MARYLAND DEPARTMENT OF TRANSPORTATION

ON-ROAD INVENTORY DEVELOPMENT PROCESS

Mitigation Work Group of the Maryland Commission on Climate Change

February 24, 2016

OVERVIEW

- Inventory / Forecast Approaches
  - Top Down vs. Bottom Up
- Maryland Emissions Modeling Process
- 2006 Inventory
- 2020 Forecast
- Transportation Trends
- 2030 Preliminary Forecast
- Challenges
- Next Steps

INVENTORY & FORECAST PROCESSES

"TOP-DOWN" APPROACH

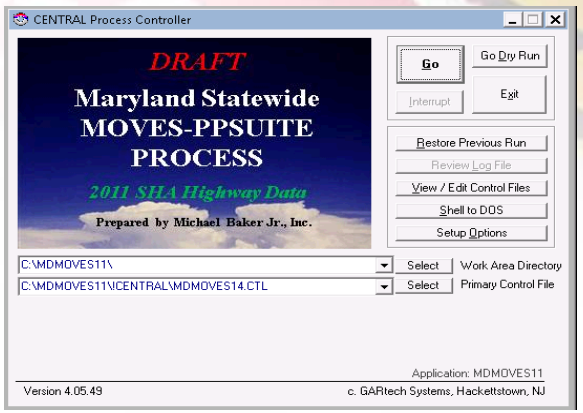
- Simplified Approach using Activity Data multiplied by Emission Factors
  - Statewide fuel consumption
  - Statewide VMT summaries
- EPA State Inventory Tool (SIT) acknowledges limitations
- "Thru Traffic" - Vehicle trips beginning and ending outside of MD not accurately accounted for.
- Does not account for travel characteristics and factors:
  - Vehicle speeds, VMT Mix, Idling, local vehicle age, population data etc.
  - Forecasting limitations
  - National defaults vs local defaults,
- SIT useful for other sources where data is limited (i.e. non-road, and non-mobile)

"BOTTOM UP" APPROACH

- VMT based inventory using Statewide on-road modeling approach with MOVES2014.
- Same process used for Statewide Emissions Inventories, State Implementation Plans (SIP) and Transportation Conformity
- Based on SHA VMT reporting, State and MPO travel demand models
- Includes robust forecasting process
- Incorporates latest planning assumptions and federal vehicle standards
- Approach used for 2006 baseline and 2020 on-road GHG inventories.

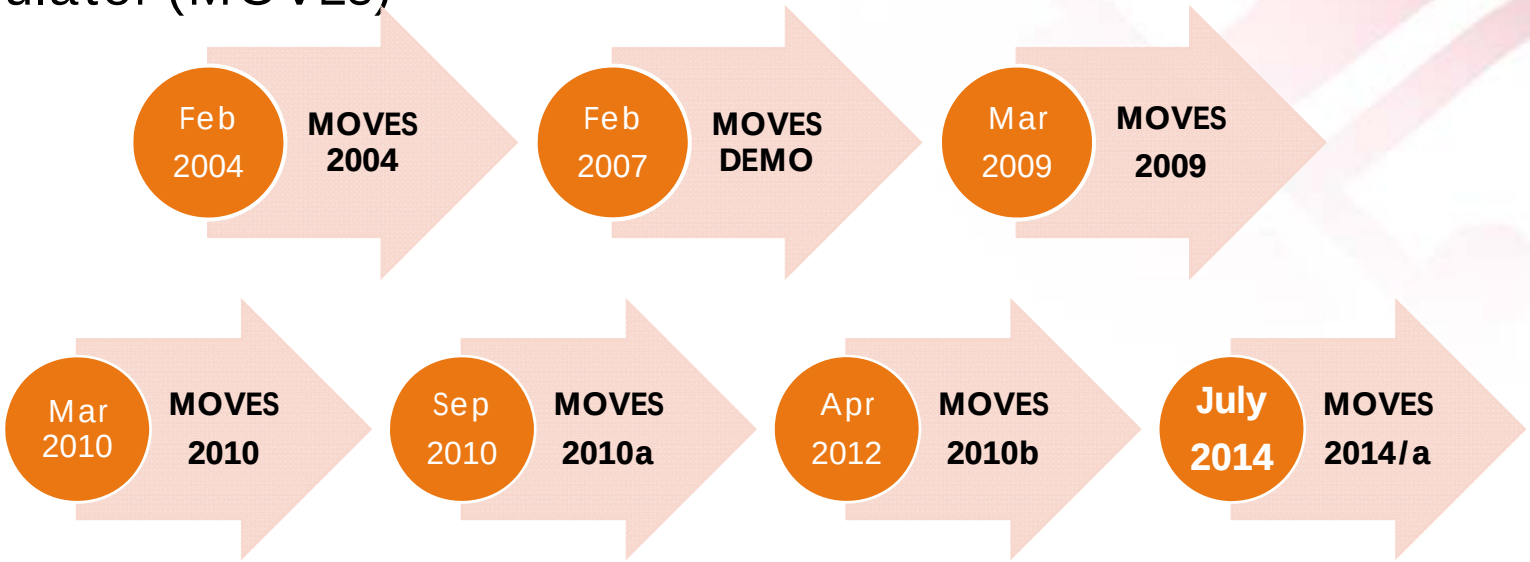
MARYLAND EMISSIONS MODELING

- MDOT/MDE implemented Emissions Process ~2005 timeframe
  - Customized software PPSUITE/Central
  - Statewide analysis tool
  - MPO consistency
  - MWCOG independent
- Updated Triennially with NEI
- MDOT maintains and provides technical support
  - MDE process
  - BMC process
  - WILMAPCO and HEPMPO
- Includes robust QA process
- Approved through Interagency Consultation Process



FREQUENT CHANGES TO THE PROCESS

- EPA Approved Emissions Models - Motor Vehicle Emission Simulator (MOVES)



- Local Planning Assumptions:
  - Minimum every 5-Years
  - MD – every three years in conjunction with NEI / SHA traffic / MVA registration / MDE environmental data

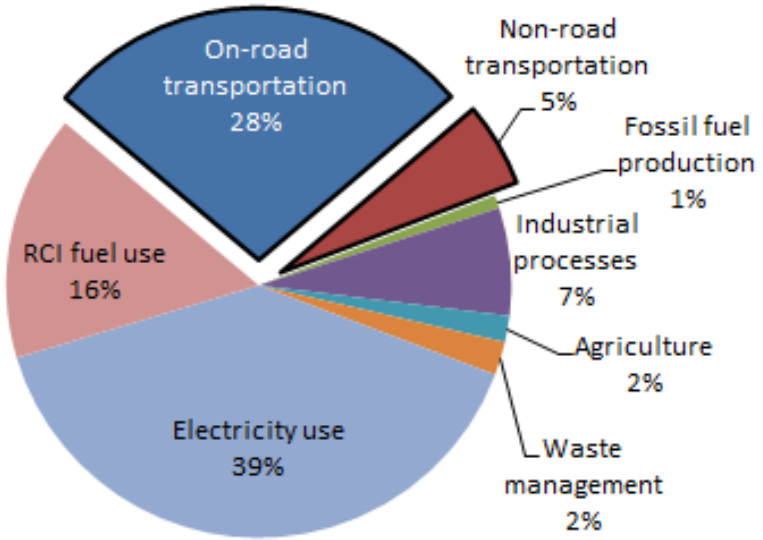
2006 INVENTORY & 2020 FORECAST

2006 BASELINE INVENTORY

2006 Baseline

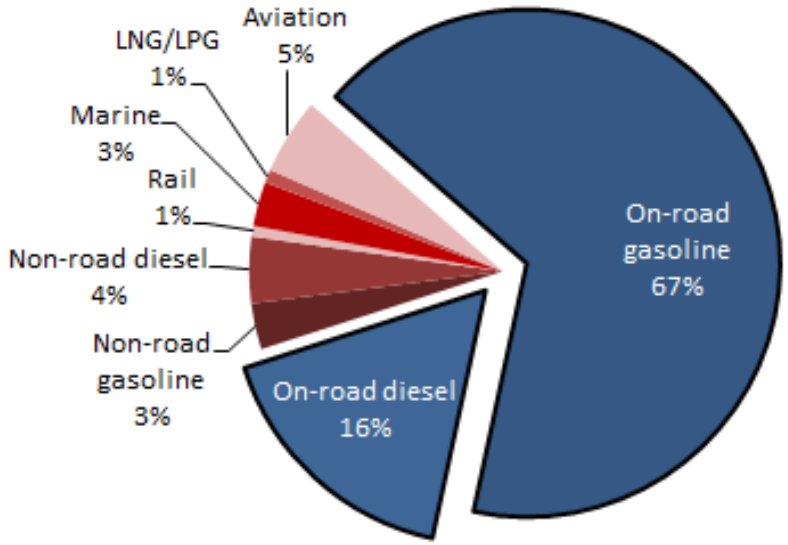
Statewide Inventory

Transportation: 33%, 35.5 mmtCO_2e



Transportation Inventory

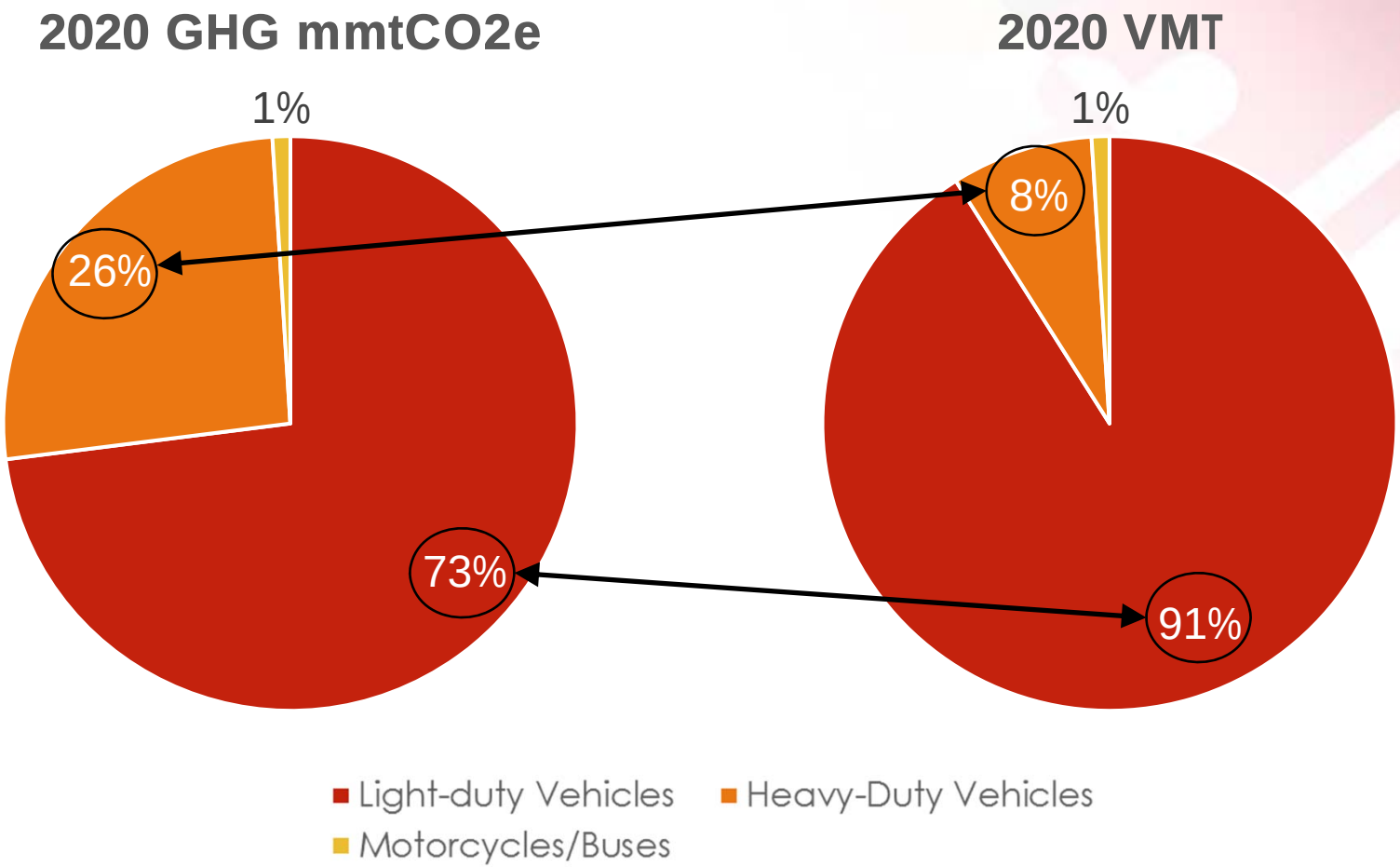
On-road: 84%, 29.7 mmtCO_2e



Other: 16%, 5.8 mmt CO_2e

Source: Maryland's Greenhouse Gas Reduction Act Plan, October 2013.

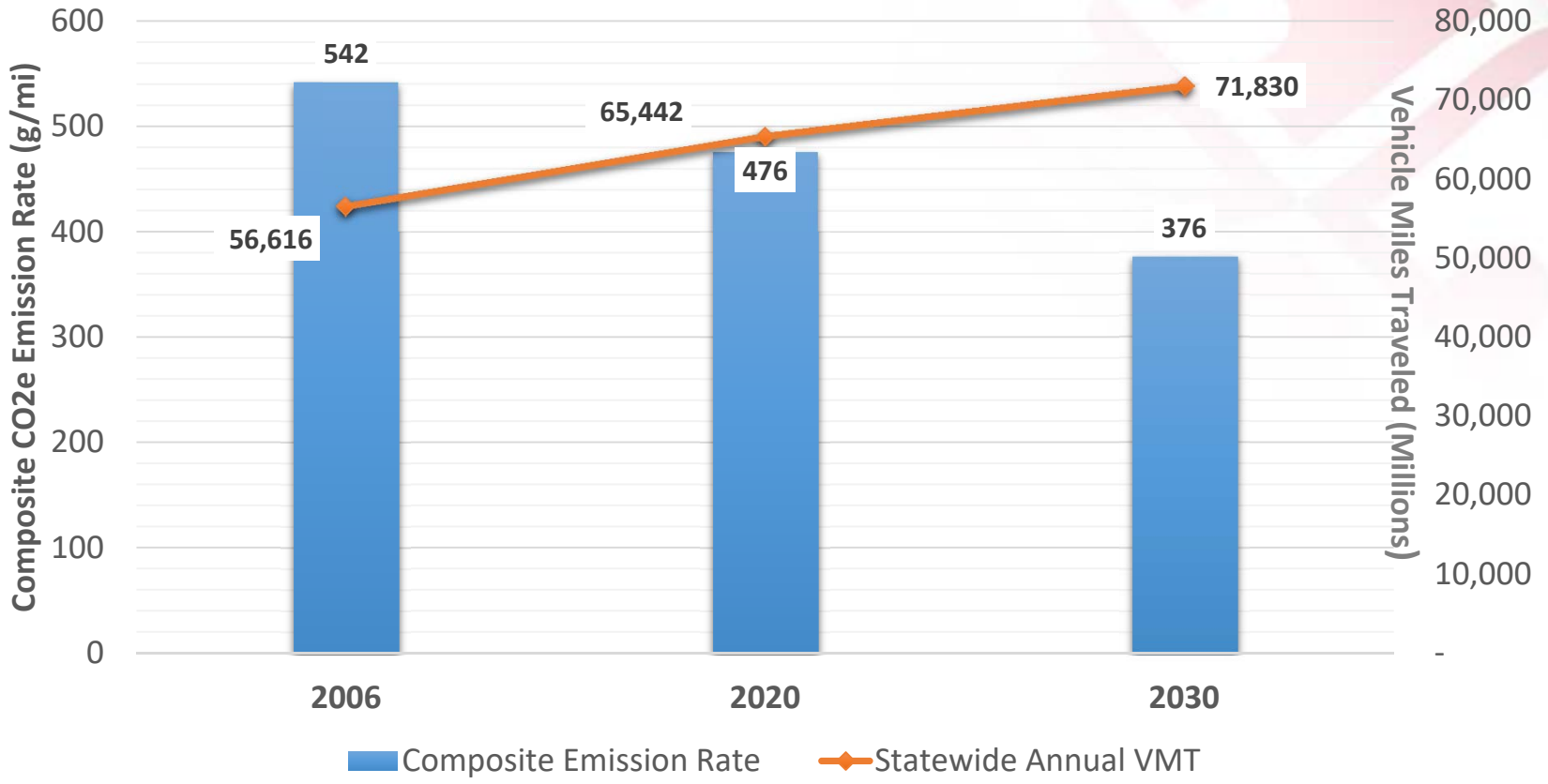
2020 GHG AND VMT ESTIMATES



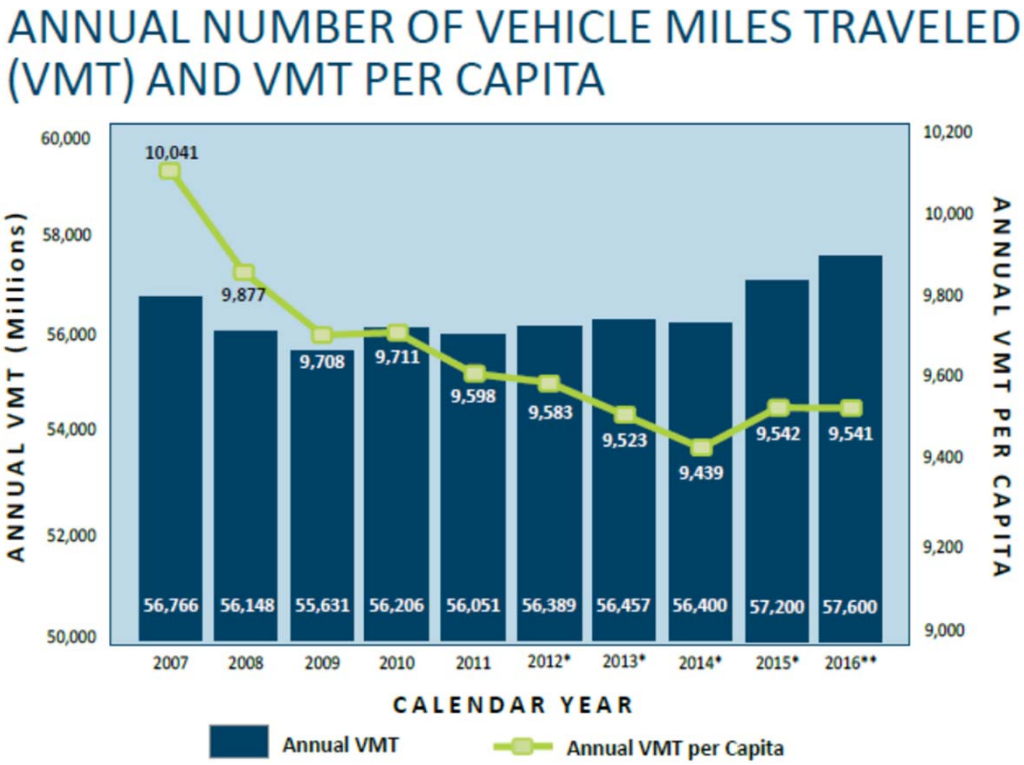
TRANSPORTATION TRENDS

TRENDS TO 2030

Emission Rate v. Vehicle Miles Traveled (VMT)



VMT & VMT PER CAPITA



2006 composite emission rate

(VMT weighted) = **542 g/mi**

1 mmt CO_2e = 1.84 billion VMT

2020 composite emission rate

(VMT weighted) = **476 g/mi**

1 mmt CO_2e = 2.10 billion VMT

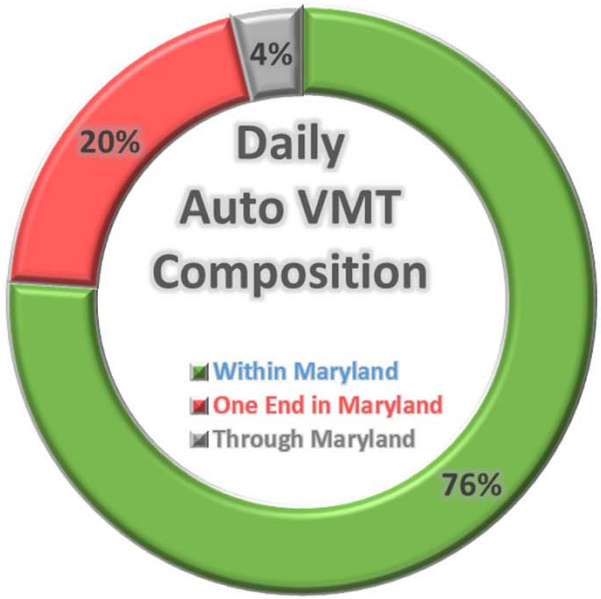
2030 composite emission rate

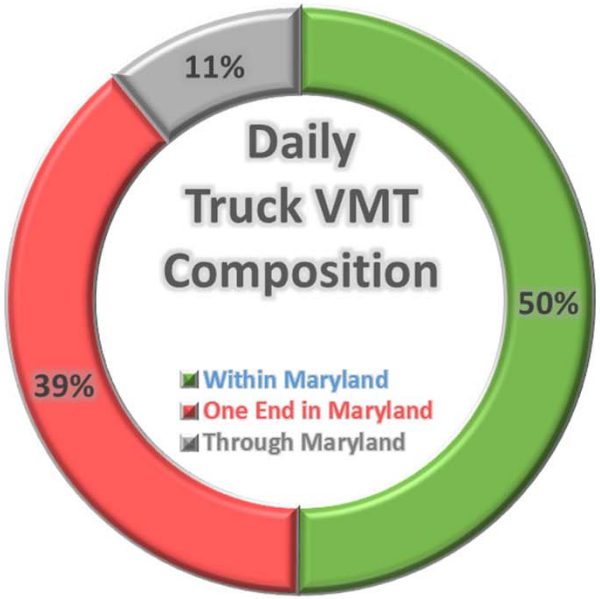
(VMT weighted) = **376 g/mi**

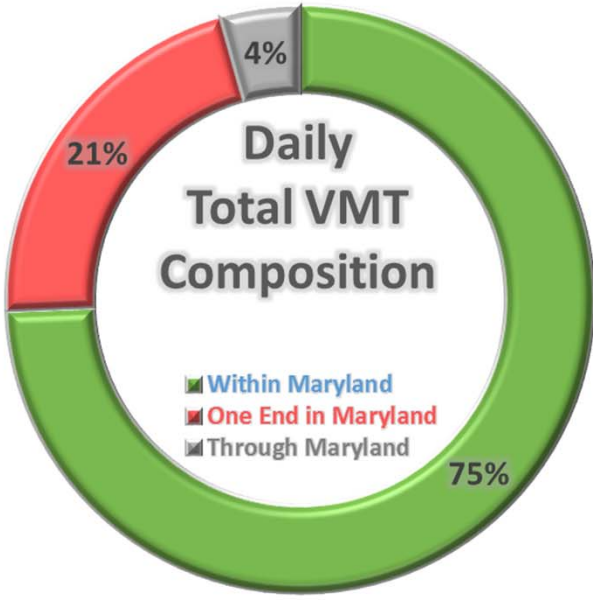
1 mmt CO_2e = 2.66 billion VMT

1 mmtCO_2e reduction = 3.7% Reduction in VMT in 2030

MARYLAND THRU TRAFFIC







Source – SHA Maryland Statewide Travel Model (2015)

TRANSPORTATION TECHNOLOGIES

Model Years	Program	Ave Fleet Standard
2008-2010	CAFE	34 mpg by 2020 (LD)
2011	Maryland Clean Car	CA Std w/ ZEV Mandate
2012-2016	Phase I – National Program	34.1 mpg by 2016 (LD)
2017-2025	Phase II – National Program	54.5 mpg by 2025 (LD)
2014-2018	Phase I – MD/HD Truck FE Standard	Multiple benefits
2018-2027	Phase II – MD/HD Truck FE Standard*	Not included in MOVES
2017>	Tier3 Vehicle and Fuel Standards	Lower sulfur content – 10 ppm

**Final Rule – August 2016*

LIGHT DUTY FLEET TURNOVER

	Light Duty Vehicle Distribution by Model Year* (Compared to Light Duty Vehicles Total)	
Model Year Group	**2020**	**2030**
2026 and Later	0.0%	31.2%
2017-2025	22.8%	51.2%
2011-2016	43.5%	13.3%
2010 and Older	33.7%	4.3%
Total	**100.0%**	**100.0%**

**Fleet turnover calculated for a sample MD county*

HEAVY DUTY FLEET TURNOVER

	Heavy Duty Vehicle Distribution by Model Year* (Compared to Heavy Duty Vehicles Total)	
Model Year Group	**2020**	**2030**
2028 and Later	0.0%	11.2%
2019-2027	11.1%	44.2%
2014-2018	24.8%	14.3%
2013 and Older	64.1%	30.3%
Total	**100.0%**	**100.0%**

**Fleet turnover calculated for a sample MD county*

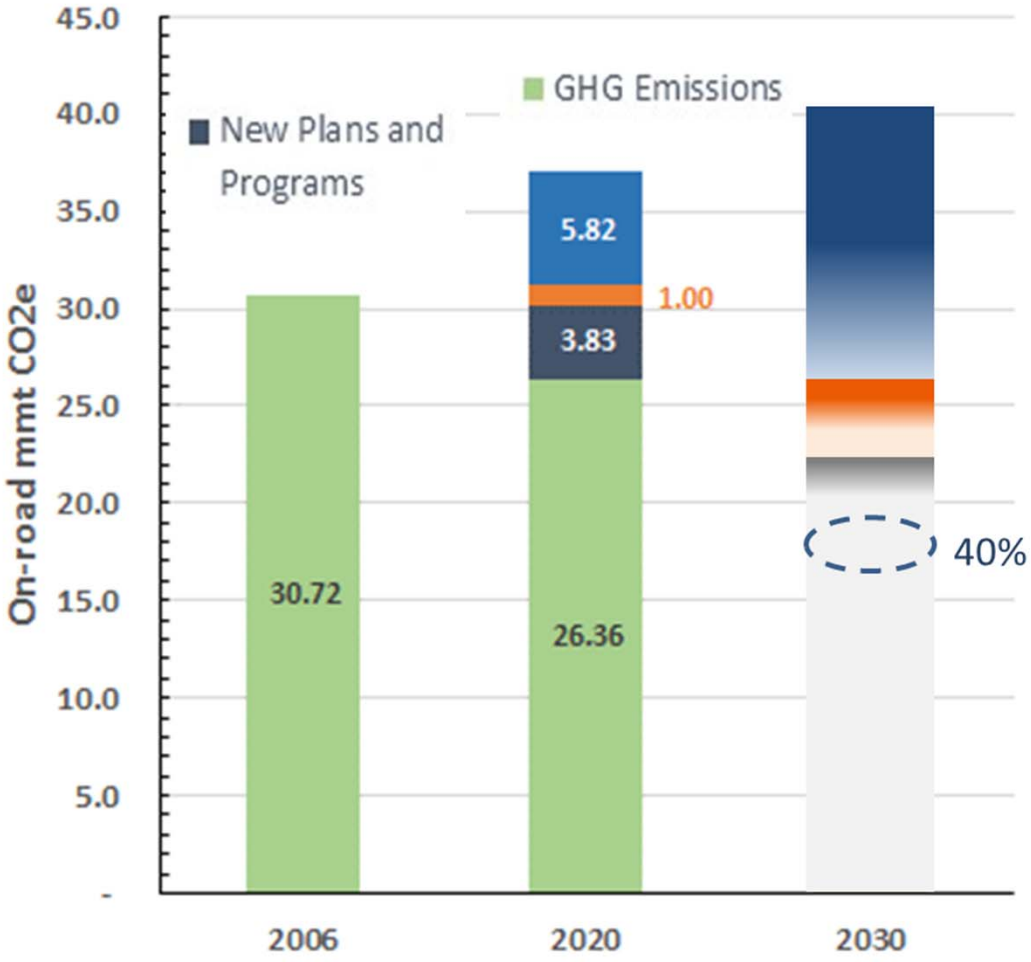
2030 OVERVIEW

LOOKING TO 2030

More complex than 2020 analysis and many more unknowns....

1. **Almost certain** – Federal and State vehicle and fuel standards
2. **Less certain** – Transportation policy and funding
3. **Some hints, with many variables to consider** –
   - Technology advancement
   - Social trends
   - Market changes and economic shifts
   - Travel behavior

2030 PRELIMINARY RESULTS



Almost Certain – Preliminary estimate of the impact of final Federal standards

Less Certain – Preliminary estimate of the impact of implementation of forecasted transportation plans and programs and land use patterns

Hints Only – Emerging technology and everything else

CHALLENGES & NEXT STEPS

CHALLENGES

- Funding – Constraints & Opportunities
- Land use planning & controls at local jurisdiction level
- Increasing impact of M/HD trucks
- Cost effective strategies compared to technology advances
- Infrastructure / manufacturer support for electric and autonomous Vehicles
- MDOT / State role v. private role
- Removing barriers (e.g. role as a facilitator)
  - Groundbreaking technologies
  - Research / Regulations
  - Changing Social Norms

NEXT STEPS

- 2017 NEI Update – due in fall of 2018
- 2017 State Agency Reports
- 2018 Draft GGRA Reporting Requirement
  - 2030 Forecast – updated with latest planning assumptions.

QUESTIONS?

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MDOT Planning Documents: www.mdot.maryland.gov

MDOT 2015 Greenhouse Gas Reduction Plan

http://www.mdot.maryland.gov/newMDOT/Planning/Environmental/Documents/Greenhouse_Gas_Reduction_Plan_rev.pdf