stagnates or other more cost and time efficient modes emerge, this could collectively cause big shifts in logistics patterns and decreased demand for truck freight.

Scenario 3: Freight Movement Sensitivity Tests

Baseline
Continued historic statewide local trend and forecasts consistent with the West Virginia Freight Plan

Aggressive (Positive) Revenue
Growth for commercial VMT in line with US Department of Energy (DOE) VMT forecasts through the Annual Energy Outlook 2021 (AEO) high-economic growth case

Aggressive (Negative) Revenue
Stagnant economy and/or increasing shift to other modes

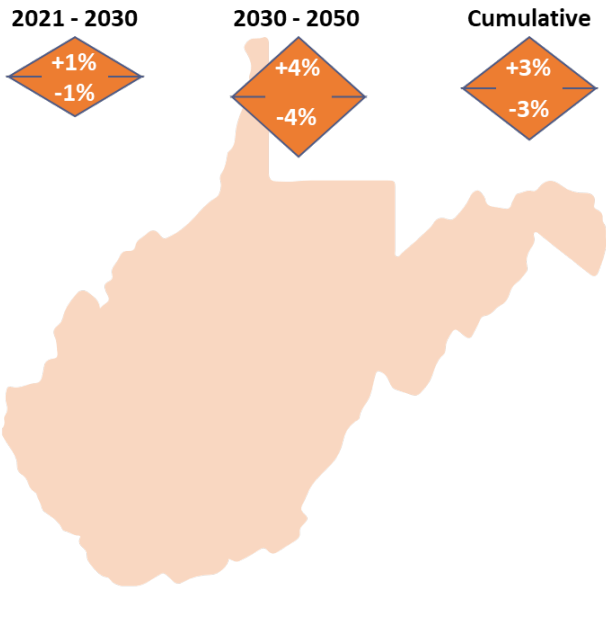
Figure 10 – Scenario 3: Freight Movement Sensitivity Tests

Scenario 3 focuses only the approximate 13 percent of total vehicle miles traveled (consistent with FHWA Highway Statistics data for 2019) attributed to medium and heavy-duty commercial vehicles. The analysis estimates the impact of higher or lower VMT to the total motor fuel tax revenue, rather than segmenting it into the impact to the motor excise tax and motor carrier tax individually. **Figure 16** presents the assumptions behind the scenario test in-terms of VMT decreases resulting from the combination of multiple factors.

	2030			2050		
	Baseline	**Positive**	**Negative**	**Baseline**	**Positive**	**Negative**
Commercial Vehicle Activity	**Change in Commercial Vehicle Miles Traveled**					
Commercial Vehicle Travel Change from Baseline	Average annual VMT growth of 0.2% through 2030	5%	-5%	Average annual VMT growth of 0.6% through 2030	5%	-5%

Figure 11 – Scenario 3 Results: Freight Movement Sensitivity Tests

The results show changes in motor vehicle fuel tax revenues (based on current rates) relative to trend forecasts of commercial vehicle miles traveled and population through 2030 and 2050. The impacts are noted in the figure to the right. The impacts of this scenario are only applied to approximately 13 percent of total statewide VMT on an annual basis through 2050.



As noted in the ***Economics Fact Sheet and White Paper*** creating and retaining jobs depends on expanding industry and trade as well as supporting existing growth. Consistent domestic as well as international trade partners for nearly the past ten years has helped stabilize West Virginia exports, which continually exceed imports and fortifies the local economy. Continued anticipated decline in natural resource extraction economies will negatively impact both freight rail and truck demand. For trucks, this decline in demand could be offset by growth in other sectors. Increasing household reliance for on-demand products increases the potential for warehousing and distribution within West Virginia as well as smaller-scale manufacturing of key products such as pharmaceuticals.

Scenario 4: Instability

The instability scenario measures what could happen to constrained revenues following a range of unforeseen yet sustained events across energy, climate, health, and security challenges likely to constrain resources, increase costs, and result in economic shocks leading to revenue declines (**Figure 17**). Revenues decline both from less travel (due to high travel costs) and less available for capital investment due to increased expenses and less purchasing power (**Figure 18**).

Scenario 4: Instability Sensitivity Tests

Baseline
Spending for maintenance and operations remains stable with cost increases generally following current inflation rates

Medium
External forces lead to higher inflation, material costs, and travel costs

Aggressive
Recurring events lead to high expenses for maintenance and reconstruction which reduces available capital for roadway improvements on top of high inflation, travel, and material costs possibly associated with macroeconomic challenges like an energy crisis, limited materials, and constrained labor

Figure 12 – Scenario 4: Instability Sensitivity Tests

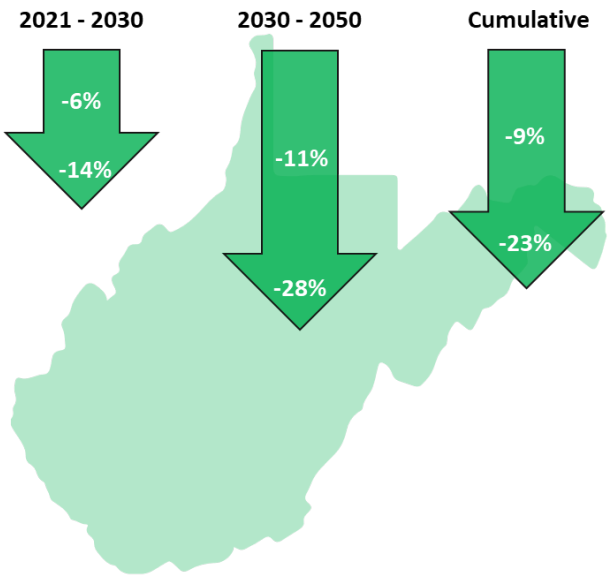
This scenario impacts both total revenue and the cost of doing business. VMT declines in the medium and aggressive case are consistent with experience in 2020 during the COVID-19 pandemic. The 15 percent decrease is directly from the 2020 to 2019 annual VMT comparison. The 30 percent decrease represents peak pandemic travel impacts in April and May 2020. Cost increases are indicative of a sustained period of high inflation – with a 10% cost increase from 2021 to 2030 and a 20% cost from 2031 to 2050.

	2030			2050		
	Baseline	**Medium**	**Aggressive**	**Baseline**	**Medium**	**Aggressive**
Instability	**Change in Vehicle Miles Traveled per Person**					
Passenger Travel Change from Baseline (w/CAV and new mobility options)	Average annual VMT growth of 0.1% through 2030	-0.5%	-1.5%	Average annual VMT growth of 0.4% through 2050	-2.0%	-4.0%
Instability	**Change in Annual Inflation Rate**					
Total Constrained Revenue Decrease (due to high inflation)	Annual inflation for materials and labor assumed between 3 and 4%		-10%	Annual inflation for materials and labor assumed between 3 and 4%		-20%

Figure 13 – Scenario 4 Results: Instability Sensitivity Tests

The results show ranges of change in motor vehicle fuel tax revenues (based on current rates) relative to trend forecasts of commercial vehicle miles traveled and population through 2030 and 2050.

This scenario attempts to capture potential uncertainty in a number of forces outside of WVDOTs control through 2050. Most of these forces pose significant risks to revenue for transportation from both current and potential future revenue sources, given the economy-wide impact of these events. WVDOT spending on emergency repairs of assets following severe storms limits the ability to deliver other transportation improvements. Any sustained event, like a public health crises or other economic shock is likely to reduce both passenger and commercial vehicle travel and overall consumer spending, impacting revenue for all state agencies.



5. Alternative Revenue Sources

Objective

Also starting from the "Real" Population growth as the same foundation and base level forecast to estimate revenues, ***five Alternative Revenue Sources*** were developed and analyzed given likely changes in fuel consumption, travel behavior and patterns, and larger economic forces challenging potency and reliability of existing revenue sources (**Figure 19**). National research and policy discussions, including those led by AASHTO in the January 2019 Matrix of Illustrative Surface Transportation Revenue Options, are heavily referenced to thoroughly document in-use examples as well as advantages, disadvantages, growth, and administration assumptions specific to West Virginia.[16]

Alternative Revenue Source		**Anticipated Revenue Impact**
Source 1	*Increase Rates Behind Existing Tax &/or Fee-Based (Motor Fuel Tax, Privilege Tax, EV Fee) Revenues*	Increased revenues follow recurring increases in tax rates consistent with CPI or other factors behind motor fuel taxes and privilege taxes, without changes in travel behavior or vehicle ownership trends
Source 2	*Deploy New Tax-Based (Sales/Use Taxes) Revenues*	Increased revenues from new (additional) tax sources result from consumer spending independent of travel patterns but rely on public support and legislative success to implement
Source 3	*Implement More Existing User-Based (Tolls or Fees) Revenues*	Increased revenues require infrastructure and/or technological investment on the Turnpike plus legislative approval to capture additional revenues from tolls or other fees, like annual registration or electric vehicle fees
Source 4	*Administer New User-Based (Impact, Mileage-based, Emissions) Fees*	Increased revenues require legislative and technological investment in vehicles plus revenue collection and management systems to capture additional revenues from new user-based fees. Mileage based fees could also serve as a replacement for the motor vehicle fuels tax
Source 5	*Leverage Other Innovative or Emerging Sources (P3, Real Estate, Advertising, Congestion Pricing)*	Increased revenues require Public-Private coordination, legislative approval, and technological investment across system to capture additional revenues

Figure 14 – Summary of Alternative Revenue Sources

Summary of Results

All calculations estimating future revenues are discounted 2 percent annually to show potential impact in 2020$ in addition to nominally forecasted values. In addition to conducting quantitative forecasts, each ***Alternative Revenue Source*** is analyzed conceptually following AASHTO guidelines to assess topics across offsetting issues, responsiveness to inflation, stability/predictability, user role, administration costs, equity, and examples of current use (**Figure 20**).

Presenting possible future revenues from each individual source shows unique potential from individual revenue sources to give a useful and applicable menu of options to consider for future decision making and analysis. Given political, social, and technological challenges, difficulties, and complications to implement one individual revenue source, assessing revenue sources separately proved to be more accurate and useful given legislative authority over rate-setting power as well as individual framework behind each alternative revenue source.

[16] Matrix of Illustrative Surface Transportation Revenue Options January 2019. AASHTO. https://policy.transportation.org/wp-content/uploads/sites/59/2019/02/HTF-Matrix-2019.pdf

Source Group	Revenue Source	Type of Change (all start in 2021)	Impact (2020$) 2% Discounting	Responsive to Inflation?	Stable &/or Predictable Revenues	"User-Pays"	Admin Costs Relative to Revenues	Equity by Income Group
Existing State User Fees and Taxes	Increase motor fuel tax	Gasoline & Diesel: $0.01/gal one time increase	2021-2050: Avg. $10m per year - $302m total	Poor	Fair - Subject to gallonage	Good	Good	Poor
	Increase motor fuel tax	Gasoline & Diesel: 1% one-time increase	2021-2050: Avg. $4m per year - $113m total	Poor	Fair - Subject to gallonage	Good	Good	Poor
	Increase motor fuel tax	Gasoline & Diesel: 1% per year increase	2021-2050: Avg. $65m per year - $1,938m total	Fair	Fair - Subject to gallonage	Good	Good	Poor
	Increase motor fuel tax	Gasoline & Diesel: 2% per year increase (appx. inflation adjusted)	2021-2050: Avg. $143m per year - $4,297m total	Good	Fair - Subject to gallonage	Good	Good	Poor
	Increase DMV Fees & Taxes	Increase Automotive Privilege Tax (APT) from 6% to 7%	2021-2050: Avg. $55m per year - $1,659m total	Poor	Good	Good	Good	Poor
	Increase DMV Fees & Taxes	Increase License and Registration Fees & Titles 1%	2021-2050: Avg. $4m per year - $115m total	Poor	Good	Good	Good	Poor
	Electric Vehicle Tax (Current @ $200/Unit)	Bloomberg Rates (High Adoption)	2021-2050: Avg. $101m per year - $3,017m total	Poor	Fair	Good	Good	Fair
	Electric Vehicle Tax (Current @ $200/Unit)	1/2 Bloomberg Rates (Low Adoption)	2021-2050: Avg. $62m per year - $1,869m total	Poor	Fair	Good	Good	Fair

Source Group	Revenue Source	Type of Change (all start in 2021)	Impact (2020$) 2% Discounting	Responsive to Inflation?	Stable &/or Predictable Revenues	"User-Pays"	Admin Costs Relative to Revenues	Equity by Income Group
New State User Fees and Taxes	Mileage Based Tax	$0.01 per VMT	2021-2050: Avg. $290m per year - $7,188m total	Poor	Fair	Good	Poor	Poor
	Implement Real Estate Transfer Tax (RETT) on Real Estate Sales	Buyer &/or Seller Pays $ Tax per Real Estate Sale	2021-2050: Avg. $120m per year - $3,613m total	Fair	Fair	Fair	Good	Fair
	Implement General Transportation Fee	% base charge for General Transportation Use	2021-2050: Avg. $227m per year - $6,800m total	Fair	Fair	Fair	Fair	Fair
	Implement New Sales Tax	1% Consumer Sales towards Transportation Use	2021-2050: Avg. $261m per year - $7,820m total	Fair	Fair	Fair	Fair	Fair

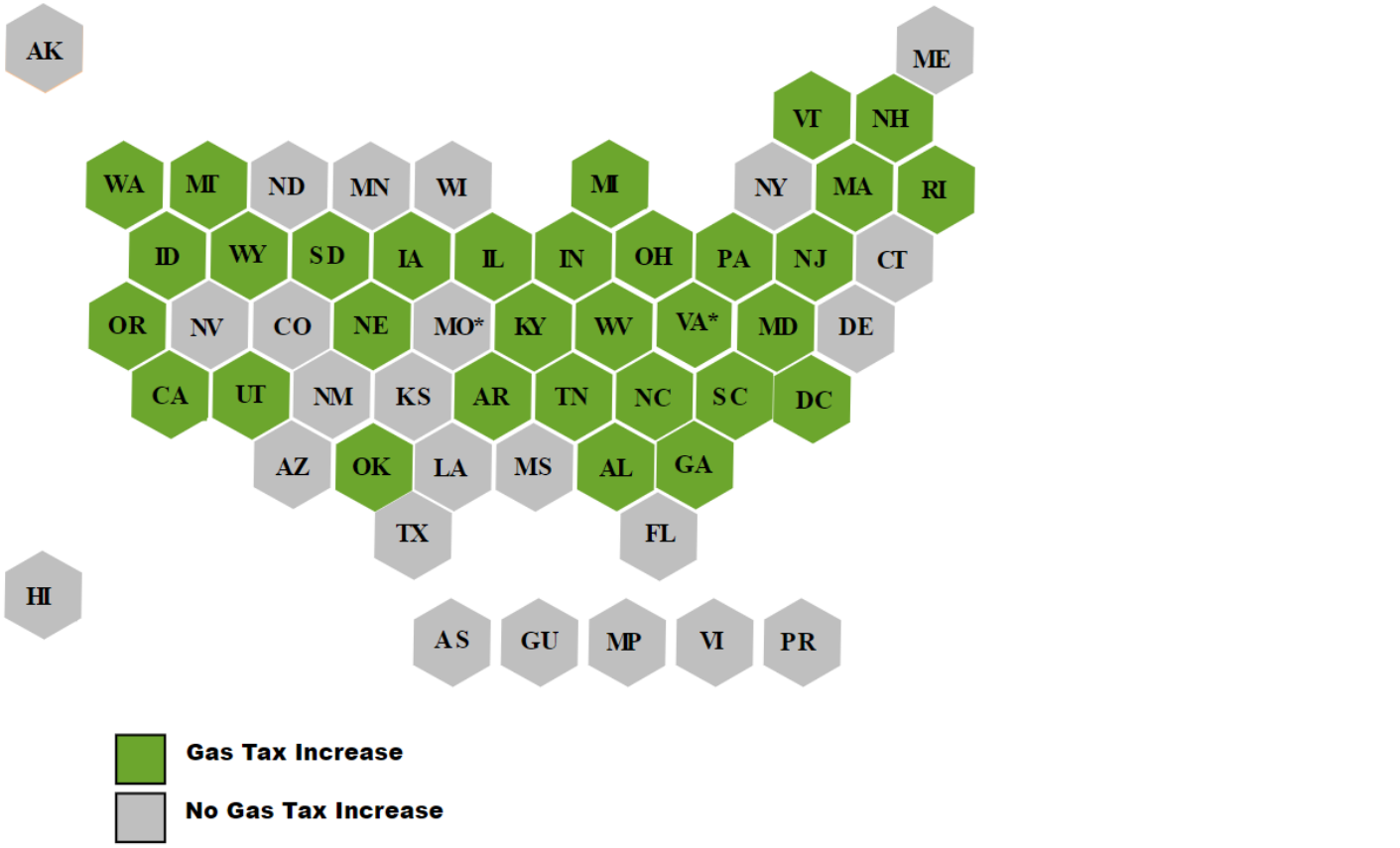
Figure 15 – Matrix of Alternative Revenue Sources

All of these sources have varying levels of exposure to external forces that could decrease potential revenue or purchasing power. These offsetting issues include:

- Declining or stable population which impacts overall economic activity and vehicle miles traveled for both passenger and commercial vehicles – **impacts all potential revenue sources**
- Increasing vehicle fuel efficiency across the entire fleet, either through continued mile per gallon improvements to internal combustion powered vehicles and/or continued market share growth of electric vehicles – **impacts all fuel-based revenue sources, electric vehicle market share growth will increase fees**
- Inflation can impact the cost of consumer goods, housing costs, and cost of materials and labor – **impacts revenue sources based on real estate or sales taxes, as well as vehicle registration and privilege tax revenues**
- Other macroeconomic shifts, such as unemployment, energy cost, housing prices, and interest rates – **impacts all revenue sources through both direct and indirect relationships**

All of these sources have some history and differing levels of success in the United States. A majority of states have recently adjusted motor fuel tax rates, including Virginia which increased the rate by 5 cents in 2020 and in 2021 (totaling from $0.162/gallon to $0.262/gallon) and will then adjust by inflation on an annual basis (see **Figure 21**)[17].

[17] National Conference of State Legislatures. State Gas Tax Increase Map, https://www.ncsl.org/portals/1/ImageLibrary/SVG/gas_tax_map_8_2020_28890.svg



***The Missouri Legislature increased gas taxes in 2018, but Missouri voters rebuked the 10-cent gas tax increase.**
***Virginia increased gas taxes statewide in 2013 and in 2020.**

Figure 16 – State Gas Tax Increases Since 2013

Electric vehicle fees are becoming more widespread as states seek methods to offset revenue losses and ensure electric vehicle owners contribute a fair share for highway use. The Eastern Transportation Coalition through a mileage-based user fee pilot across five states in 2020, is assessing the revenue potential of this revenue approach. Other states like Utah and Oregon are implementing voluntary based programs enabling vehicle owners to choose the approach best for their vehicle ownership and driving habits.

Figure 22 and Figure 23 presents the baseline total revenue forecast compared to the twelve alternative revenue sources. All values are in discounted $2020. Note, for the purposes of comparison, each new revenue source was assumed to start in 2021. Figure 20 displays a broad range of total revenue increases through 2030 and 2050, including:

- Marginal increases of 1 percent or less (for one-time MFT increase and registration and license fee increase),
- Moderate increases between 4 to 9 percent for privilege tax increases, 1 percent annual MFT increases, real estate transfer taxes, and EV fees across different EV market assumptions, and
- Substantial increases from 10 to 20 percent for 2 percent annual MFT increases (in-line with inflation), $0.01 per mile VMT fees, and new taxes for transportation.

Figure 22 – Revenue Source Comparison

Transportation Revenues

Revenue Source Forecasts	billions (2020$)			annual billions (2020$)			% increase in total constrained revenue		
	2021-2030	2031-2050	Total	2021-2031	2031-2051	Total	2021-2030	2031-2050	Total
Total Revenue (Baseline)	**$12.156**	**$29.730**	**$41.887**	**$1.216**	**$1.487**	**$1.396**			
Gasoline & Diesel Taxes: $0.01/gal one time increase	$0.102	$0.201	$0.302	$0.010	$0.010	$0.010	1%	1%	1%
Gasoline & Diesel Taxes: 1% one time increase	$0.038	$0.075	$0.113	$0.004	$0.004	$0.004	0%	0%	0%
Gasoline & Diesel Taxes: 1% per year increase	$0.215	$1.723	$1.938	$0.022	$0.086	$0.065	2%	6%	5%
Gasoline & Diesel Taxes: 2% per year increase	$0.443	$3.854	$4.297	$0.044	$0.193	$0.143	4%	13%	10%
Increase Automotive Privilege Tax from 6% to 7%	$0.448	$1.211	$1.659	$0.045	$0.061	$0.055	4%	4%	4%
Increase License and Registration Fees & Titles 1%	$0.033	$0.082	$0.115	$0.003	$0.004	$0.004	0%	0%	0%
Bloomberg Rates (High Adoption)	$0.665	$2.352	$3.017	$0.066	$0.118	$0.101	5%	8%	7%
1/2 Bloomberg Rates (Low Adoption)	$0.513	$1.357	$1.869	$0.051	$0.068	$0.062	4%	5%	4%
$0.01 per VMT	$2.336	$4.852	$7.188	$0.234	$0.243	$0.240	19%	16%	17%
Buyer &/or Seller Pays $ Tax per Real Estate Sale (ex. $2.50 per $500 property value)	$1.174	$2.439	$3.613	$0.117	$0.122	$0.120	10%	8%	9%
% Base Charge for General Transportation Use	$1.939	$4.861	$6.800	$0.194	$0.243	$0.227	16%	16%	16%
1% Consumer Sales towards Transportation	$2.230	$5.590	$7.820	$0.223	$0.280	$0.261	18%	19%	19%

Figure 23 – Revenue Source Comparison

6. Conclusions and Moving Forward

Forecasting revenues provides insight into future funding risks and opportunities for continued expansion, maintenance, and operation of the state's highway system. Comparing these forecasted revenues to needs can help decision makers understand options for how current and future transportation needs can be met. Note, while the analyses in this report are primarily focused on revenues for WVDOH, revenue sources for other WVDOT divisions, like aeronautics, transit, rail, and the WV Turnpike, are also impacted by the same macroeconomic trends. For other modes, revenues from other sources are significant drivers – for example, transit is heavily reliant on Federal formula funds and grants for capital and maintenance spending. Funding for rail improvements is heavily supported by Class I railroad investments and through revenue generated by the State Rail Authority through shoreline railroad operations. For the WV Turnpike, revenue is primarily from toll collection, which is directly impacted by total VMT.

Identifying both anticipated and unforeseen risks to revenue structures as the economy, transportation industry, and transportation technology change is necessary to keep assets maintained and people and goods moving. Changes in population, behavior, spending, business, industry, and travel all affect transportation, movement, and overall economic health. Upkeep of statewide systems to meet demand ensures safe and reliable mobility. Choosing future revenue structures that mitigate the impact of these anticipated and unforeseen risks will help ensure a more sustainable and constant revenue picture.

Modifying existing revenue sources or implementing new revenue sources require significant planning, public outreach, and leadership. Anticipating and mitigating possible implementation challenges across political, economic, social, and demographic issues while choosing priorities is important. Shaping outcomes takes time and resources given the complexities behind revenue collection, administration, and usage to ensure a safe and reliable transportation system. Offering ample opportunities for public and stakeholder input and feedback throughout the process with clear communication of tradeoffs and/or consequences if nothing is done helps keep residents on the same page as policy to ensure widespread approval.

Many states, including neighbors like Virginia, have recently enacted comprehensive new transportation funding packages. These packages take advantage of the increasing recognition among state legislature's that band-aid fixes (bonding, general fund transfers, Federal grants) to increasingly compromised existing sources (per gallon gasoline and diesel taxes) only help catch-up to addressing current needs. The greater concern is the longer-term sustainability of revenue sources due to anticipated and unforeseen risks.

In 2021 and 2022 there is increasing certainty that Federal surface transportation legislation will be reauthorized. Reauthorization could drastically affect future Federal funding and policies for surface transportation. Further, potential infrastructure stimulus bills and/or additional Federal grant opportunities may provide other opportunities for transportation funding in West Virginia. The analysis in the 2050 LRTP Finance Plan, combined with stability from the Federal perspective (roughly 1/3rd of total highway revenue) over the next five or more years (standard funding period for reauthorization), will provide West Virginia a platform for further analysis of state revenue needs and potential legislative action to modify state revenue sources to better address long-range needs. Identified and unidentified risks would tend to lower any projected revenue while enhancing revenues could increase baseline revenue estimates. Collectively, the size of the gap would expand, shrink, or eliminate the funding gap.