Transportation Planning and Programming Process Overview

Colleen Turner – Assistant Director, Office of Planning and Capital Programming
Maryland Department of Transportation
August 13, 2019

MARYLAND DEPARTMENT OF TRANSPORTATION

MDOT at a Glance

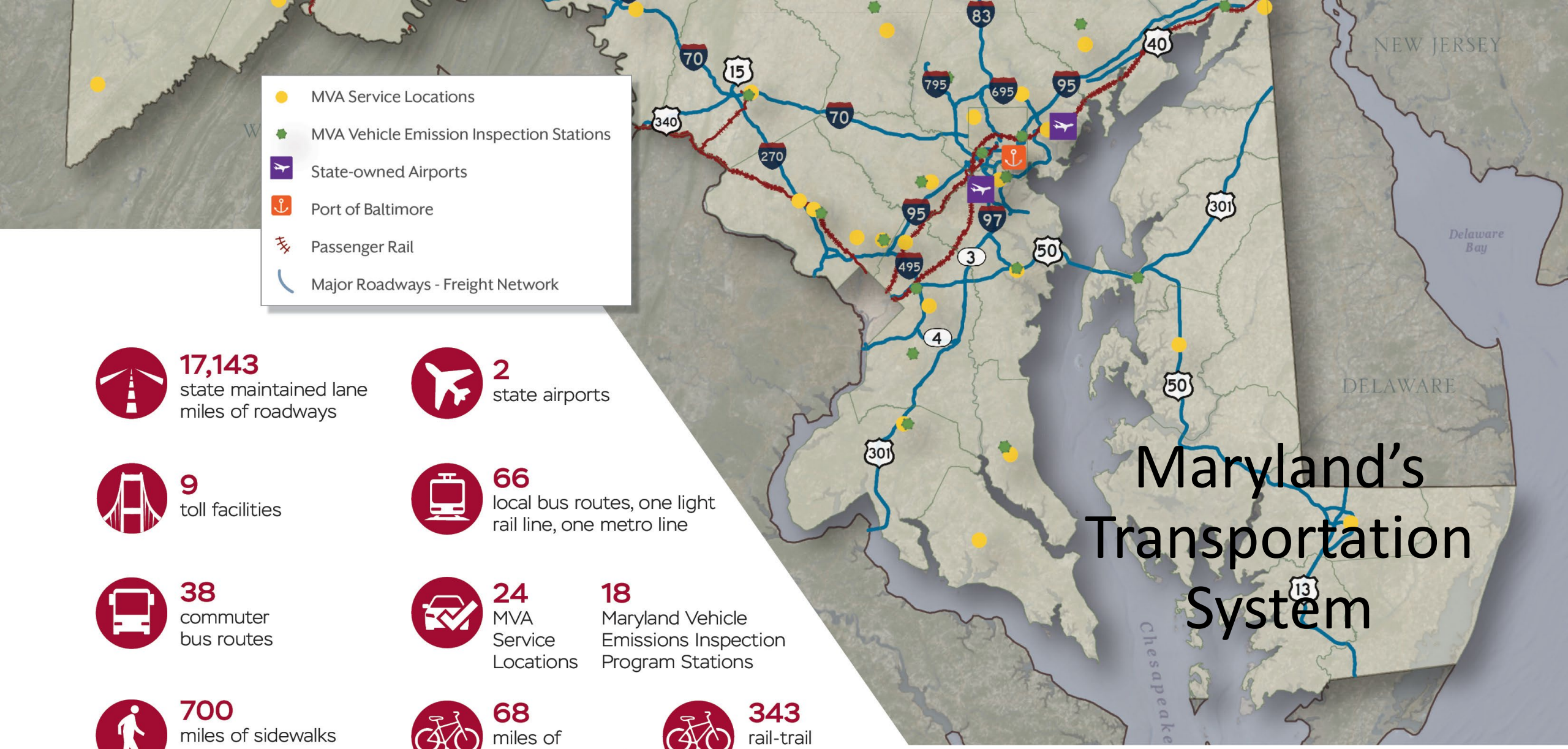
MARYLAND DEPARTMENT OF TRANSPORTATION

MISSION STATEMENT

"The Maryland Department of Transportation is a customer-driven leader that delivers safe, sustainable, intelligent, and exceptional transportation solutions in order to connect our customers to life's opportunities."

Maryland Overview

MARYLAND DEPARTMENT OF TRANSPORTATION



Maryland's Transportation System

17,143 state maintained lane miles of roadways

2 state airports

9 toll facilities

66 local bus routes, one light rail line, one metro line

38 commuter bus routes

24 MVA Service Locations

18 Maryland Vehicle Emissions Inspection Program Stations

700 miles of sidewalks along state roadways

68 miles of shared-use paths

343 rail-trail miles

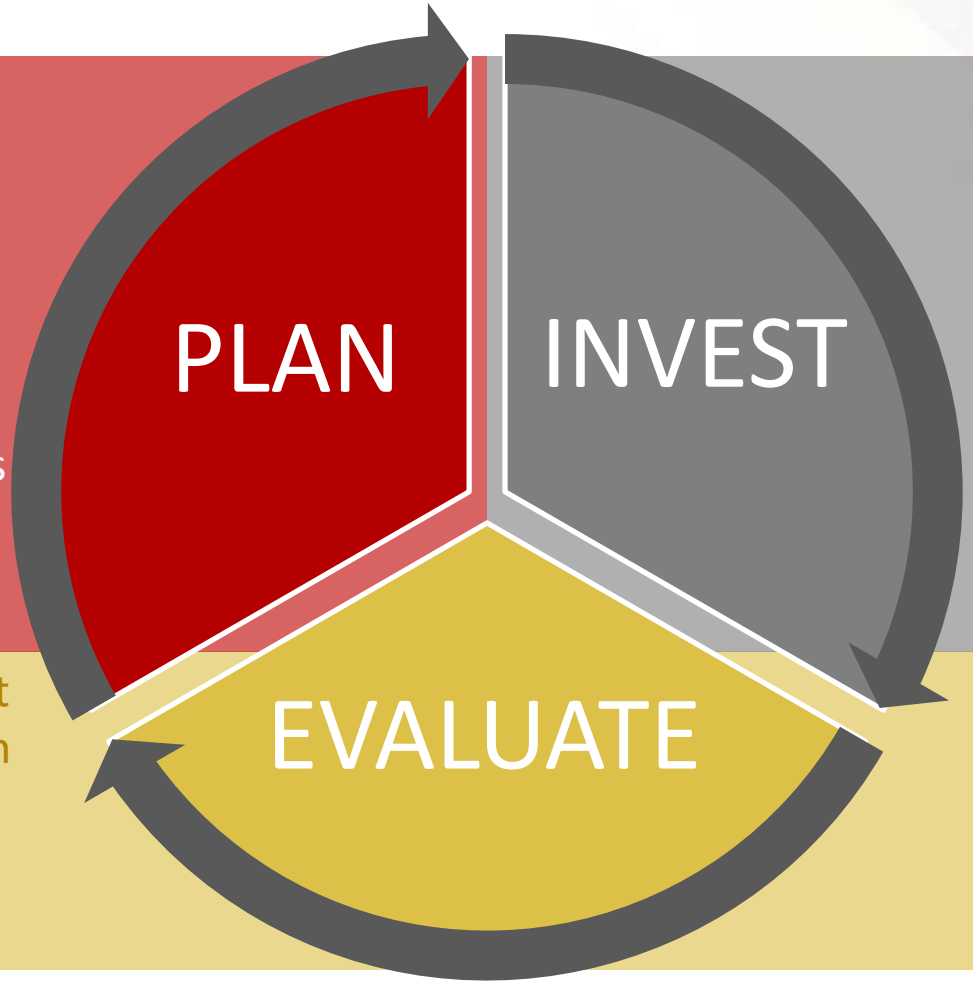
171 miles of short line freight rail and

7 State-owned public cargo

1 international cruise terminal

MDOT also supports 33 public use airports in the State through federal grant programs, provides technical assistance for transit systems in 23 counties, and is a funding partner of the regional Washington

Performance Based Planning and Programming



- Set vision, goals, objectives
- Identify priorities that meet the vision
- Work with stakeholders and the public to seek input and direction
- Establish policies and programs to address challenges and capitalize opportunities

- Seek input on local priorities
- Develop projects based on studies and system performance
- Prioritize capital investments consistent with State goals
- Address Federal planning requirements and air quality
- Provide an opportunity for public and stakeholder input

- Review performance consistent with the goals and objectives in the MTP and Federal factors
- Develop strategies to address performance deficiencies

- Review performance trends and update performance targets to reflect changing priorities and external factors

The State Report on Transportation

The State Report on Transportation is submitted annually to the General Assembly.

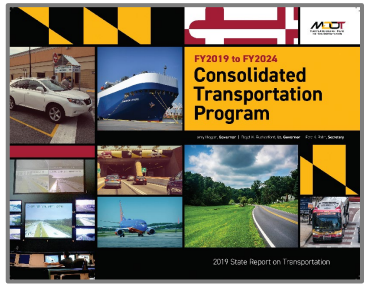
Plan

Updated every 5 years

The MTP establishes a ***20-year vision for multi-modal transportation in Maryland*** that ***outlines the State's transportation policies and priorities*** and ***helps guide Statewide investment decisions*** for all modes of transportation.

Supported by the Bicycle and Pedestrian Plan, other TBU/Mode Specific Plans and MPO MTPs

Invest

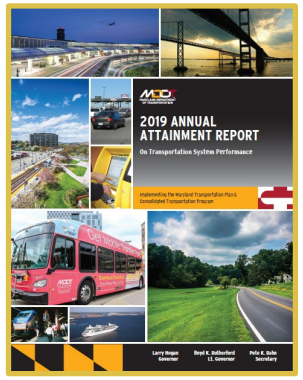


Updated annually

MDOT's fiscally constrained 6-year capital budget for all State transportation projects. MDOT works with residents, businesses, local jurisdictions, and local and state elected officials to include projects into the CTP.

Implemented by each project sponsor through project development, delivery and matching funds

Evaluate



Updated annually

Provides an overview of the transportation system, system investment, mobility and accessibility. MDOT assesses progress toward achieving its overarching strategic goals and objectives by aligning performance measures and data with each MTP goal area and objective.

Development is coordinated across the MDOT TBUs, covers 49 unique measures and targets across the 7 MTP goals

MTP Goals and Strategies

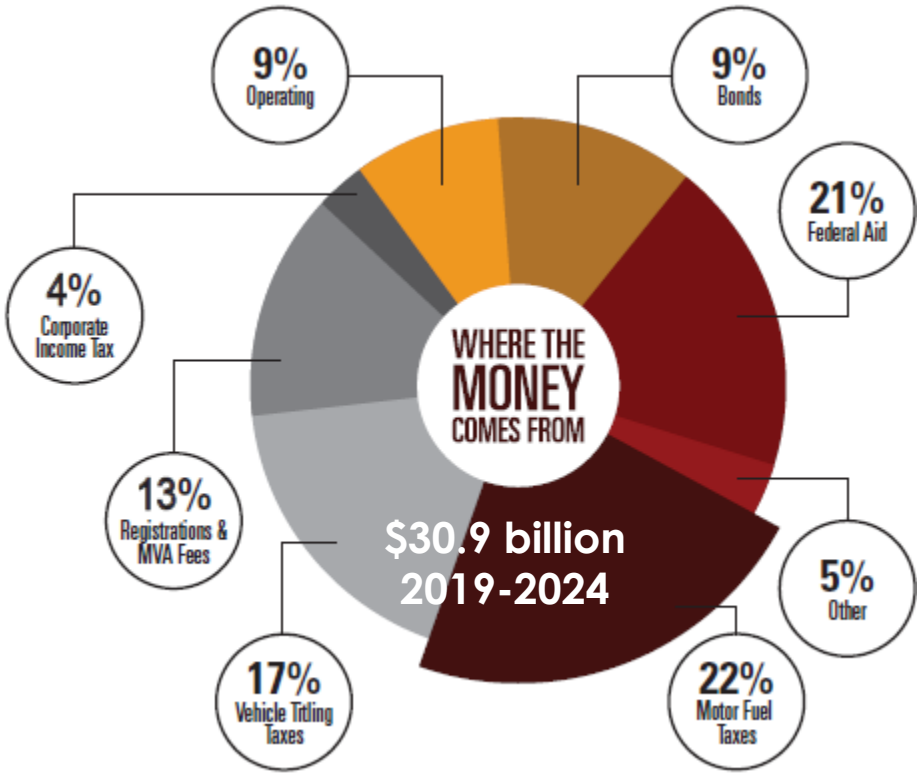
The MTP includes a set of strategies for implementing goals and objectives

- Strategy development was informed by MDOT TBU strategic and business plans, as well as public input
- Putting the strategies into action will help assure progress toward performance targets
- Some implementation strategies are statewide, while most are tailored to address the needs of the State's diverse regions

Consolidated Transportation Program

Funding Sources and Investments

The source of a majority of "State" funding for transportation needs is the Transportation Trust Fund (TTF)



Other Sources

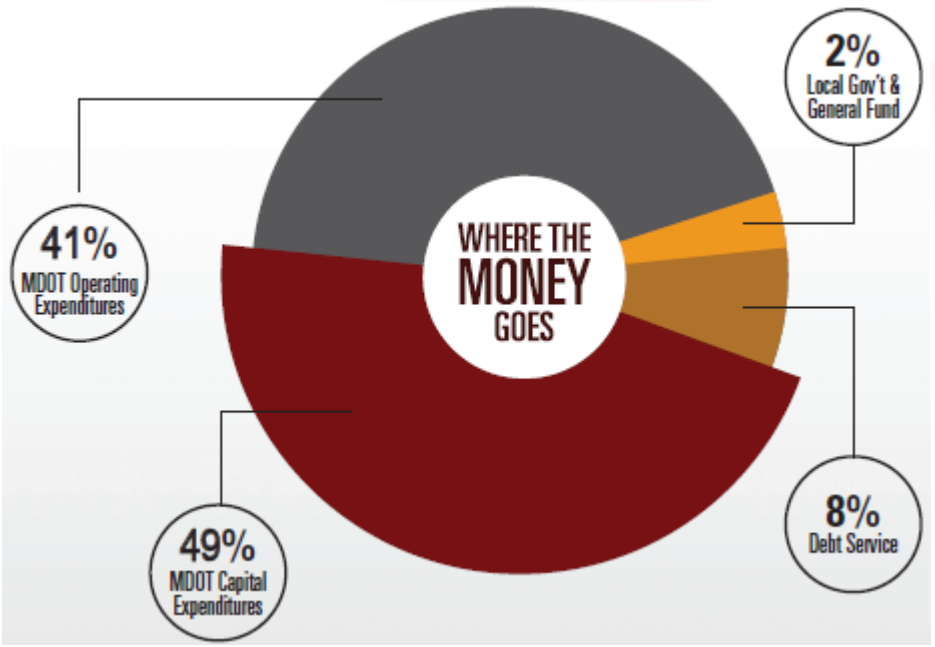
WMATA

Local contributions

Airport fees

Discretionary grants

$14.4 billion from the TTF goes to capital investments in the CTP, plus an additional $2 billion from "Other" sources to total a $16.4 billion six-year capital program



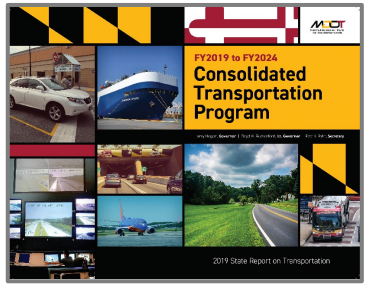
Consolidated Transportation Program

Funding Sources and Investments

2019-2024 CTP $16.44 billion

$3.31 billion — MARYLAND DEPARTMENT OF TRANSPORTATION — MARYLAND TRANSIT ADMINISTRATION

$2.57 billion — Washington Metropolitan Area Transit Authority



$244 million — MARYLAND DEPARTMENT OF TRANSPORTATION

$644 million — MARYLAND DEPARTMENT OF TRANSPORTATION — MARYLAND AVIATION ADMINISTRATION

$8.68 billion — MARYLAND DEPARTMENT OF TRANSPORTATION — STATE HIGHWAY ADMINISTRATION

$143 million — MARYLAND DEPARTMENT OF TRANSPORTATION — MOTOR VEHICLE ADMINISTRATION

$842 million — ARYLAND DEPARTMENT OF TRANSPORTATION — MARYLAND PORT ADMINISTRATION

Consolidated Transportation Program

How The Program is Developed

Multiple criteria to identify cost-effective investments that align with transportation priorities:

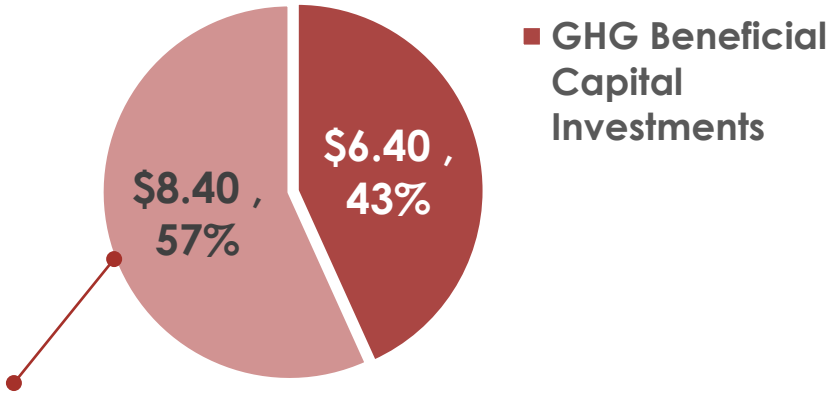
- Meets all federal and other legal mandates
- Supports MDOT's mission, priorities and MTP goals
- Meets all federal match requirements
- Chapter 30 project scoring (construction projects > $5m)
- Supports State plans and objectives
- Supports existing project commitments and upholds intergovernmental agreements
- Is the single top priority within a local priority letter
- Is consistent with local plans
- Is included in the regional Metropolitan Planning Organization (MPO) long-range plan

Each fall, the Secretary of Transportation visits each of the 23 counties and Baltimore City to present the draft CTP at the annual Tour meetings to local elected officials & citizens

Consolidated Transportation Program

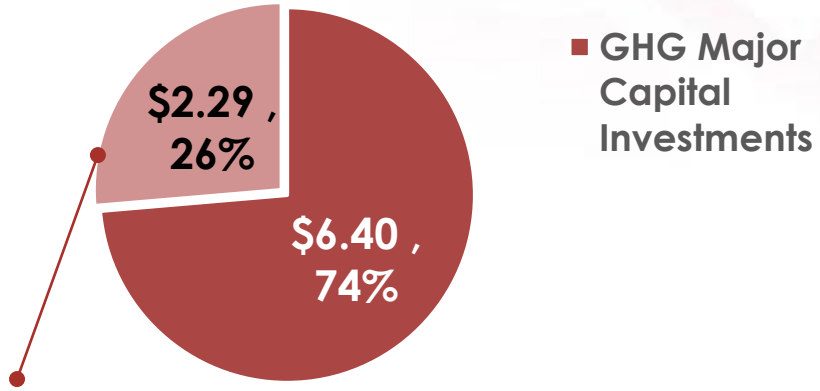
GHG Mitigating Investments

MDOT estimates that 43 percent (approximately $6.4 billion) of the total $14.8 billion six-year CTP (FY 2018 – 2023)…
is associated with investments that could reduce GHG emissions by 2020 and beyond



The majority of non-GHG mitigating investments are within MDOT's commitment to system preservation and maintenance programs

Total funding for major capital programming is roughly $8.7 billion, and MDOT is investing nearly three quarters of that funding…
in projects that are expected to result in GHG emissions reductions



Non-GHG mitigating major capital projects include major bridge replacements, other asset and fleet replacements or rehabilitation

Annual Attainment Report

Measuring Transportation System Performance

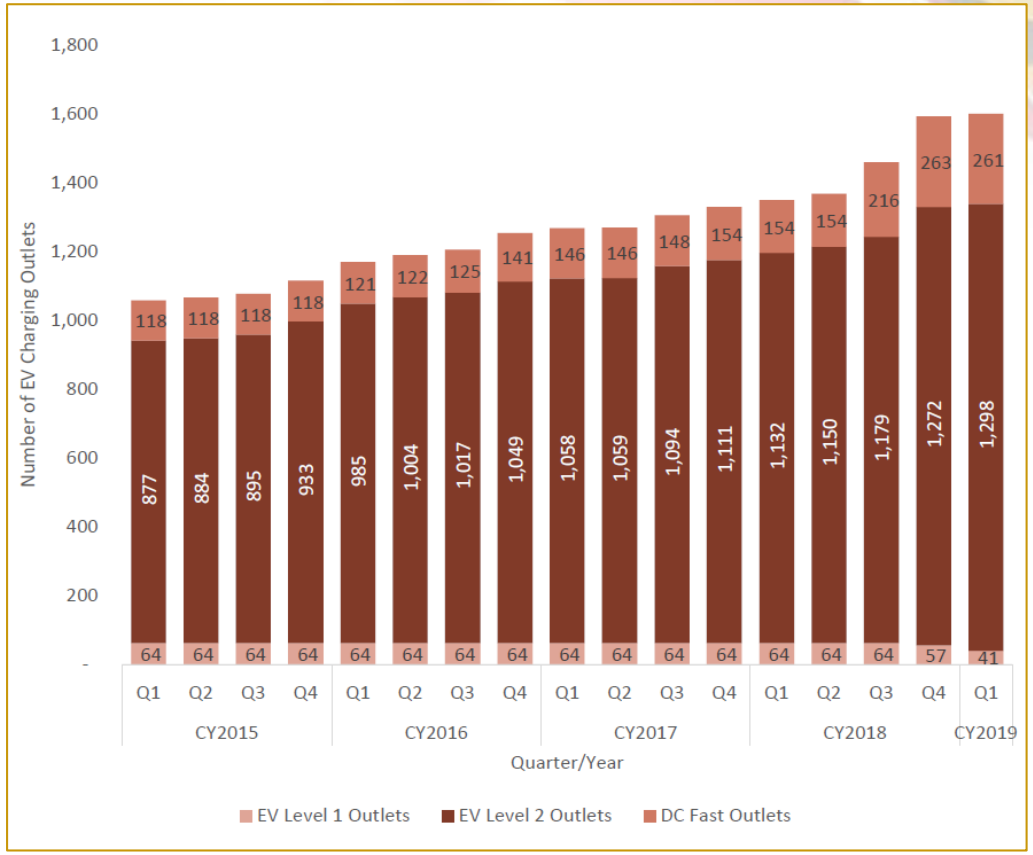
Annual Attainment Report (since 2000):

- Reports progress toward achieving the goals and objectives in the MTP and the CTP
- Establishes performance indicators that quantify achievement of these objectives
- Sets performance targets

Starting in 2017, through coordination with MPOs and adjacent state DOTs, **MDOT developed baseline performance measures and targets to address MAP-21/ FAST Act federal requirements**

MDOT also generates quarterly reports through the MDOT Excellerator Performance Management System which focuses on agency performance against 10 tangible results

Electric Vehicle Charging Outlets (2015-2019)



Transportation Sector GGRA Plan

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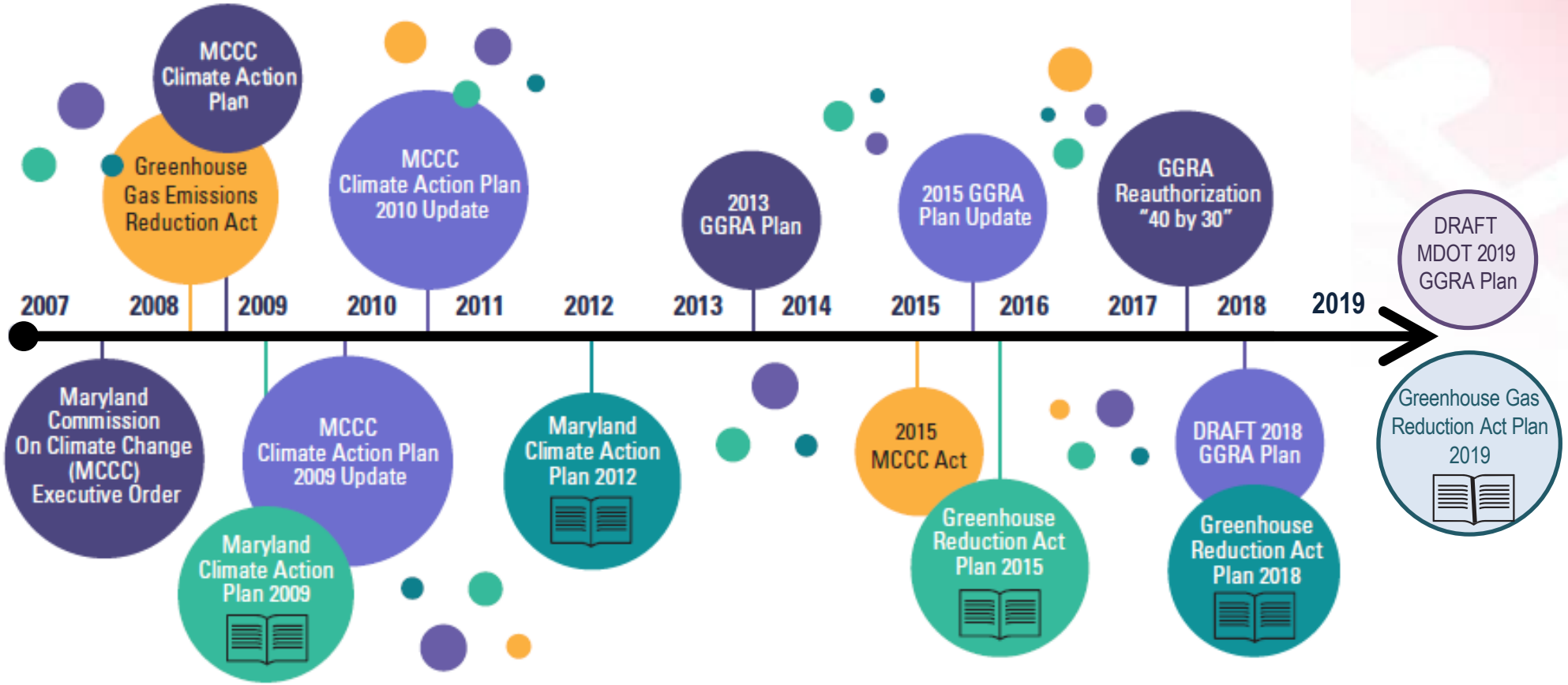
MARYLAND DEPARTMENT OF TRANSPORTATION

Presentation Outline

- **MDOT's GGRA Story**
  Accomplishments since 2008 and our Approach to Climate Change
- **Trends – Opportunities and Challenges**
  How transportation is changing and will change through 2030 and beyond
- **The 2030 Picture**
  What can the transportation sector achieve and how much will it cost
- **Beyond 2030**
  How will the emerging trends and disrupters impact the transportation sector

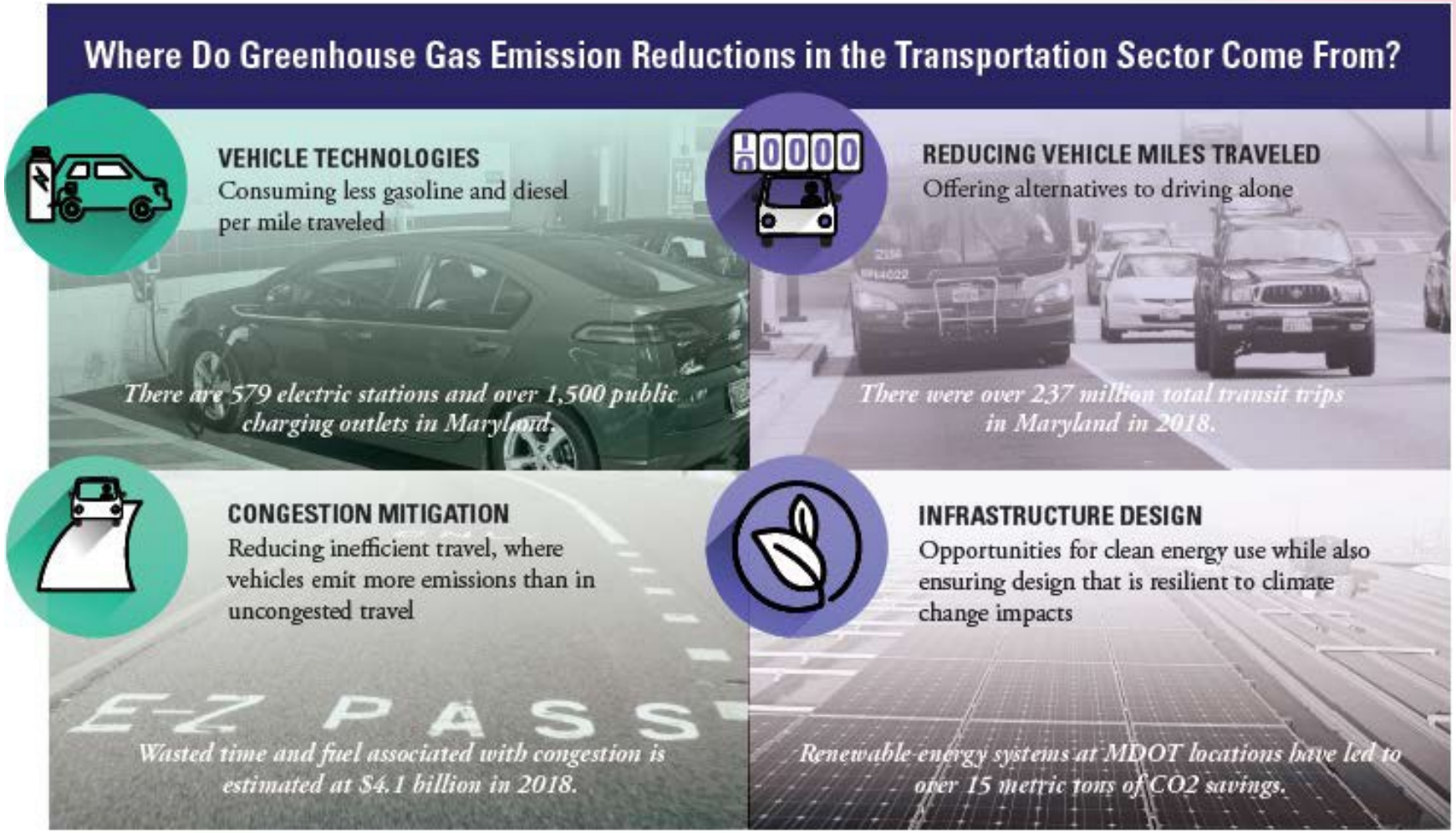
MDOT's GGRA Story

Coordinated planning and analysis for over 10 years



MDOT's Approach to Climate Change

New vehicle technologies could reduce GHG emissions by 34% through 2030



As the fleet becomes more efficient, VMT strategies and transit ridership are less effective at reducing GHGs

A car operating at 20 mph emits 25% more than a car operating at 50 mph

Solar systems on MDOT properties reduce energy use

Trends – Opportunities and Challenges

Economic, technology, development, and demographic trends create both challenges and opportunities for reducing GHG emissions from transportation

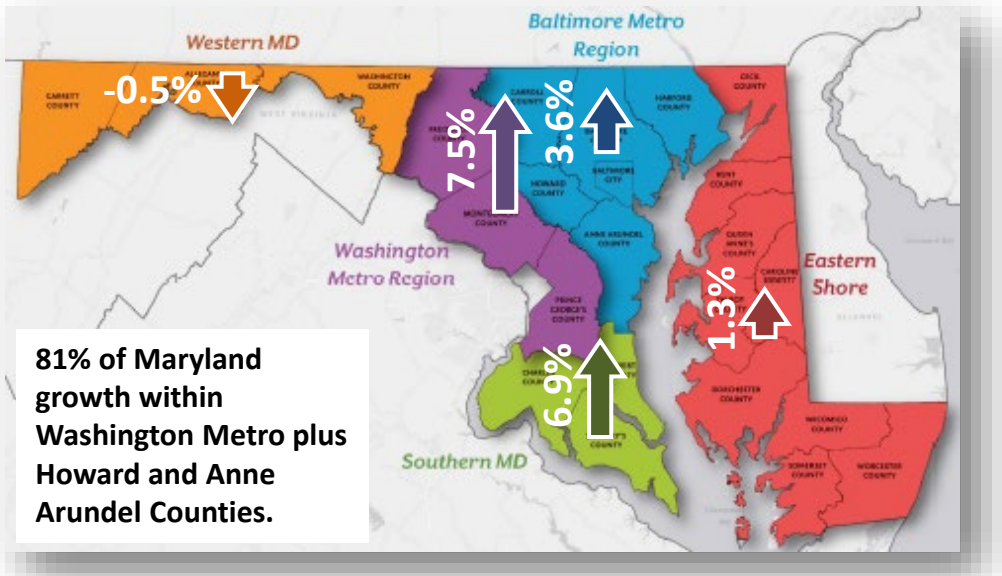
The Maryland Context

Travel demand follows economic trends

6.05 million people

#19 in US by population #5 in density

2010 to 2017 Growth = 4.8%

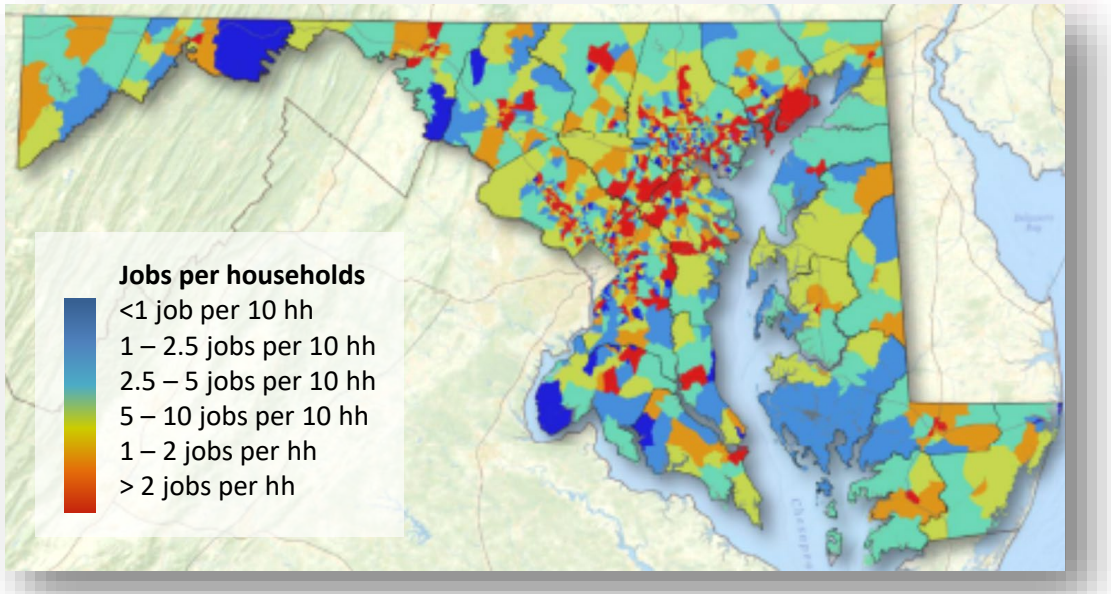


3.23 million civilian jobs in 2018 5% growth since 2010

Maryland's Gross State Product increased from $242.3 billion in 2000 to $329.1 billion in 2015.

Labor force participation rate has stayed between 65% and 70% since 2007. It currently stands at 68.4%, 5% above the national average.

Maryland Jobs and Households



Maryland Transportation Trends

Addressing Challenges & Reducing GHG Emissions

Demand for travel is directly tied to population, employment, density, and demographics. Population and employment growth adds daily trips that the transportation system needs to accommodate. Where people live, how they travel to work, and their stage of life all influence travel demand in Maryland.

PORT OF BALTIMORE FOREIGN CARGO TONNAGE
31.8M (2016 CY) ▼3.0% (2010-2016)

POPULATION
6.0M (2016 CY) ▲4.4% (2010-2016)

EMPLOYMENT
3.6M (2015 CY) ▲6.2% (2010-2015)

REGISTERED VEHICLES
5.1M (2016 FY) ▲4.9% (2010-2016)

LICENSED DRIVERS
4.3M (2016 FY) ▲4.8% (2010-2016)

MDOT MVA TRANSACTIONS
11.1M (2016 FY) ▲0.8% (2010-2016)

ELECTRIC VEHICLE REGISTRATIONS
6,788 (2016 CY) ▲1014.6% (2012-2016)

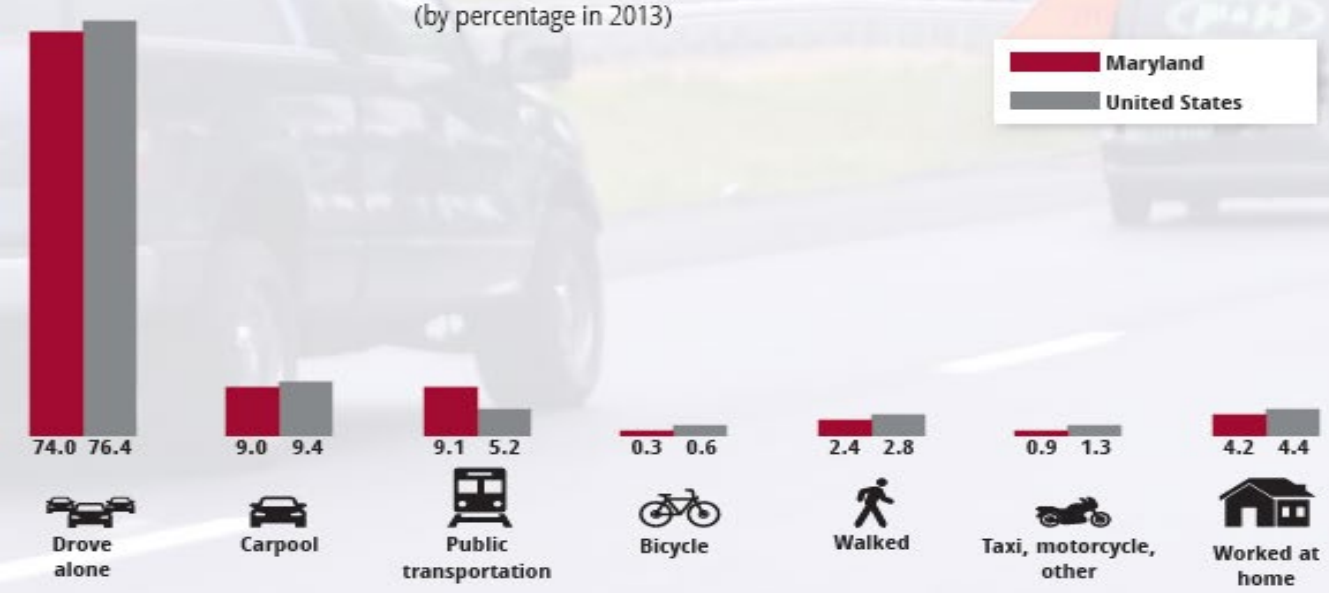
ANNUAL VEHICLE MILES TRAVELED (VMT)
60B (2017 CY) ▲6.6% (2010-2017)

ANNUAL VMT PER CAPITA
9,802 (2016 FY) ▲0.9% (2010-2016)

ANNUAL TRANSIT RIDERSHIP
260.8M (2016 FY) ▼8.6% (2010-2016)

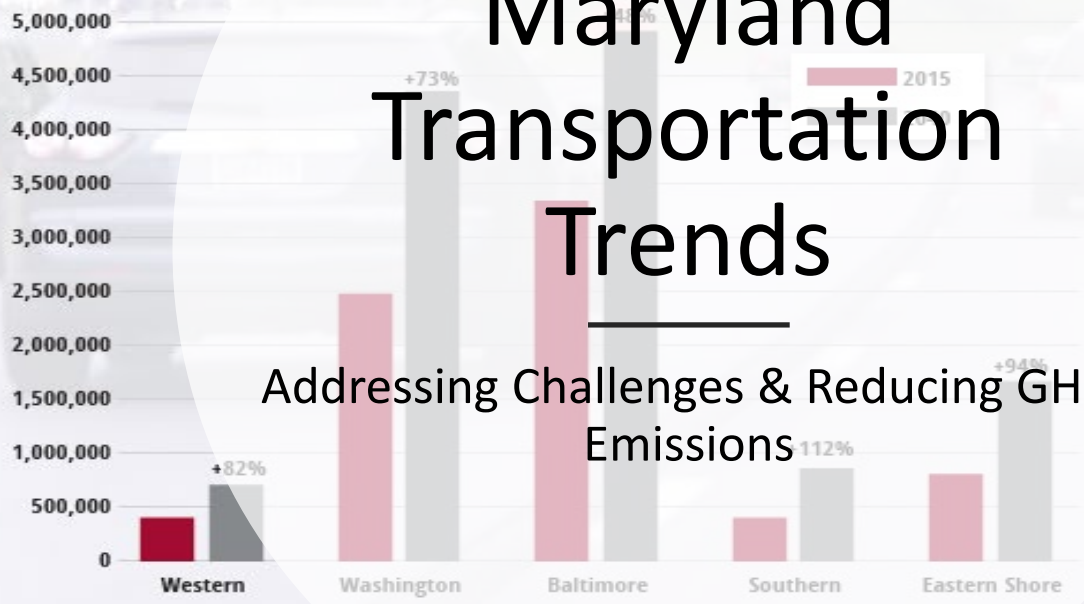
AIR CARRIER EMPLANEMENTS
25.1M (2016 CY) ▲14.6% (2010-2016)

How Marylanders Get to Work
(by percentage in 2013)



Source: State Transportation Statistics, 2015, prepared by the US Department of Transportation Bureau of Transportation Statistics

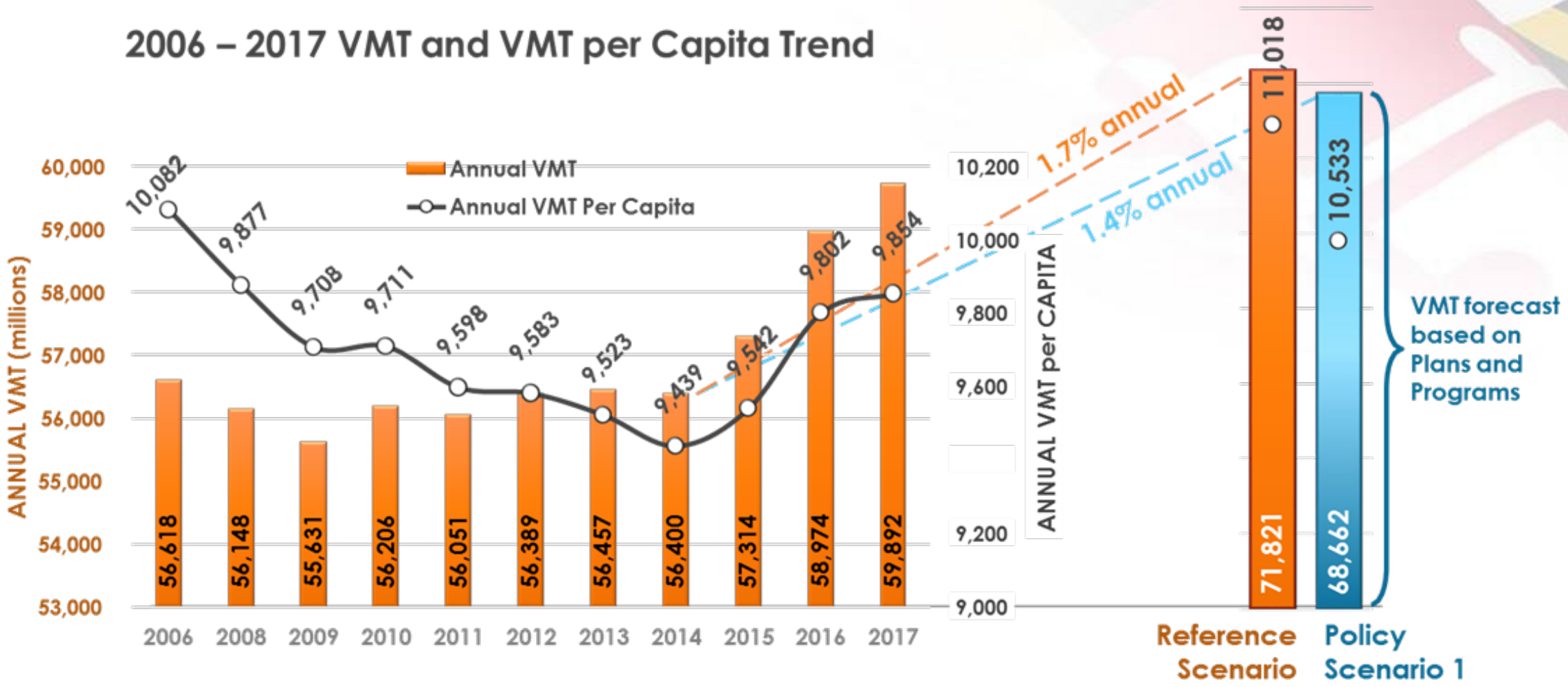
Vehicle Hours of Travel (by Region)



Source: Maryland Department of Transportation State Highway Administration, MSTM V1.1

Economic Growth and Travel Demand

Strong Economies Require Mobility



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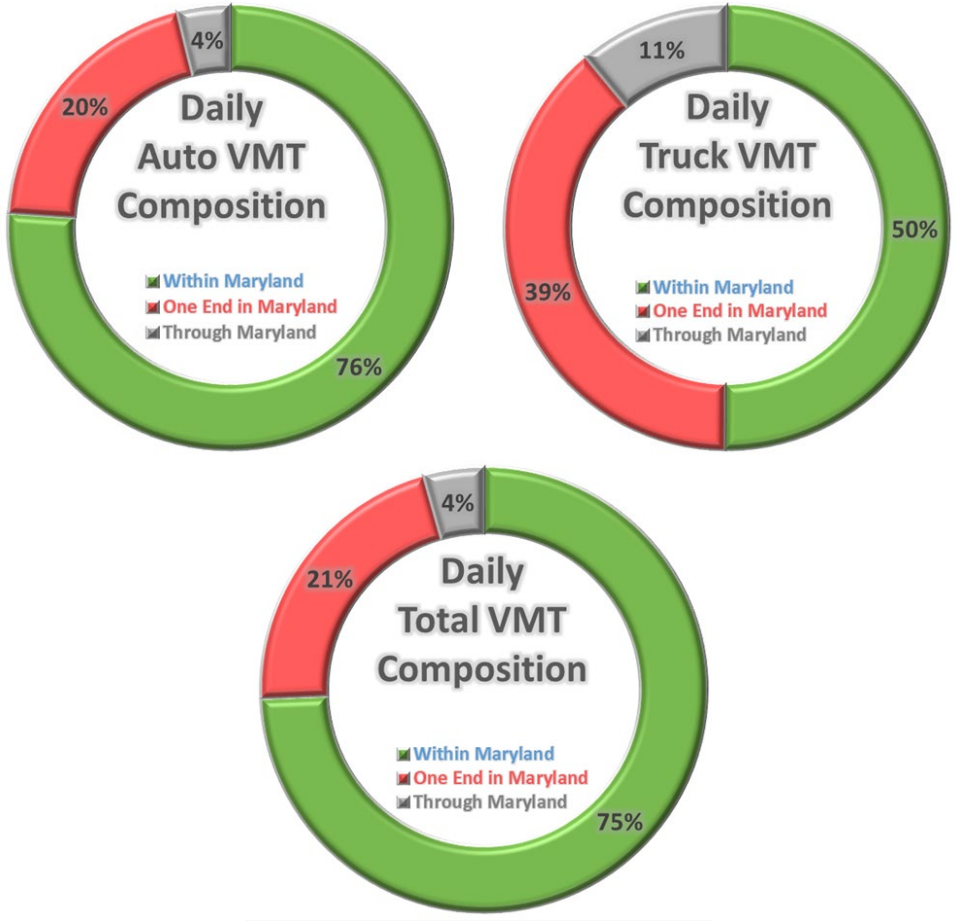
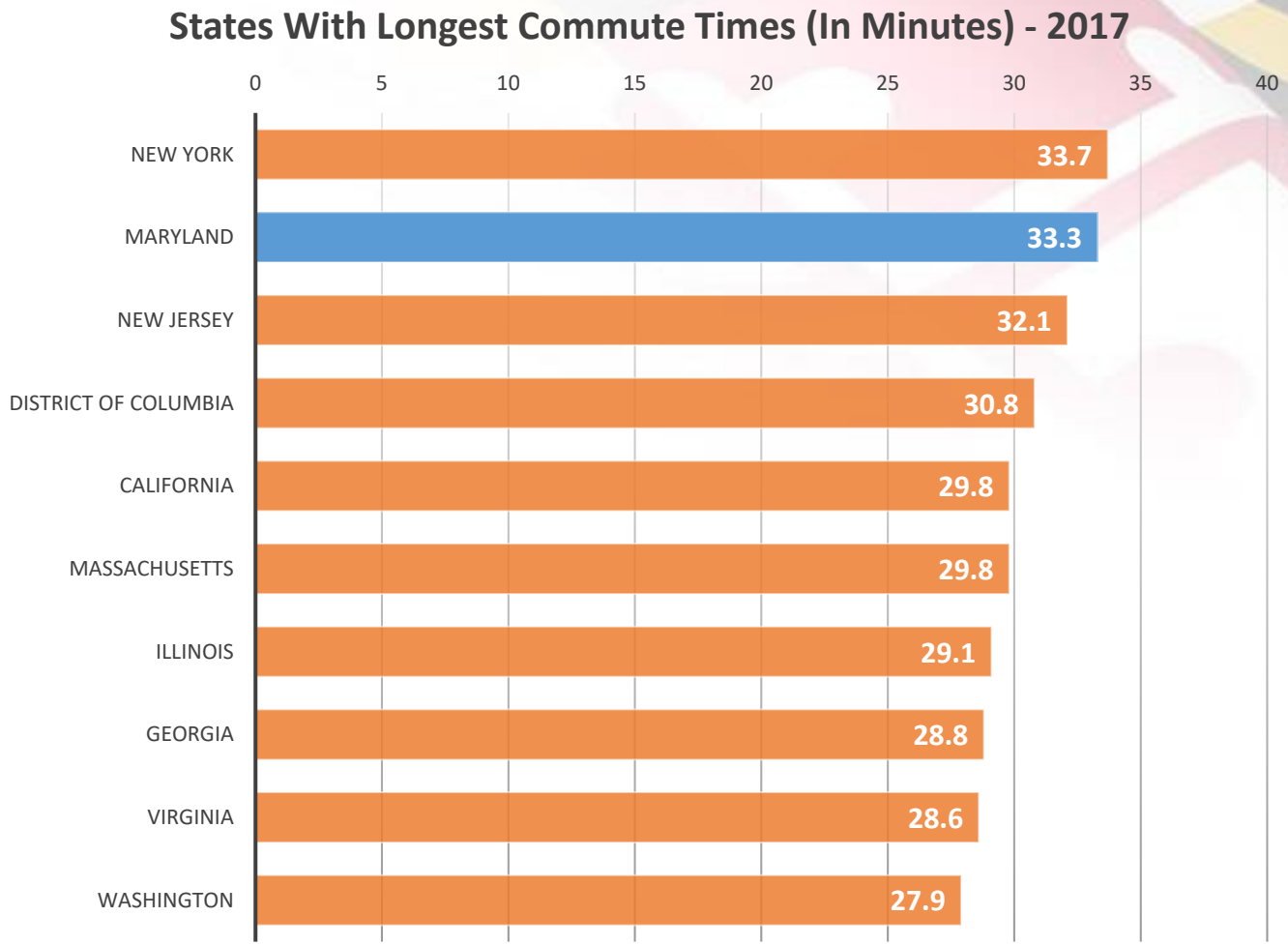
VMT in Maryland

Our Economy and Location Bring Unique Challenges

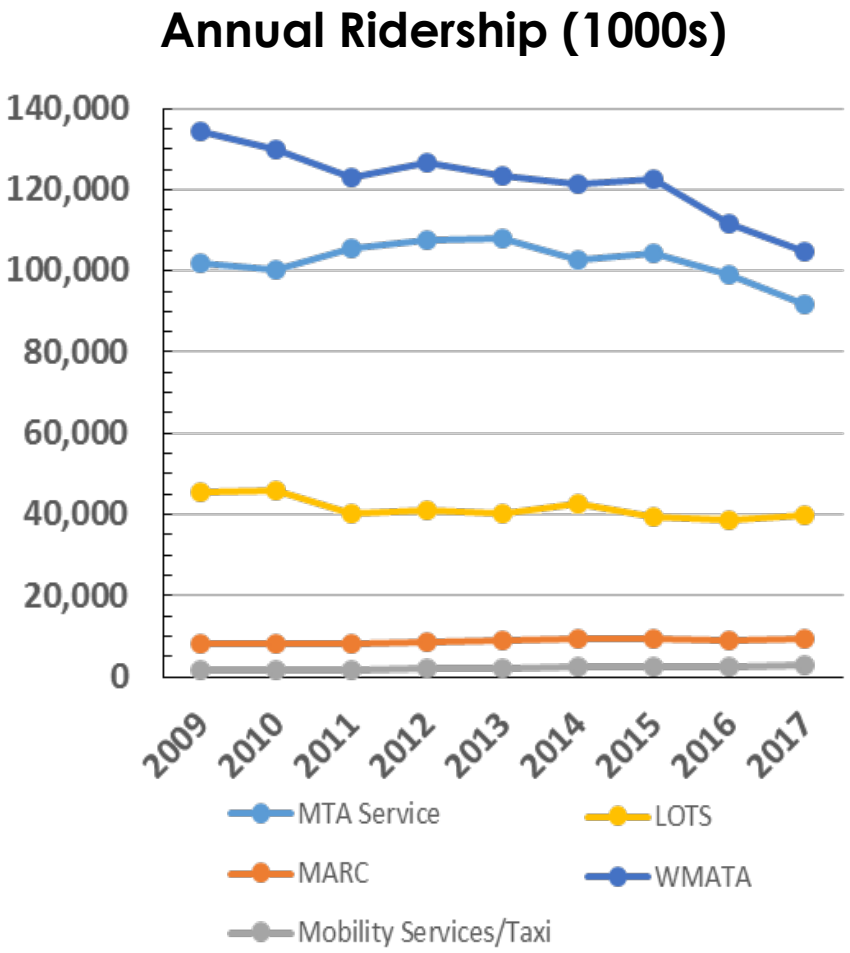


Source – SHA Maryland Statewide Travel Model (2015)



The Role of Public Transportation

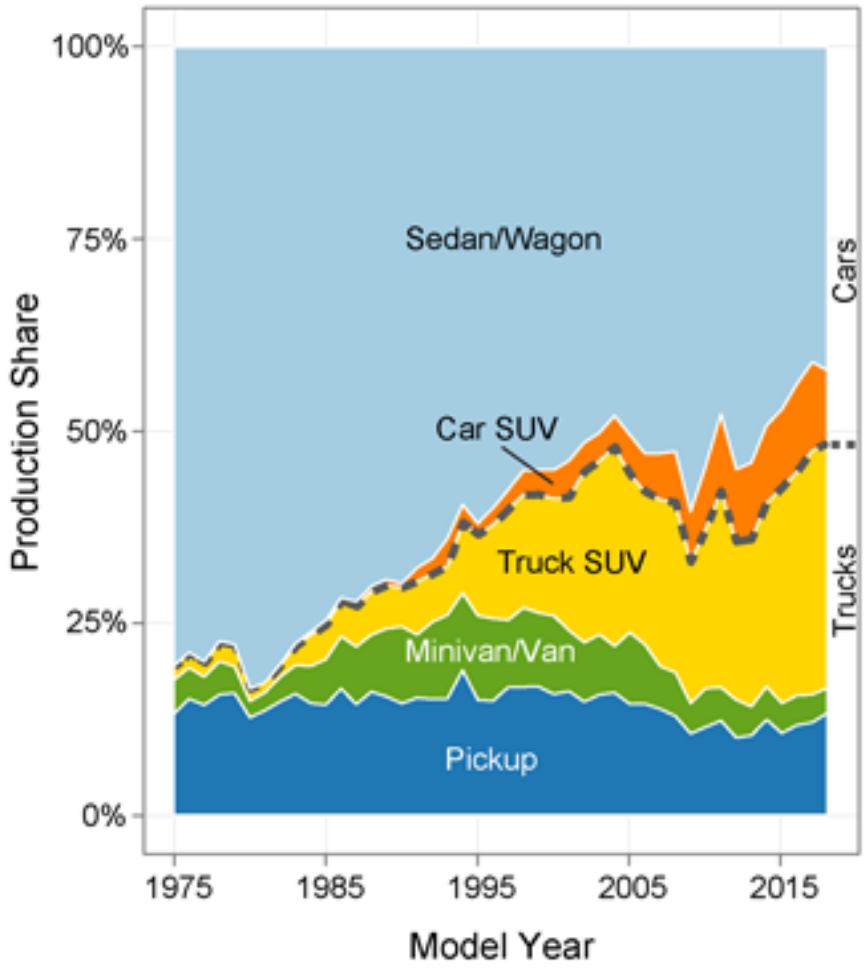
Realities and Opportunities to Reducing GHG Emissions

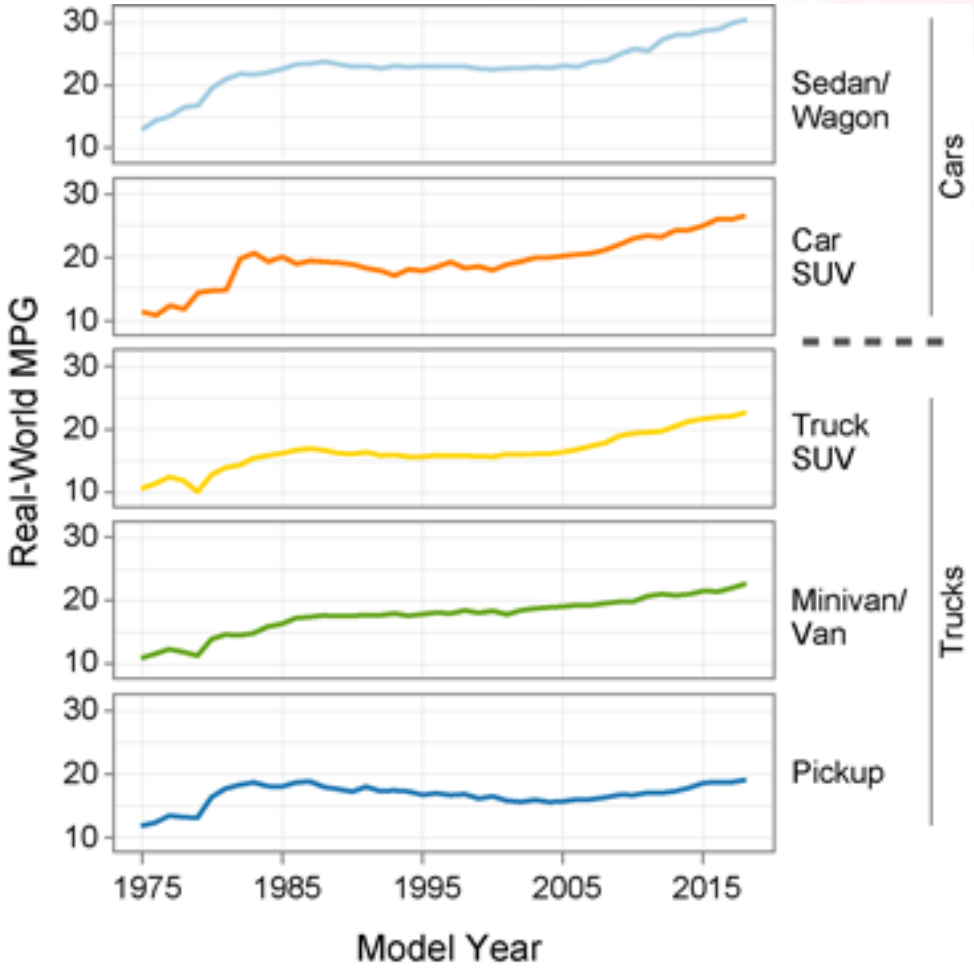


- **Average annual growth rate in MTA service revenue vehicle miles from 2006 to 2017 was 3.1%**, while ridership declined over that same period
- **MD is #5 in transit commute mode share (9%)** behind only IL, MA, NJ, NY
- Over the last 10 years, the share of the capital budget committed to MTA and WMATA has **steadily increased from 29.6% in 2006 to 33.1% in 2016**
- The percent of transit customers within bike or walk distance of fixed route transit **has increased from 49% in 2010 to over 53% in 2018**
- Transit operating cost per revenue mile continues to increase, with a **25% increase in cost since 2013**

Consumer Preference

Increasing share of SUVs, vans, and pickups all with lower average real world MPG, represent over 60% of the MY 2018 market





While the share and diversity of new, efficient technologies are increasing, some benefits are being offset by the market shift away from cars

Source: US EPA Automotive Trends Report

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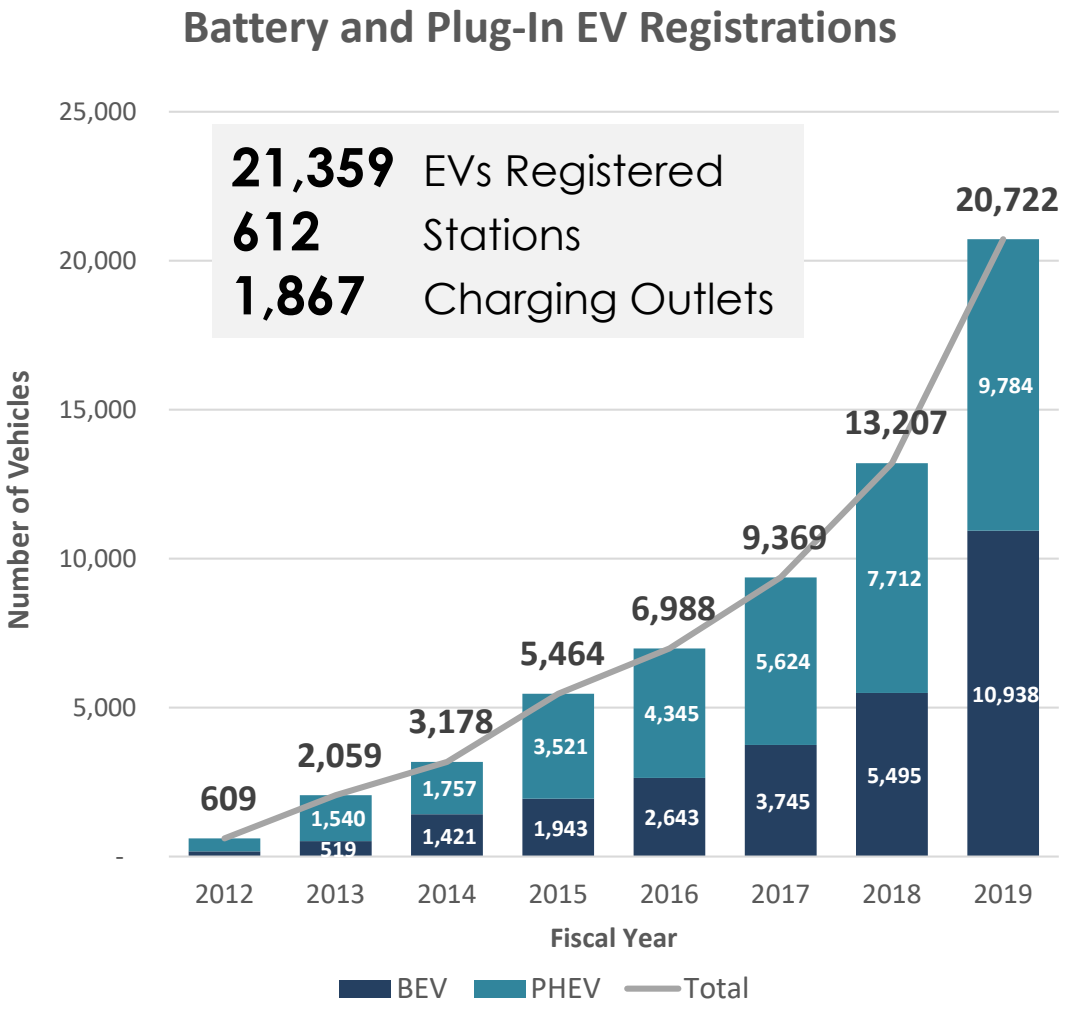
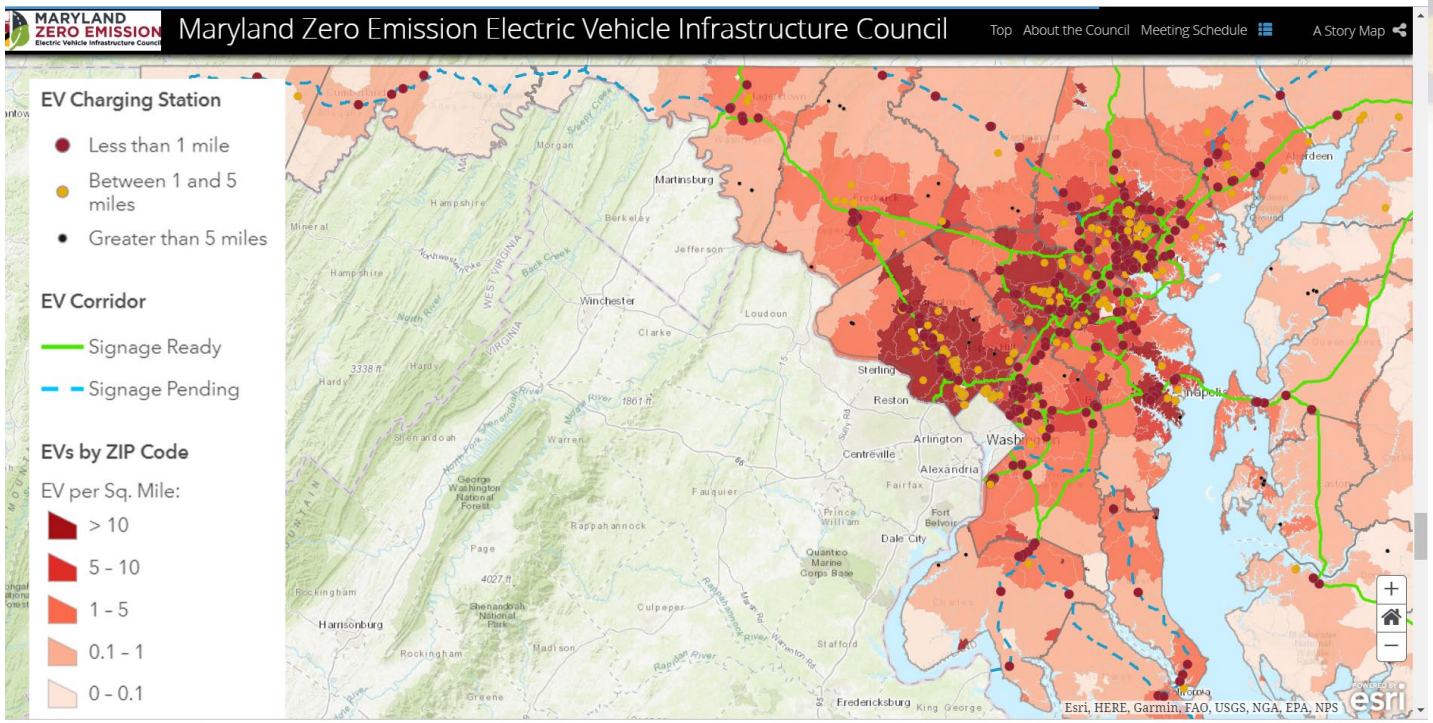
Electric Vehicles





MDOT MARYLAND DEPARTMENT OF TRANSPORTATION

Highway Congestion

Inefficiencies in Transportation Increase GHG Emissions

- **Over 86 million annual hours of delay** on the MDOT highway network translating to over **$4.1 billion in wasted time and fuel**
- **19% of freeway VMT and 29% of arterial VMT** operate in congested conditions during the PM peak hour

MDOT SHA's CHART incident management program saved motorists $1.465 billion in user costs and helped reduce delays by 38.6 million vehicle hours in CY 2017.

MDTA's electronic toll transactions increased from 79% of all transactions in 2015 to 83% in 2018.

MDOT SHA is developing Transportation Systems Management and Operations (TSMO) solutions that provide active traffic management and integrated corridor management capabilities

Washington Area Traffic Relief Plan

The largest initiative in the Traffic Relief Plan will evaluate transformative solutions to address congestion on I-270 and I-495.

- **Top 5 highest volume** highway sections in Maryland are within program area
- Today, on average, severe congestion lasts for **7 hours each day on I-270 and 10 hours each day on I-495**
- Many sections experience speeds **less than 15 mph under existing conditions** and traffic is expected to deteriorate

Congestion Benefits

- All alternatives are projected to **reduce delay by 20% or more** compared to the No Build condition
- **Equates to projected daily fuel savings of about 19,000 gallons (~7 million gallons / year)**

Alternatives	Delay Reduction vs. No Build	
	AM Peak	PM Peak
2040 No Build	0%	0%
Alternative 5	20%	22%
Alternative 8	24%	33%
Alternative 9	34%	33%
Alternative 10	35%	35%
Alternative 13B	27%	22%
Alternative 13C	26%	35%

**Source: VISSIM Simulation Model. Values reflect delay in all lanes (GP & HOT/ETL) in the year 2040, and also include interchange ramps and junctions.*

Legend

- > 30% decrease in average delay
- 20% - 25% decrease in average delay
- 25% - 30% decrease in average delay
- < 20% decrease in average delay

Source: MDOT Workshop Spring 2019 Presentation

The New Mobility Future

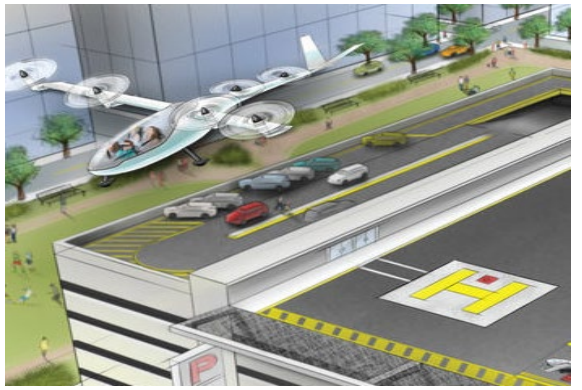
The opportunities from CAVs, new modes, and drones

Connected and automated vehicles (CAVs) are likely to transform personal and freight travel

New fuels, vehicle ownership models, and modes of transportation are emerging and reshaping choices and preference, fueled by private sector innovation

Image Source: Shared Mobility News
https://www.sharedmobility.news/

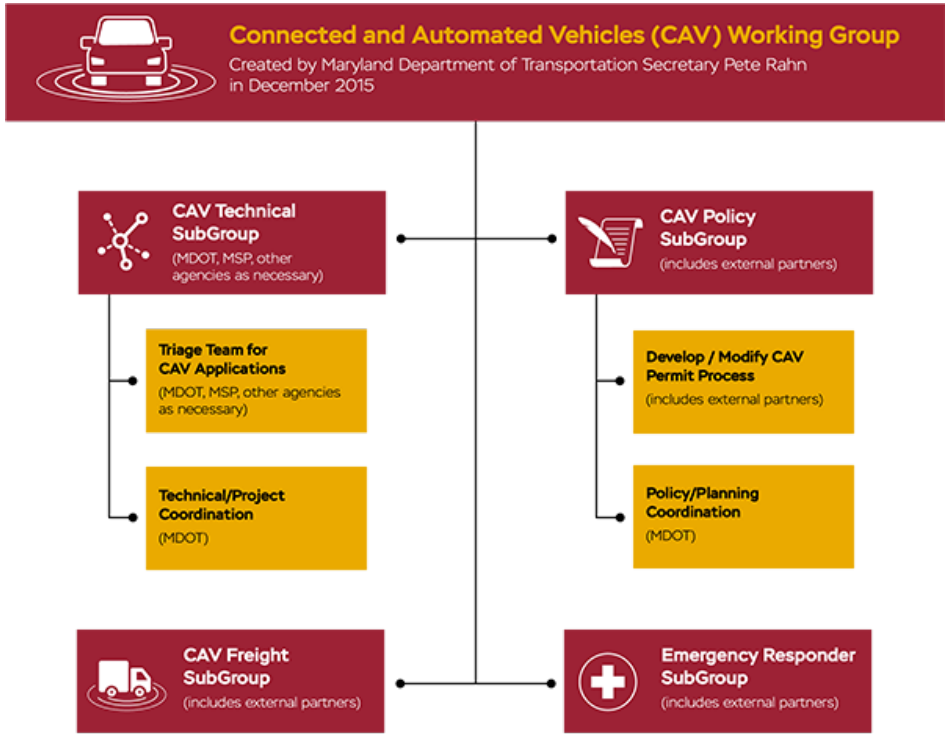
Unmanned aerial vehicles are a promising tool for transportation system management, package delivery, and even people movement

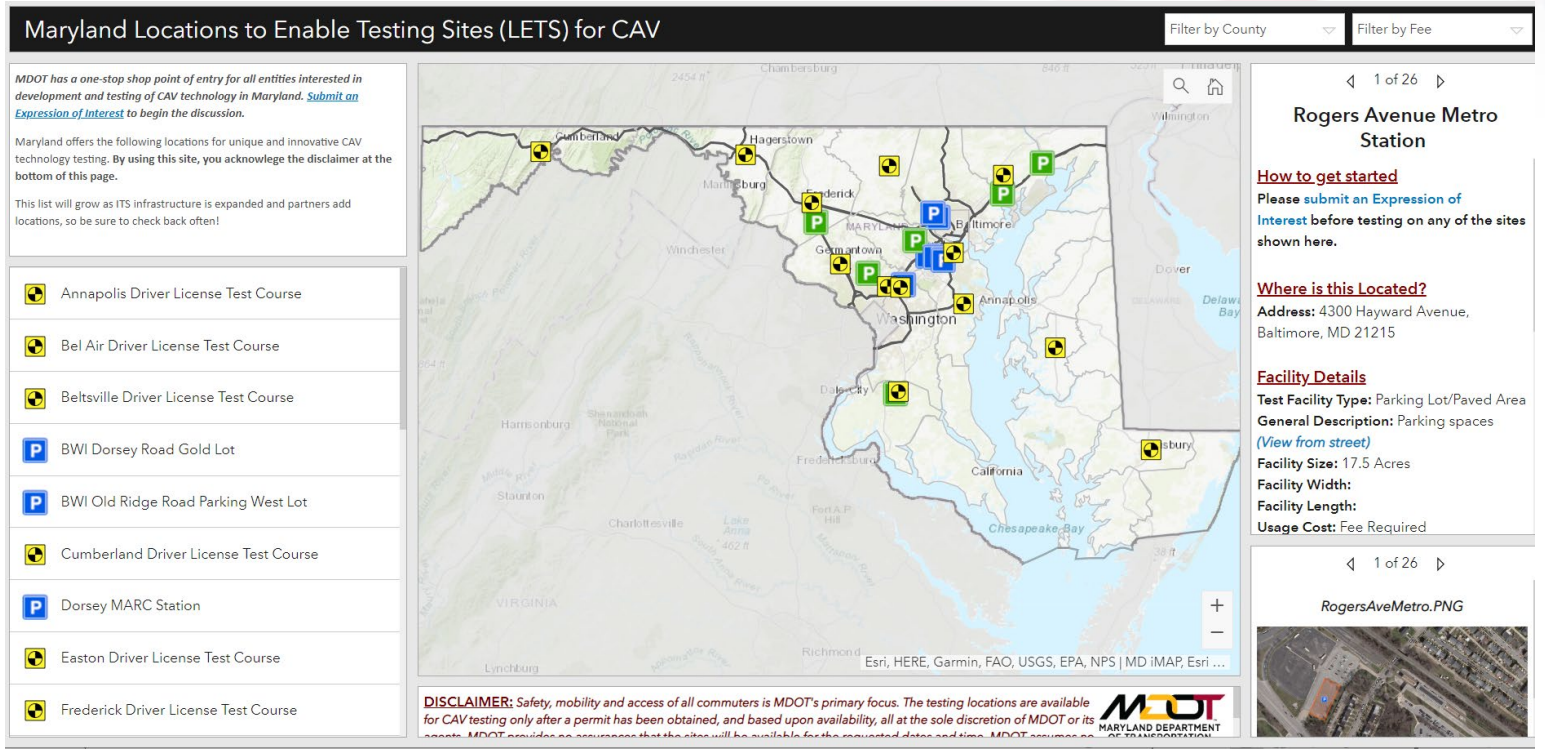


What Are We Doing?

MDOT Actions Positioning Maryland as a Leader

- Key role as facilitator, policymaker, and regulator.
- MDOT CAV Strategic Plan
- Maryland Locations to Enable Testing Sites (LETS) for CAV

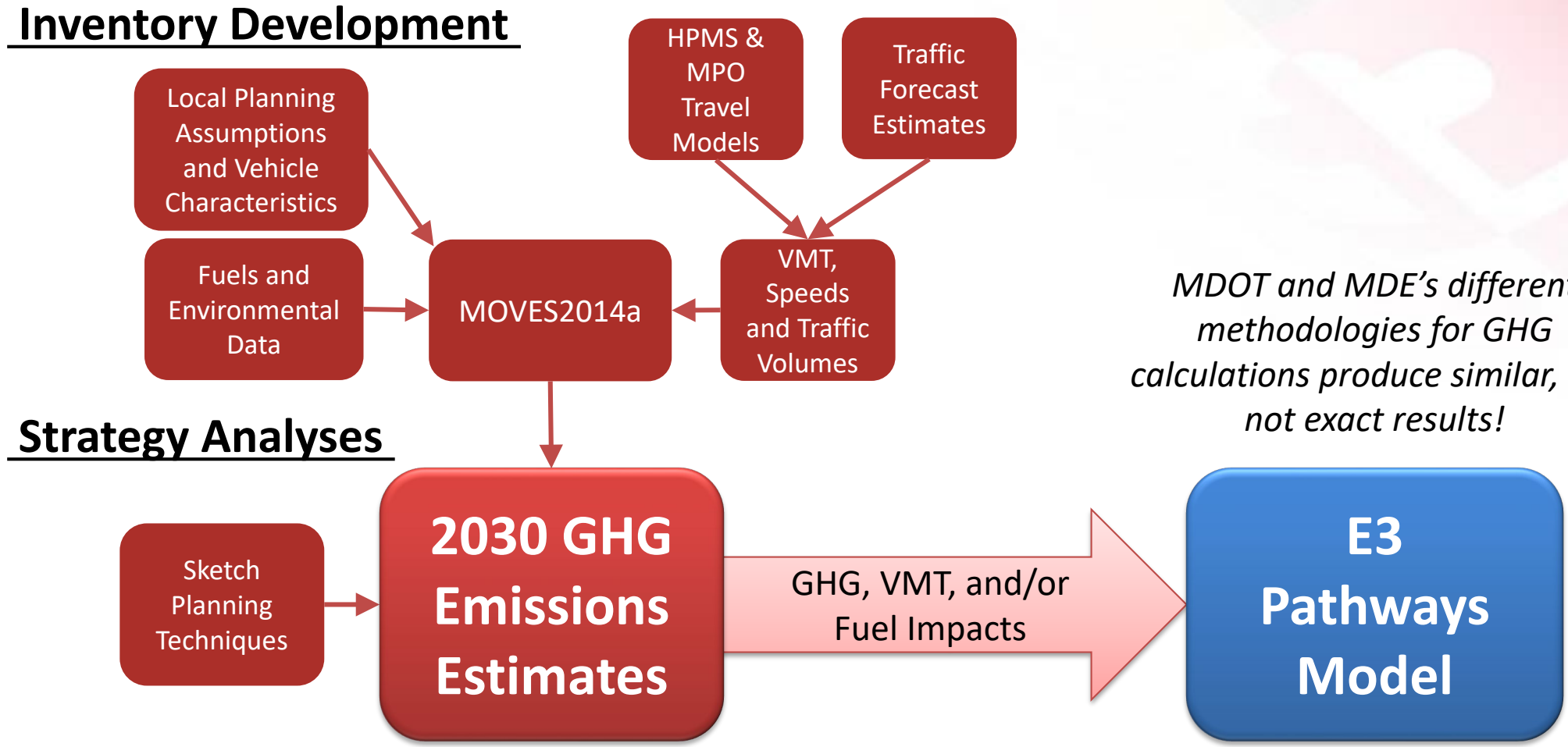




The 2030 Picture

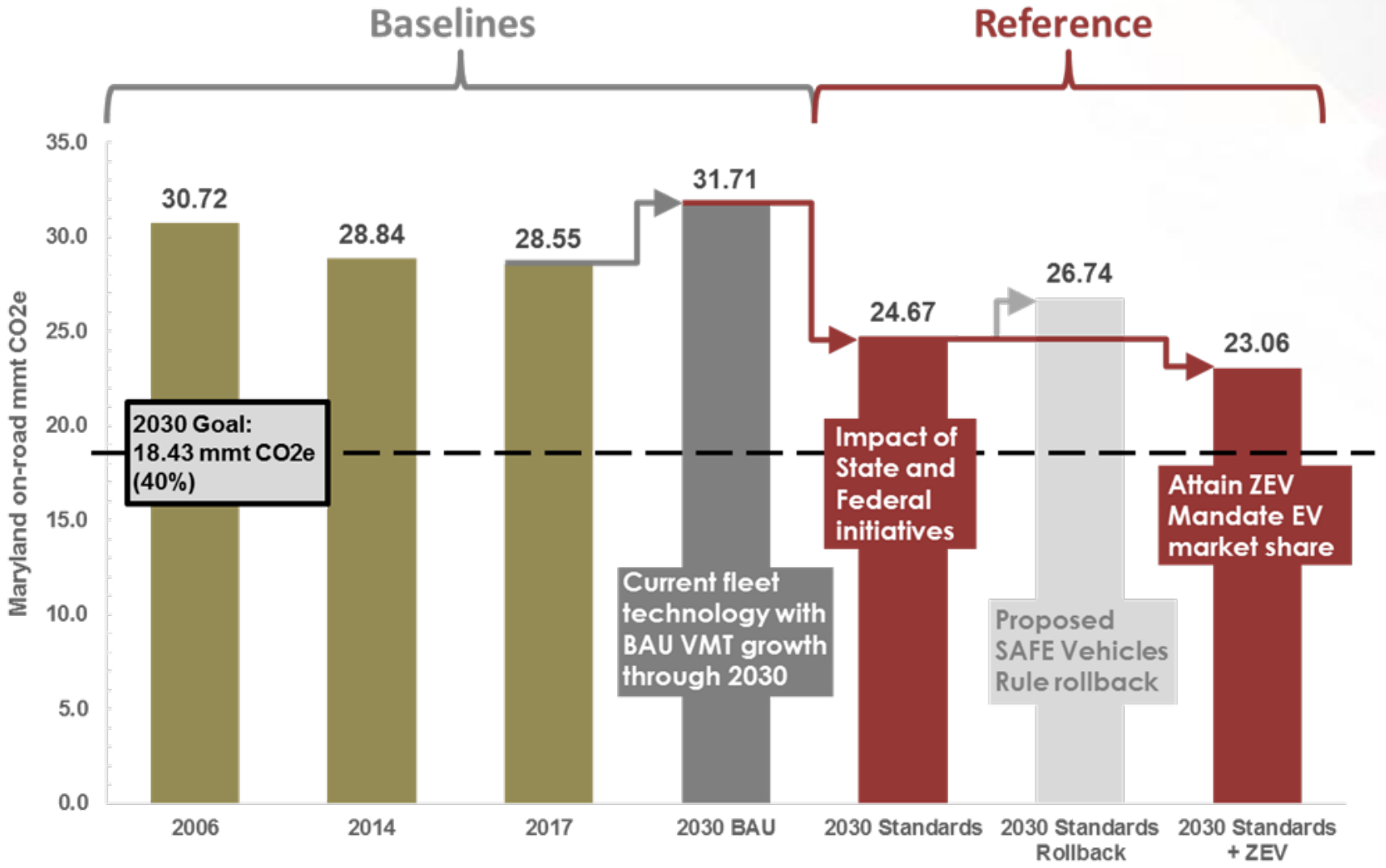
Where will current trends takes us through 2030, and if the best-case outcomes are achieved, how far could we reduce emissions from transportation

GHG Emissions Modeling



MDOT and MDE's different methodologies for GHG calculations produce similar, but not exact results!

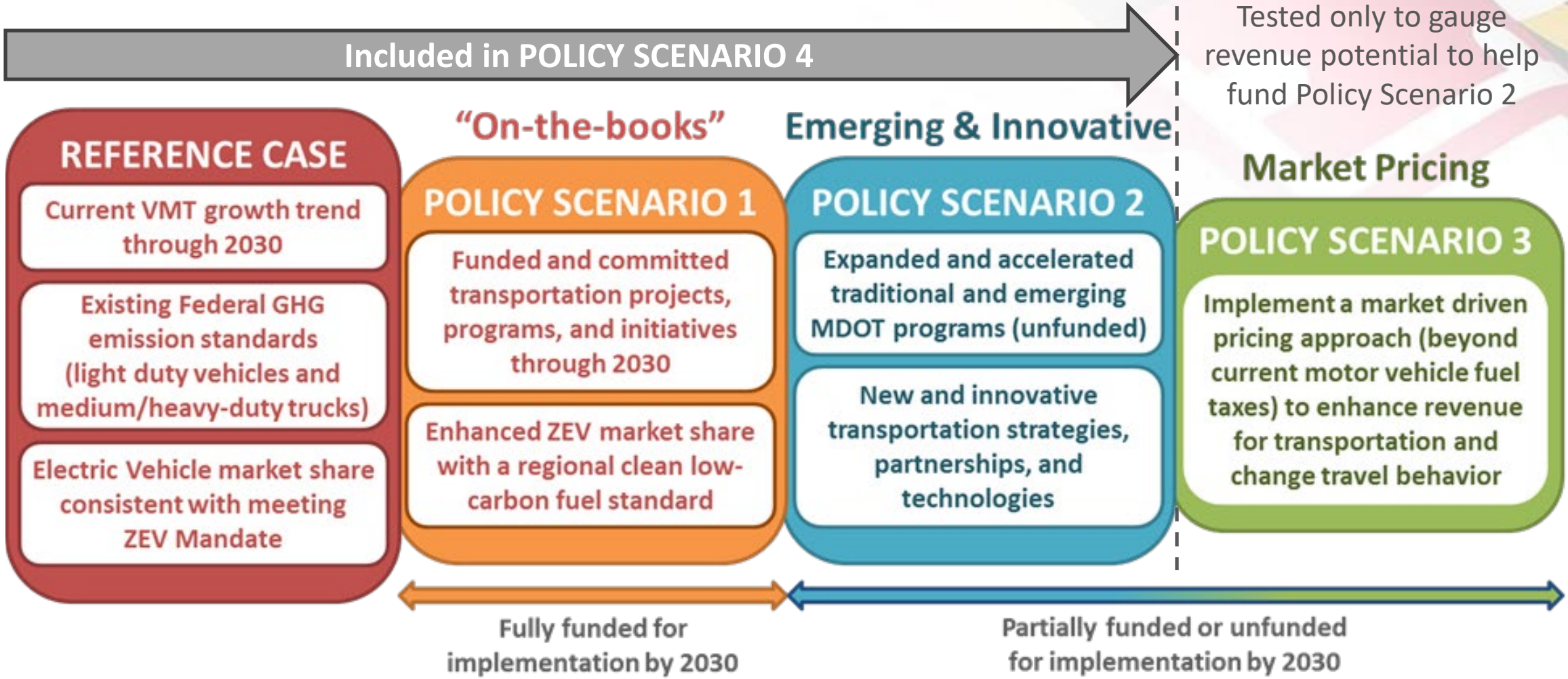
Baseline and Reference Scenarios



- In 2014, a reduction of **1.96 billion VMT** is required to reduce GHG emissions by 1 mmt CO_2e
- In 2030, a reduction of **2.87 billion VMT** is required to reduce GHG emissions by 1 mmt CO_2e
- **In other words, 2030 VMT would have to be reduced by 4 percent to achieve a 1 mmt CO_2e reduction in on-road emissions**

The MDOT Scenario Process

The Careful and Evidence Driven Approach to 2030



Policy Scenario 4 Strategies - "On the Books"

Strategy	GHG Emission Reduction (mmt CO_2e)	Reduction Potential	Estimated Costs ($M)	Estimated Cost
Cumulative impact of the 2018 MPO Plans & Programs	1.060	ooo	$7,296	$$$
On-Road Technology (CHART, Traveler Information)	0.163	oo	$246	$$
Freight and Freight Rail Programs (MDOT MTA rail projects and National Gateway)	0.072	o	$31	$
Public Transportation (New capacity, improved operations, Bus Rapid Transit in MPO MTPs by 2030)	0.033	o	$2,144	$$$
Public Transportation (fleet replacement / technology based on current procurement)	0.024	o	$256	$$
TDM (Commuter Choice MD, Commuter Connections ongoing and expanding programs)	0.142	ooo	$30	$
Pricing Initiatives (conversion to All Electronic Tolling)	0.018	oo	$49	$
Bicycle and Pedestrian Strategies (program continuation and expansion through 2030)	0.004	o	$205	$$
Land-Use and Location Efficiency (MDP assumptions)	0.318	ooo	N/A	$
Port of Baltimore Dray Track Replacements	0.005	o	$18	$
BWI Airport parking shuttle bus replacements	<0.001	o	$52	$
Total Policy Scenario #1	**1.841**		**$10,326**	

Policy Scenario 4 Emerging Strategies

Strategy	GHG Emission Reduction (mmt CO_2e)	Reduction Potential	Estimated Costs ($M)	Estimated Cost
Freeway Management/Integrated Corridor Management	0.052	oo	$506 to $760	$$
Arterial System Operations and Management	0.049	oo	$453 to $680	$$
Limited Access System Operations and Management	0.023	oo	$108 to $152	$$
Managed Lanes (I-270/I-495 Traffic Relief Plan Implementation)	0.051	oo	$6,650 to $9,840	$$$
Intermodal Freight Centers Access Improvement	0.017	oo	$2,240 to $3,136	$$$
Commercial Vehicle Idle Reduction, Low-Carbon Fleet	0.055	oo	Nominal §	$
Eco-Driving (informal implementation underway)	0.042	oo	$3 to $5	$
Lead by example - Alternative Fuel Usage in State Fleet	0.004	o	Nominal §	$
Truck Stop Electrification	0.007	o	$9 to $38	$
Transit capacity/service expansion (fiscally unconstrained)	0.069	oo	$2,307 to $2,659	$$$
Expanded TDM strategies (dynamic)	0.314	ooo	$15 to $30	$
Expanded bike/pedestrian system development	0.081	oo	$103	$$
Freight Rail Capacity Constraints/Access	0.072	oo	$300	$$
Regional Clean Fuel Standard	0.382	ooo	$148	$$
MARC Growth and Investment Plan / Cornerstone Plan	0.052	oo	$1,078	$$$
Additional 100K Ramp Up (total of 704,840 EVs)	0.322	ooo	$54	$$$
50% EV Transit Bus Fleet	0.036	oo	$93	$
Total Policy Scenario #2 "Emerging"	**1.628**		**$14,068 - $19,077**	

Policy Scenario 4 Innovative Strategies

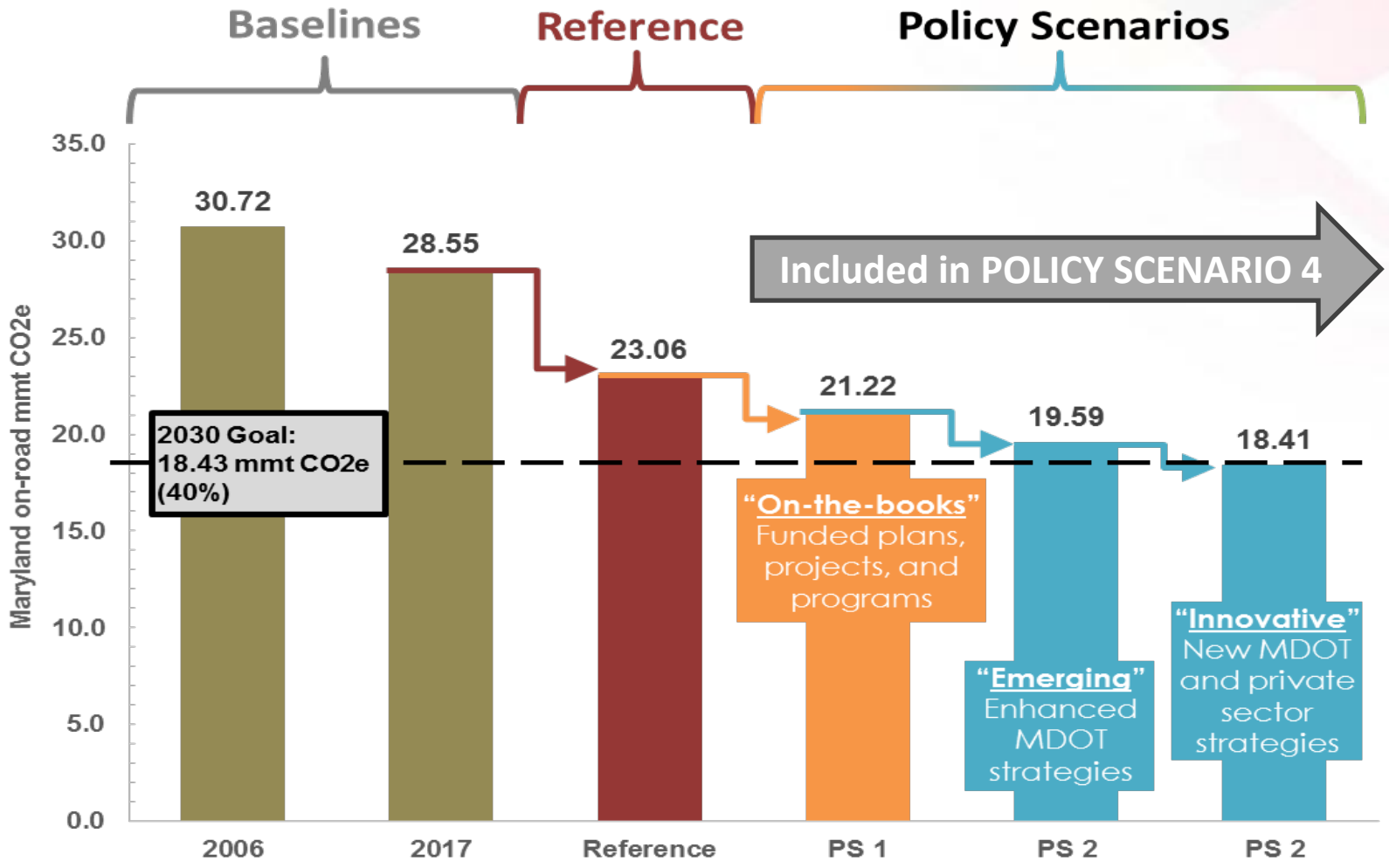
Strategy	GHG Emission Reduction (mmt CO_2e)	Reduction Potential	Estimated Costs ($M)	Estimated Cost
Autonomous/Connected Vehicle Technologies	0.647	ooo	$43 - $62	$
Variable Speeds / Speed Management on Freeways	0.083	oo	$7 - $14	$
Zero-Emission Trucks/Truck Corridors	0.059	oo	$34 to $128	$$
Ride-hailing / Mobility-as-a-Service (MaaS)	0.256	ooo	Nominal §	$
Intercity Bus Service Expansion	0.050	oo	$2,240 to $3,136	$
Pay-As-You-Drive (PAYD) Insurance	0.062	oo	Nominal §	$
Freight Villages/Urban Freight Consolidation Centers *	0.023	oo	$4,705 - $ 6,893	$$$
SCMAGLEV/Hyperloop **	0.056	oo	$45,300 to $47,300	$$$+
Total Policy Scenario #2 "Innovative"	**1.186**		**$50,089 - $54,397**	

*Freight Villages/Urban Freight Consolidation Center costs represent a combination of private sector investment and Maryland commitment

** High Speed Rail and SCMAGLEV costs include a majority of private costs and a mix of Federal and regional funding.

Policy Scenario Results

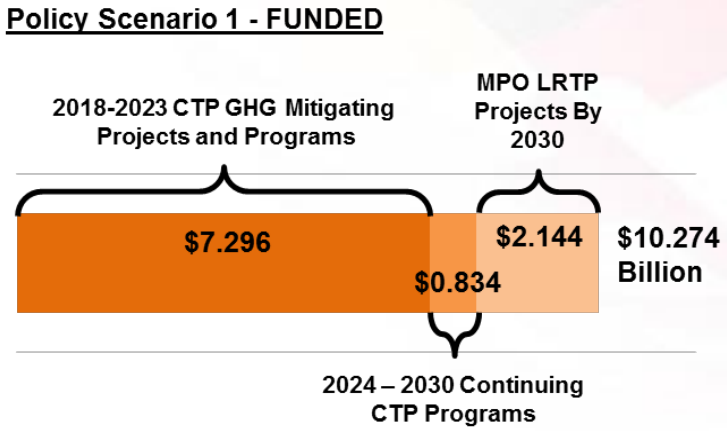
Transportation GHG Reduction by 2030



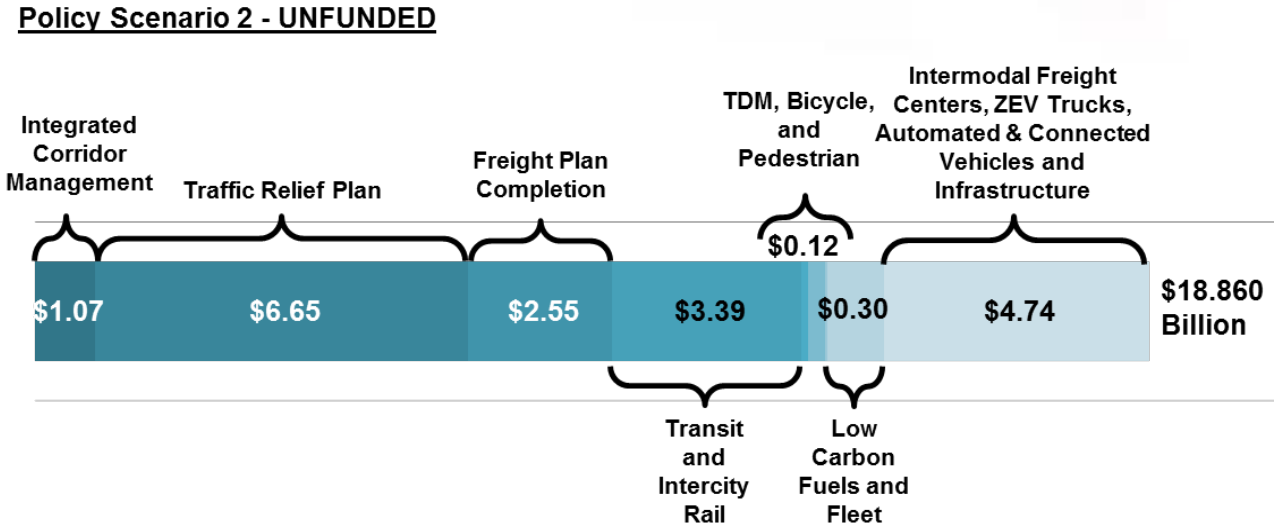
Costs and Cost Effectiveness

Our Funding Need and the GHG Return on Investment

- **Estimated $10.2 billion programmed or planned toward GHG supportive projects through 2030**



- **Up to $18 billion more needed** to implement suite of emerging and innovative strategies through 2030



Co-benefits and Economic Impacts

Environmental Co-benefits

- Improved Air Quality providing significant reductions to ozone and fine particulates
- Reduced Impacts on infrastructure, water quality and sensitive ecosystems

Public Health

- Criteria pollutant emission reductions
- Reduced exposure and crash reduction
- Quality of life and public health improvement with alternative transportation options (non-motorized)

Equity

- Enhancing access to jobs and reducing transportation costs
- Matching opportunities to skills and providing access

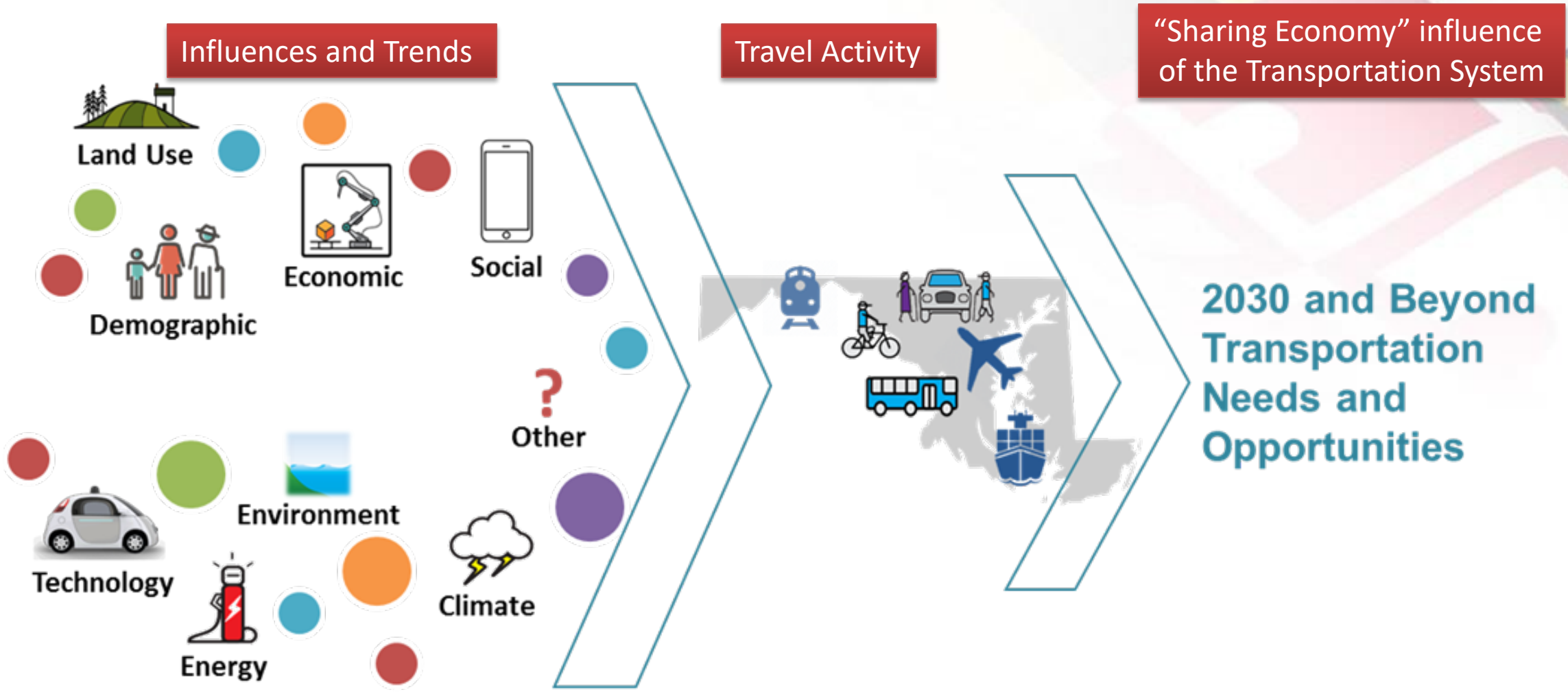
Economic Vitality

- Consumer Cost Savings
- Business Cost Savings
- Changes in Government Expenditures
- Net Macroeconomic Benefits

Beyond 2030

How will the emerging trends and disrupters impact the transportation sector?

Transportation for 2030 and Beyond



2050 Perspective on Opportunities, Challenges and Uncertainty

GHG Emissions Opportunity

Trends and drivers that present inherent opportunities to decrease GHG emissions from the transportation sector

- **Federal GHG Emission Standards**
- **ZEV market share growth**
- **Transition to an electric transit fleet**

GHG Emissions Challenge

Trends and drivers that present inherent challenges to mitigating GHG emissions in the transportation sector

- **Population and VMT growth**
- **System delay and reliability**
- **Transportation costs**

Uncertain

Trends and drivers where there are too many uncertainties in transportation sector impacts or extent of relevance through 2030

- **Autonomous and connected vehicles**
- **Mobility as a service**
- **Change in freight logistics patterns**
- **Climate impacts and system resiliency**

Success Stories

- MDOT SHA improved **93.9 directional miles for bicycle access** in FY 2017 and **62.5** miles in FY 2018
- MDOT MAA procured **20-60' articulated Shuttle Buses** powered by **Clean Natural Gas (CNG)** for transportation between the BWI Marshall Airport terminal and the Consolidated Rental Car Facility
- MDOT MPA **reduced emissions by 19% between 2012 and 2016** while at the same time **increasing cargo throughput by 10%**
- MDOT MPA **continues to replace more than 173 dray tucks** through USEPA's DERA grant and helped Canton Railroad install **idle-reduction technology in six switcher locomotives**
- MDOT SHA's **CHART** reached a milestone of **one million responses** (since 1995) – Saved motorists **$1.465 billion in user costs** and helped reduce delays by **38.6 million vehicle hours** in **CY 2017**
- FY 2018–FY 2023 CTP set aside **$3.310 billion for transit projects** that will increase transit reliability and contribute to emissions reductions
- In FY 2018, approximately **29,000 jobs** were supported in Maryland by MDOT, an increase of more than **3,400 jobs over FY 2017**

2018 Mitigation Working Group Recommendations - Discussion on Progress & Next Steps

Colleen Turner – Assistant Director, OPCP
Maryland Department of Transportation
August 13, 2019

MARYLAND DEPARTMENT OF TRANSPORTATION

Recommendations and Progress Summary

1. ZEEVIC incentives and policies	Implementation
2. GHG emission reduction potential of vehicle and infrastructure technologies, and associated co-benefits including equity	Research Ongoing
3. Enhance travel demand management, land use/smart growth, active transportation, and inter-city travel strategies	Research Ongoing
4. Develop tracking of key indicators of GHG reduction strategies	Implementation
5. Review state fleet procurement procedures and practices	Research Ongoing
6. Public transportation and school bus electrification	Research Ongoing

Recommendation # 1

Implementation

As part of the process to meet the State's current **light-duty zero emission vehicle (ZEV) goals** and projections, the Maryland **Electric Vehicle Infrastructure Council (EVIC)** [Now ZEEVIC] should specifically assess:

- Bolstering the State's consumer **purchasing incentives** for ZEVs, and regulatory and financial incentives for high power/speed ZEV infrastructure installation, including particular attention to investments and incentives for challenging areas;
- Policies that employ Maryland's public utilities to aid in efforts to **rapidly and equitably expand EV infrastructure** in Maryland, with specific targets in rural areas; and
- Policies that **make it easier to install EV charging infrastructure** at multi-family housing locations with attention to high density, urban populations.

Progress and Status of Efforts

- **Highlight: Maryland ranked in the Top Tier of ZEV States on the Electrification Coalition ZEV State Policy Scorecard, second only to California**
  - Maryland – **Tier 1** *(CA and CT are the other two)*

    " Maryland places near the top due to generous financial incentives for purchasing ZEVs and for incentives offering up to $5,000 for the installation of workplace chargers."

- Expansion Efforts:
  - Supplementing existing alternative fuel corridors with the following: US 1, I-795, I-97, MD 140, MD 100, MD 32, MD 4, MD 5 / MD 235, US 113, US 13, and MD 528

- Equity:
  - Right to Charge
  - Morgan State Survey Report Update (2018) - "…. legislation to address the difficulty of charging in HOAs or multifamily housing would allow for greater equity and EV market penetration"
  - Howard County Legislation

PC 44 / Order 88997

- PC 44: Transforming Maryland's Electric Grid
  - EVIC provided letter of support for PC 44
- Order 88997 approves incentives for about 5,000 EV chargers across residential, MUD, and public charging portfolios.
  - Order intended to further EV goals, while balancing impact on ratepayers, and limited to PSC's focus on grid impacts of EVs
  - Authorizes a 5-year pilot program, with semi-annual reports
- Utilities directed to work with EVIC to develop programs aimed at advancing equitable access to transportation electrification

Zero Emission Electric Vehicle Infrastructure Council (ZEEVIC)

- Maximize the use of grant and alternative funding opportunities for EV / EVSE in MD.
- Develop an approach to address the Right to Charge and EV Parking / Anti-Icing.
- Ensure EV readiness through strategic infrastructure planning that focuses on corridors, workplaces, and communities.
- Continue education and outreach coordination with a focus on diversity and equity.

Next Steps

- Developing a better understanding of the environmental and economic opportunities that can be realized through the growth of BEV ownership and EVSE installation in Maryland
- Ensuring EV readiness by finding an appropriate balance between home/workplace/public charging infrastructure
- Developing a better understanding of the needs of underserved communities within the context of EV deployment
- Meetings every other month – Open to the public

Recommendation # 2

Research Ongoing

The Maryland Department of Transportation (MDOT) should continue to **research and evaluate the GHG emission reduction potential** of **vehicle and infrastructure technologies**, including:

- Connected and automated vehicles;
- EVs and other ZEVs;
- Transportation network companies/shared rides; and
- System operations.

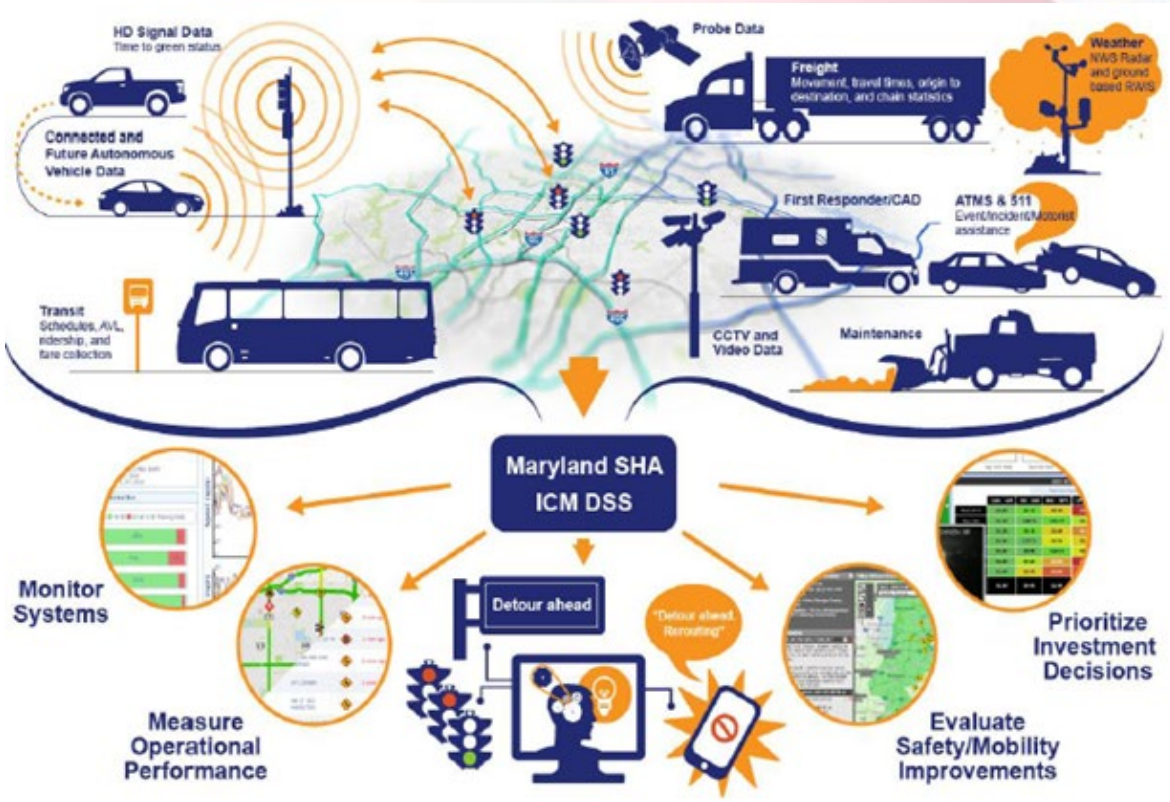
The evaluation effort should include consideration of **safety, congestion, and equity** issues including **public health, economic, and workforce impacts**.

Connected and Automated Vehicles

- Established a Connected and Automated Vehicle (CAV) Working Group as the central coordination point
- The Aberdeen Test Center has been recognized as a federal testing location for AV and US 1 was selected to pilot an innovative technology corridor
- CAV strategic plans document opportunities, challenges, priorities, strategies, and recommendations to help guide the State in planning and implementing CAV technology

System Operations

- MDOT SHA is a recognized national leader in the testing and deployment of real time technologies to adjust signal operation
- The system uses real-time traffic conditions and artificial intelligence (AI) to adjust the timing of traffic signals
- Traffic Relief Plan will improve traffic operations for 700,000 drivers per day on 14 major corridors across the state ($50.3 million in the FY 2019-2024 CTP)



Recommendation # 3

Research Ongoing

MDOT should continue to enhance **travel demand management strategies, land use/smart growth, active transportation, and inter-city travel strategies**, in **collaboration with the Maryland Department of Planning** (MDP) and other State agencies and stakeholders.

Transportation Demand Management

- Emission Reductions through Transportation Emission Reduction Measures (TERMs) (Source: 2019 AR)
- Commuter Choice Maryland – TDM Program CommuterChoiceMaryland.com
- MDOT SHA to construct 642 Park and Ride spaces and finalize design of 286 spaces in the coming year

PROGRAM	PROGRAM DESCRIPTION	DAILY REDUCTION IN VEHICLE TRIPS*	DAILY REDUCTION IN VMT*
COMMUTER CONNECTIONS TRANSPORTATION EMISSIONS REDUCTION MEASURES**			
Guaranteed Ride Home	Provides transit users or carpoolers up to four rides home per year in a taxi or rental car in the event of an unexpected personal or family emergency	6,398	181,335
Employer Outreach	Supports marketing efforts to increase employee awareness and use of alternatives to driving alone to work every day	102,625	1,841,429
Integrated Rideshare	Promotes other alternative transportation services to employers and to the general public. Commuter information system documentation is provided with comprehensive commute information, to include regional TDM software updates, transit, telework, park-and-ride and interactive mapping	1,779	51,340
Commuter Operations and Ridesharing Center	Updates and maintains the Commuter Connections database for ride-matching services and provides information on carpooling, vanpooling, telecommuting, bicycling and walking for the Washington-Baltimore metropolitan region	19,949	401,327
Telework Assistance	Provides information to employers in Maryland on the benefits of telecommuting and assists in setting up new or expanded telework programs for employers	14,839	361,204
Mass Marketing	Promotes and communicates the benefits of alternative commute methods to single-occupant vehicle commuters through the media and other wide-reach communications	10,133	163,250
MDOT MTA TRANSPORTATION EMISSION REDUCTION MEASURES			
MDOT MTA College Pass	Offers a subsidized monthly transit pass to full- or part-time students enrolled in greater Baltimore metropolitan area colleges or universities	1,247	9,847
Transit Store in Baltimore	Provides customer access to transit information and for purchases of transit passes. Some 15-20% of total transit pass sales occur through this outlet	3,376	56,959
MDOT MTA and SHA Park-and-Ride*		51,845	874,629

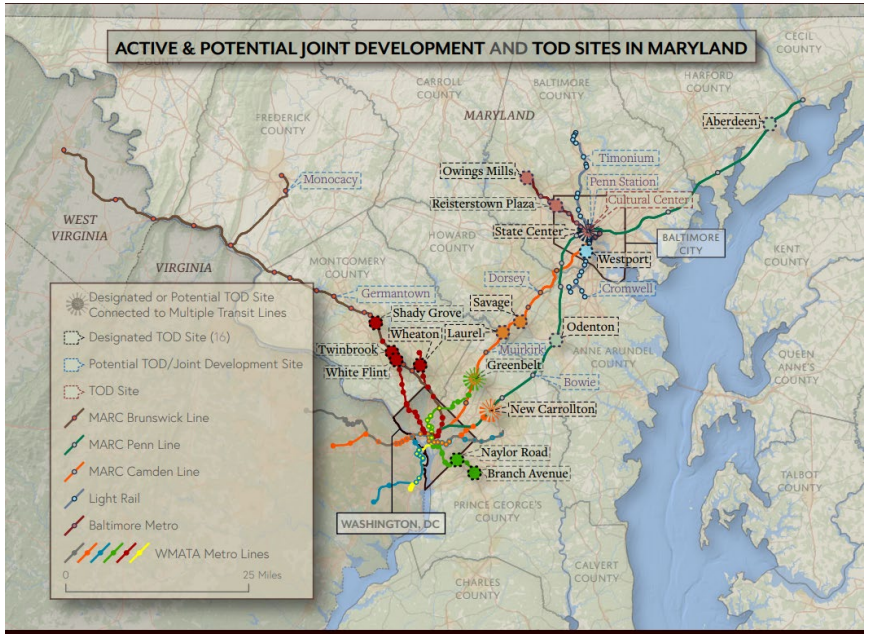
* The impacts shown reflect the current definitions and most recent data available for each of the measures. Data are estimated.

** The Commuter Connections program is run through the Metropolitan Washington Council of Governments. The reduction in trips and VMT for Commuter Connections reflect reductions for all of the Metro Washington region, including Maryland, District of Columbia and Virginia.

*** MDOT MTA data is collected every five years.

TOD Initiatives

- In coordination with state, local, and private sector partners
- Maryland TOD by the numbers:
  - 16 Designated TOD sites
  - 129 rail transit stations
  - 9981 acres of mixed-use zoning
  - 20,067 Average weekday MARC riders
- Planning tools for TOD – Coordination between MDOT and MDP
- Other coordination areas
  - CAV strategic Action Plan
  - Transportation Alternatives Program
  - MDOT SHA Project Life Cycle Transportation Projects



Other Efforts

- **Coordination with MDP**
  - Ongoing coordination regarding assumptions on land-use and transportation nexus
  - Forecasting and demographic growth assumptions
  - Scenario planning construct
  - Checks for preventing overlaps on emissions reduction estimates
  - Discussion and sharing of methodological approach to emission reduction estimation
- **Active Transportation**
  - 2019 Maryland Bicycle and Pedestrian Master Plan
  - Released January 2019
  - Model Complete Streets Policy for Bike/Pedestrian Access to Transportation Facilities

Recommendation # 4

Implementation

MDOT should **develop tracking of key indicators of GHG reduction strategies** to monitor progress of achieving goals. Examples include state facilities and fleet adoption of renewable/low-emissions energy sources, ZEV penetration, equity indicators to track participation, congestion levels, vehicle miles traveled (VMT) per capita, mobility access, and adoption of low-emissions vehicle technology for personal use.

MDOT Performance Management

The State Report on Transportation

MDOT Secretary's Office (TSO), Transportation Business Unit (TBUs), partners and public

MDOT TSO, TBUs, local jurisdictions and public

MDOT TSO and TBUs for public consumption

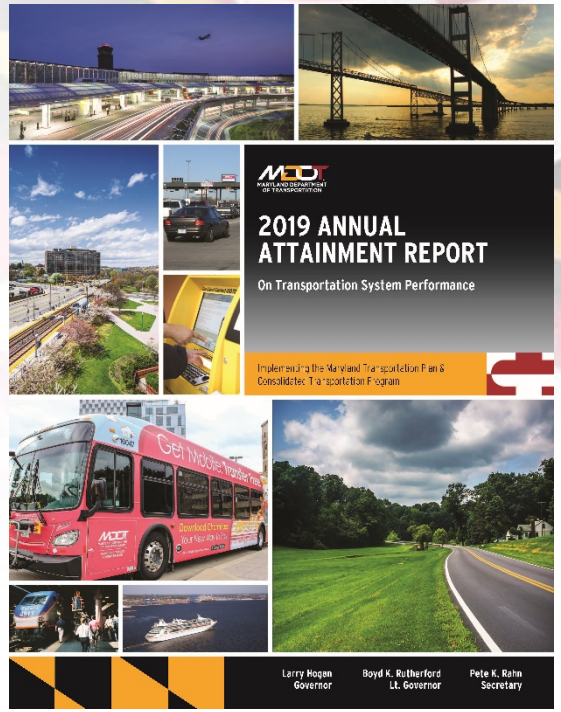
Attainment Report (AR)
Annual report presented to stakeholders, public, Governor, General Assembly

Managing for Results (MFR)
Annual submission to the Maryland Department of Budget and Management

MDOT Excellerator
Quarterly reporting on measures within ten tangible results

MDOT Attainment Report

2019 Report



Annual Measures that are indicators of GHG Emissions:

1. Total On-Road Emissions
2. Vehicle Miles Traveled (total and per capita)
3. Transit Ridership
4. VMT Reduced from TDM Programs
5. Delay and Travel Time Reliability
6. Electronic Toll Transactions
7. MVA Alternative Service Delivery (ASD) Transactions
8. Incident Management Delay Savings (CHART)
9. Access to Transit and Bicycle Access to Transit
10. Registered EVs
11. Publicly Available Charging Infrastructure
12. MDOT Survey Perceptions of Multimodal Connectivity

Interactive Highlights

MDOT Excellerator

- Section 9 on Environmental Stewardship
- Fuel Efficiency of State Fleet
  - Consumption patterns evaluated for improving fuel efficiency and shifting towards use of renewable fuels.
- Publicly Available Electric Vehicle Charging Infrastructure & Total Electric Vehicles Registered in Maryland
- State of Maryland's Air Quality Emissions (State fleet fuel use and utility energy use

PERFORMANCE MEASURE 9.4A
Publicly Available Electric Vehicle Charging Infrastructure & Total Electric Vehicles Registered in Maryland

Chart 9.4A.1: Electric Vehicles Registered in Maryland Q2 CY2016-Q4 CY2018

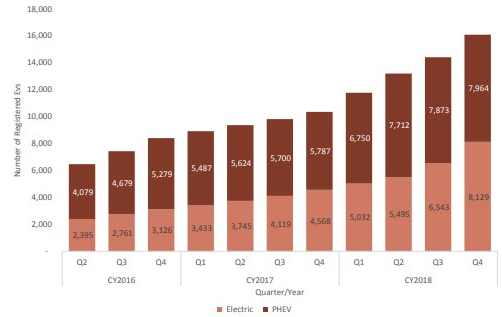
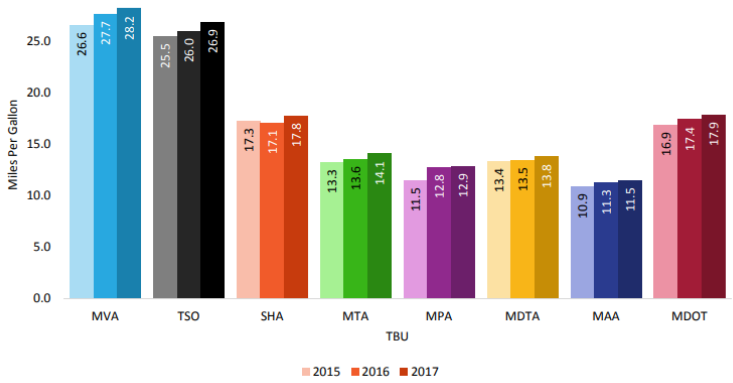


Chart 9.4A.2: Electric Vehicle Charging Outlets Q1 CY2015-Q4 CY2018

PERFORMANCE MEASURE 9.3A
Fuel Efficiency: Miles Per Gallon

Chart 9.3A.1: MDOT TBU Light-Duty Vehicle Average MPG CY2015-CY2017



MARYLAND DEPARTMENT OF TRANSPORTATION

Recommendation # 5

Research Ongoing

MDOT, MDE, Maryland Energy Administration (MEA), Department of Budget and Management (DBM) and the Department of General Services (DGS) **should review state fleet procurement procedures and practices and provide direction on procurement of EVs and other ZEVs**, and associated charging/filling station installation guidance and targets, by October 2019.

Progress and Status of Effort

- Less than 10 EVs in Maryland State Agency fleet
- Infrastructure needed before purchase
  - MDOT has installed new EV chargers at MDOT headquarters
  - Maryland Volkswagen Mitigation Plan provides funding for EVSE, which could include installation at state offices
- MDOT, in collaboration with MDE, MEA, DBM, and DGS through the State Agency workgroup within EVIC, is in the process of reviewing procurement procedures and best practices

Recommendation # 6

Research Ongoing

MDOT should **report on its analysis** regarding electric trains/rail, and continue to work with other appropriate agencies and stakeholders to **examine the costs and benefits of supporting deployment opportunities of ZEV school and transit buses** in Maryland. The analysis should include:

(a) Capital, maintenance and operating cost comparisons;

(b) Research into the viability of ZEVs as well as hybrid and alternative fuel technologies;

(c) Emissions reduction benefit summaries; and

(d) Potential goals to fully electrify bus transport in the State, including targets for deployment and provisions for low-interest financing.

Progress and Status of Effort

- Maryland Volkswagen Mitigation Plan provides funding for:
  - 8 Electric Shuttle Busses at BWI Airport
  - Transit Bus Replacements
  - School Bus Replacements, including an Electric School Bus Pilot Program

- Howard County Electric Bus Project
  - Through a federal grant, Howard County, RTA, MDOT MTA, and the Center for Transportation and the Environment (CTE) have partnered to replace three aging diesel buses with three state-of-the-art battery electric buses that utilize wireless opportunity charging at the Columbia Mall.
  - Data collection and reporting over a two year period ending in August 2019

2019 Draft Recommendations - Inputs

- Draft Recommendations
  - Carryover Recommendations
  - New Recommendations
- Carryover Recommendations
  - Need for continued policy support/emphasis (EVIC, for example)
  - Ongoing progress in 2019 (strategies that need to be carried forward for complete implementation)
  - MDOT leadership position (Solar Program, EVIC, adaptation/resilience, for example)
- New Recommendations
  - Contemporary/emerging issues/landscape (technology, sharing economy, logistics patterns)
  - Congestion mitigation and travel reliability (comprehensive, multi-strategy statewide approach to addressing recurring and non-recurring congestion challenge)
  - Active transportation and demand management strategies (bicycle, pedestrian, transit access, micromobility, support for multimodalism)

Carryover Recommendations

Recommendation	Supporting Rationale
# 1 ZEEVIC incentives and policies	Next Steps regarding improved understanding of EV ownership, equity considerations, infrastructure needs. Also continuation and expansion of partnerships for ZEV planning across states.
# 2 GHG emission reduction potential of vehicle and infrastructure technologies, and associated co-benefits including equity	Emerging technology and policy landscape, continued need to study co-benefits, and also to assess longer-term effects of some of these strategies (2050?)
# 5 MDOT, MDE, Maryland Energy Administration (MEA), Department of Budget and Management (DBM) and the Department of General Services (DGS) should review state fleet procurement procedures and practices and provide direction on procurement of EVs and other ZEVs, and associated charging/filling station installation guidance and targets, by *October 2019*.	Infrastructure funding through Volkswagen Mitigation Plan as a precursor to fleet purchase; ZEEVIC state agency group reviewing best practices in procurement.

New Draft Recommendations

Recommendation	Supporting Rationale
MDOT will continue to provide support and coordinate with regional partnerships and initiatives like the I-95 Corridor Coalition, AASHTO, and TCI efforts to address transportation management, technology, and funding issues of common interest.	Consistent with MDOT's goals and priorities, and affirms the value and synergies created through regional level implementation of transportation strategies to enhance mobility and reduce emissions.
MDOT will review shifts in mobility trends, technologies, and logistics that impact congestion and reliability, and assess the value and return on investment of past, ongoing, and planned investment into a more efficient and reliable system.	Increasing congestion and reliability challenges, in part also associated with other Maryland priorities like safety and security, and economic development.
MDOT will strengthen partnerships and initiatives to further "Active Transportation," and evaluate new tools and data techniques to support route planning for shared mobility options.	MDOT Bicycle and Pedestrian Master Plan (BPMP) update conducted research and outreach related to trends, needs, and opportunities, which captured emerging trends, some of which were included as part of this recommendation.

QUESTIONS?

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