

Medium and Heavy-Duty Transportation Recommendations

Union of
Concerned Scientists



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*Maryland Mitigation Working Group
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Trucks and buses are heavy hitters on climate change and air pollution

| Vehicle Type | No. of Vehicles |
|---|-----------------|
| Heavy-Duty Pickup and Van <i>Class 2b</i>  | 227,705 |
| Bus <i>Class 3-8</i>  | 16,834 |
| Single-Unit Work and Freight Trucks, Combination Trucks <i>Class 3-8</i>  | 150,223 |
| TOTAL | 394,762 |

Make up 9% of the 4.2 million registered vehicles

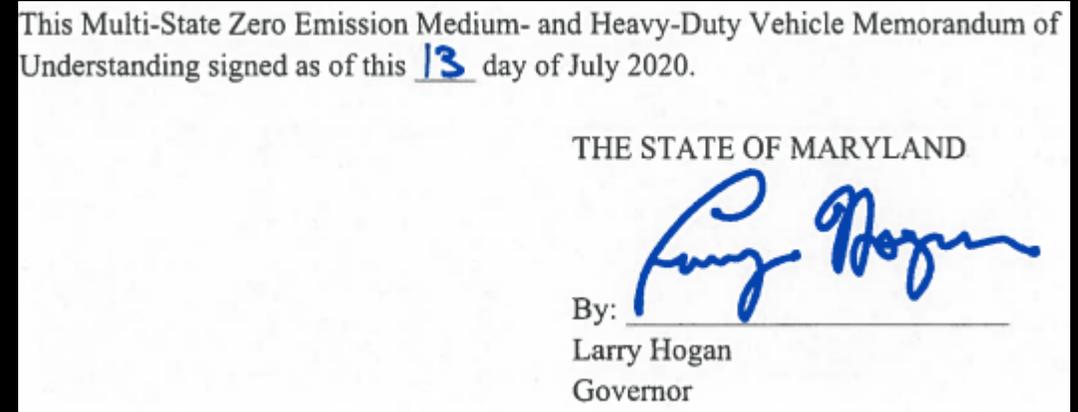
But of all on-road vehicles in the state, contribute a disproportionate:

- 39 percent of nitrogen oxide (NOx)
- 48 percent of fine particulate matter (PM2.5)
- 21 percent of greenhouse gas emissions

Sources: [FHWA Highway Statistics 2019 Table MV-1](#), [EPA 2017 National Emissions Inventory](#)

Maryland has already committed to shifting to zero-emission MHDV's

- **NESCAUM MOU (July 2020):** Governor Hogan joined 14 other states and DC to commit to 30% ZEV MHDV sales by 2030 and 100% sales by 2050.
- **2030 GGRA Plan:** NESCAUM MOU goals are crucial to meeting the 2030 GHG reduction goal ([PATHWAYS study](#)).
- **Climate Solutions Now:** even an optimistic scenario including 100% ZEV MHDV sales by 2045 does not close emissions gap for new 2031 goal ([May MWG meeting](#)).



Major policy shifts are needed

1. By 2023, adopt the *Advanced Clean Trucks rule (ACT) and Heavy-Duty Omnibus Regulations (HDO)*.
2. By 2025, require the procurement of *zero-emission buses for locally-operated transit systems*.
3. Allocate funding and technical assistance for a multi-year effort for *school bus electrification*
4. Require utility *MHDV charging infrastructure* programs, including fleet and public charging, and incentives for off-peak/managed charging to support sales timelines in ZEV MHDV regulations.
5. Maximize ability of Maryland entities to take advantage of *federal funds*.

35 signatories in support of these recommendations

Sincerely,

ArchPlan Inc.

Audubon Mid-Atlantic

Audubon Naturalist Society

Bikemore

Cedar Lane Environmental Justice Ministry

Central Maryland Transportation Alliance

Ceres

Chesapeake Climate Action Network

Climate Reality Montgomery County

Coalition for Smarter Growth

Disability Rights Maryland

Downtown Residents Advocacy Network
(Baltimore)

Elders Climate Action Maryland Chapter

Elizabeth Bunn

Glen Echo Heights Mobilization

Greenbelt Climate Action Network (GCAN)

Labor Network for Sustainability

League of Women Voters of Maryland

Locust Point Community Garden

Maryland Conservation Council

Maryland League of Conservation Voters

Maryland Legislative Coalition

Maryland Nonprofits

Maryland PIRG

Maryland Sierra Club

MLC Climate Justice Wing

Mobilize Frederick

Montgomery Countryside Alliance

Prince George's County DSA

Strong Future Maryland

The Climate Mobilization Montgomery
County Chapter (TCM MoCo)

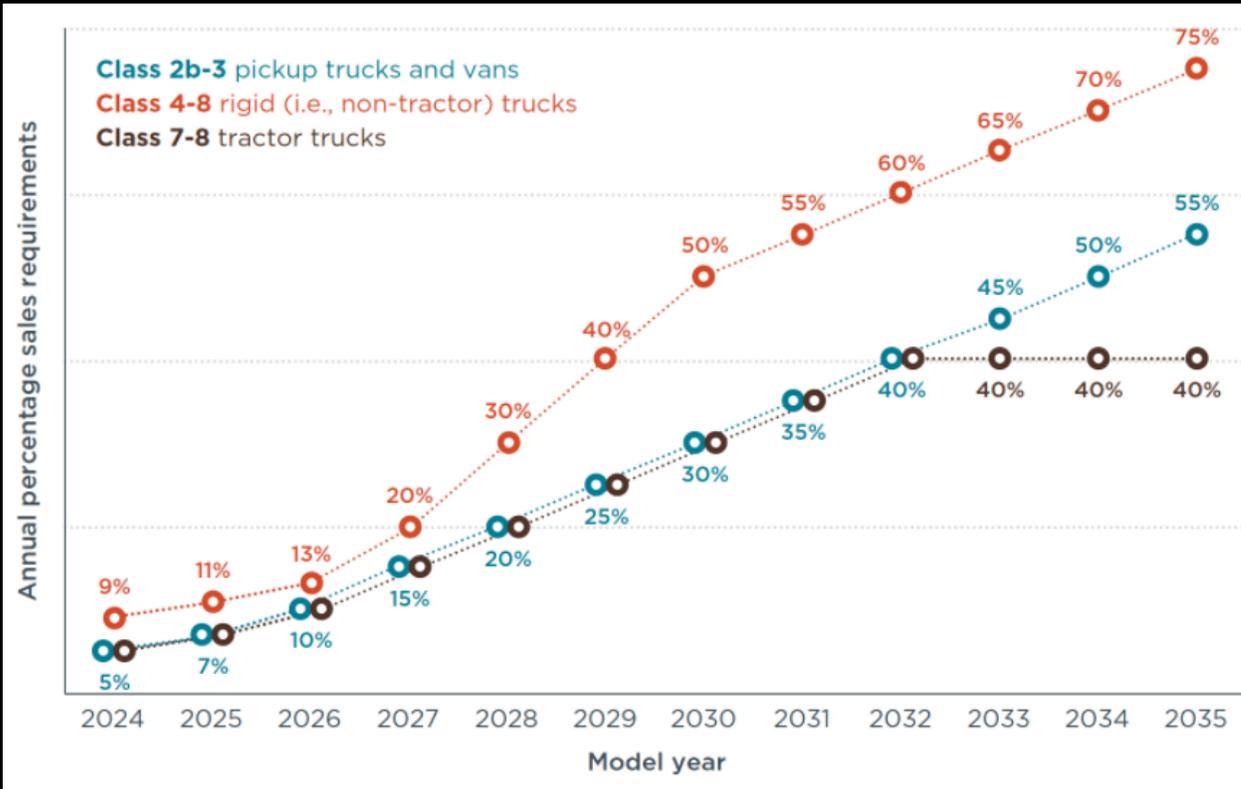
Transit Choices

Union of Concerned Scientists

Unitarian Universalist Legislative Ministry of
Maryland

Washington Area Bicyclist Association

Advanced Clean Trucks rule



Source: [ICCT](#)

- Requires manufacturers to sell increasing percentages of zero-emission trucks (class 2b-8).
- Already adopted in CA, OR, WA, NJ, NY, and MA. VT, CT, and ME to adopt.
- Puts the state on track for sales of MHDVs to reach 100% by 2045.

Strong business and manufacturer support for ACT

Large retailers and energy solutions companies operating in Maryland and MHDV OEM's support the ACT rule.



SIEMENS



Other OEM's and fleets have committed to manufacturing and acquiring ZEV MHDV's.



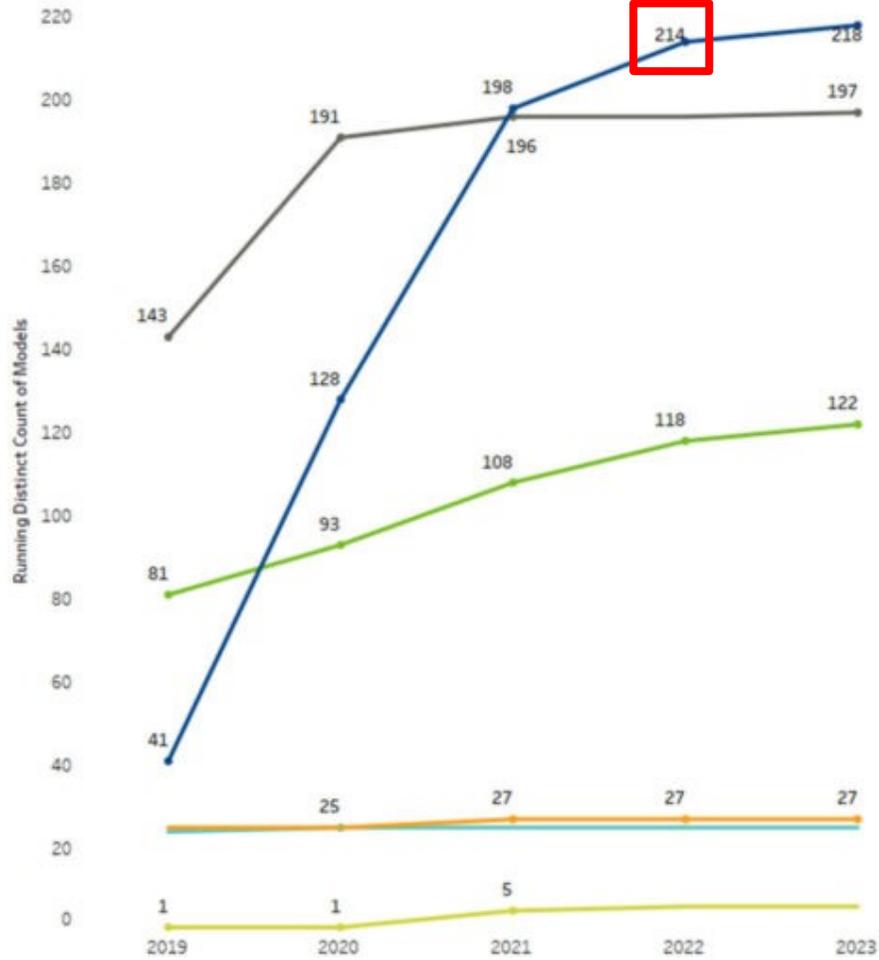


TECHNOLOGICAL FEASIBILITY

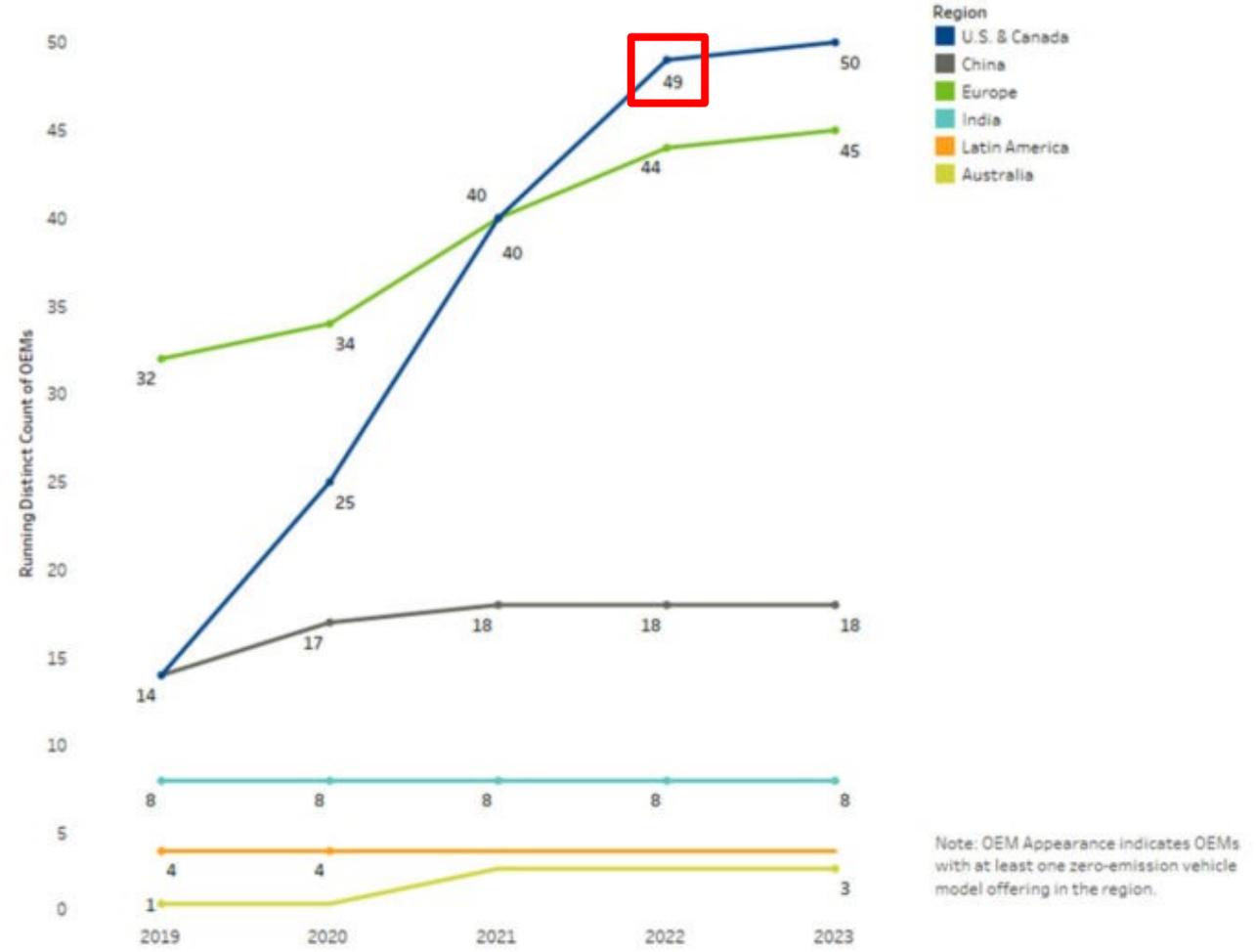
Growth of Models Available by Region and OEMs by Region Trending Upwards



Growth of ZE-MHDV Models Available by Region



Growth of OEM Appearance by Region



Note: OEM Appearance indicates OEMs with at least one zero-emission vehicle model offering in the region.

Many OEM's are making ZEV MHDV's

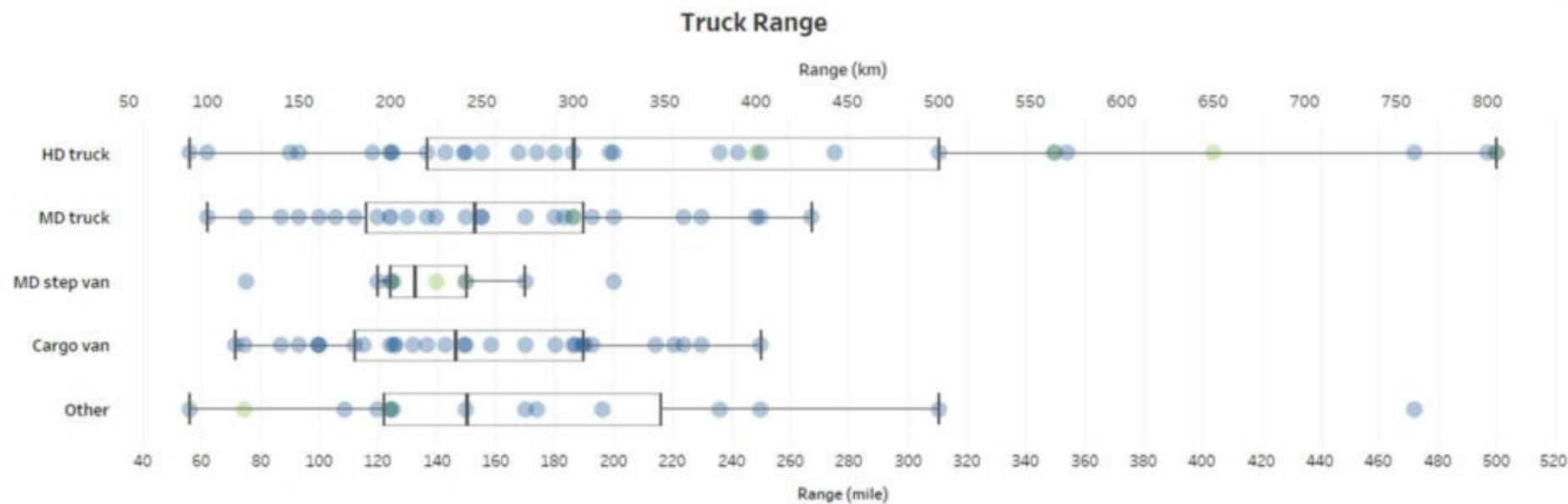


Source: [Zero Emission Technology Inventory](#)

Includes 24 heavy duty models e.g. Volvo's VNR Electric long-haul truck made in VA



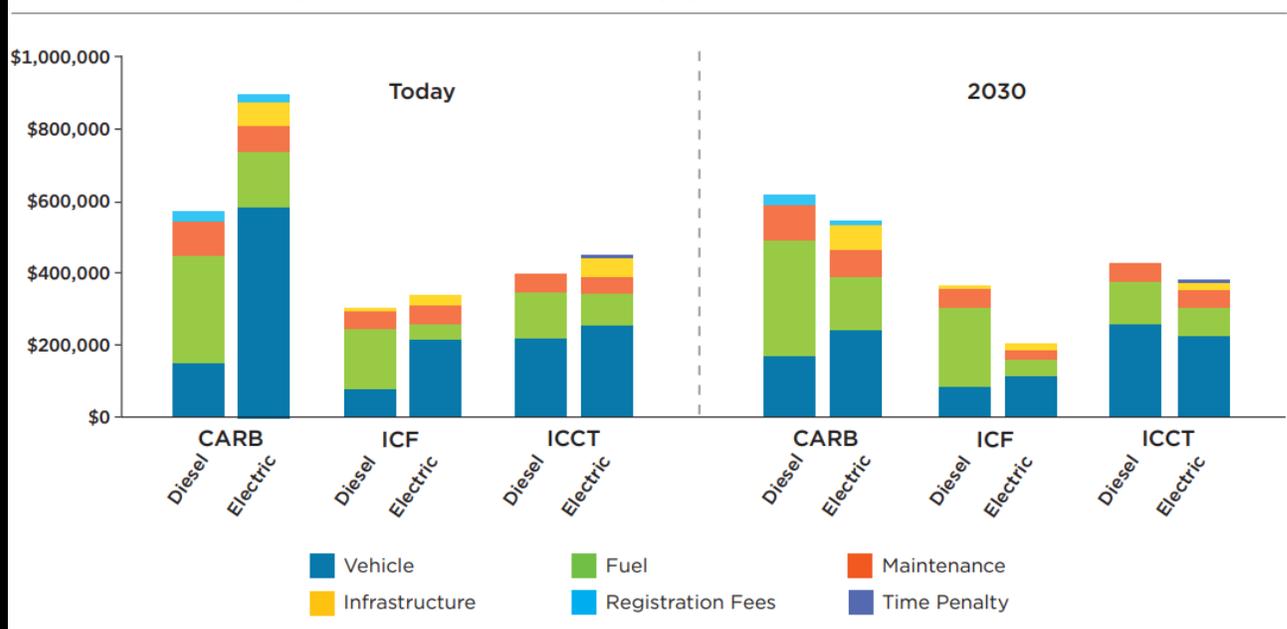
Global ZET Median Range & Battery Capacity Growing to Cover Majority of Urban Duty Cycles



Source: [Zero Emission Technology Inventory](#)

ZEV MHDV's are cheaper over their lifetimes than diesel and gas counterparts

FIGURE 9. Total Cost Comparisons, Class 8 Short-Haul/Drayage Trucks



The total cost of ownership for Class 8 electric short-haul/drayage trucks can be lower than diesel today with financial incentives, and is estimated to be lower for diesel trucks within the next decade without such incentives.

Notes: In the ICCT study, "today" corresponds to 2020; in the CARB and ICF studies, 2018. Vehicle costs in the ICF and CARB analyses account for the residual value of the vehicle at the end of its assumed period of ownership.

SOURCES: HALL AND LUTSEY 2019; ICF N.D.A, CARB 2019A.

Source: ["Ready for Work", Union of Concerned Scientists](#)

Figure 11 Projected EV -ICE Cost Parity by Market Segment

| Projected EV Life-Cycle Cost Parity with Diesel & Gasoline Vehicles | | |
|--|--|---|
| By 2025 | By 2030 | After 2030 |
| <ul style="list-style-type: none"> Heavy-duty Pickup and Van Regional Haul Tractor Long Haul Tractor Delivery Van Delivery Truck Service Van Refuse Hauler Box Truck (Class 8) Dump Truck | <ul style="list-style-type: none"> Shuttle Bus Service Truck | <ul style="list-style-type: none"> Box Truck (Class 3 - 7) Stake Truck (Class 3- 7) |

Source: [MJ Bradley and Associates](#)

and are more reliable too – saving on maintenance costs

Is the grid ready? Yes.

The grid is more than capable today of supporting Zero Emission Truck adoption in the short-term and long-term when transportation electrification is more robust.

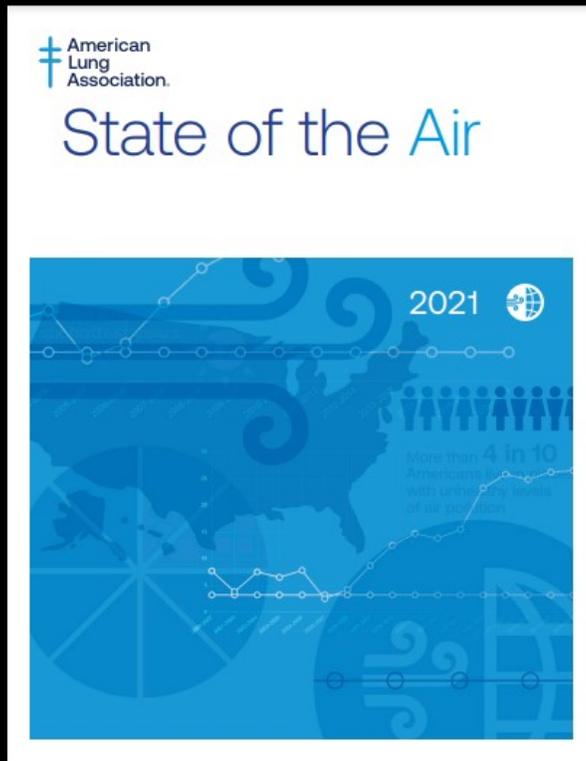
- There is enough power generation and transmission currently to serve the increase in charging load from EV purchases in the next few years
- Transition to EVs is happening gradually, not overnight. Utilities will be able to plan and upgrade grid in the interim and market certainty from regulations helps utilities and private sector make informed investments in infrastructure
- EVs can support the grid through vehicle to grid integration
- In California, the leading market for EVs, EVs account for less than 1% of the grid's load usage
 - Study from CPUC, CEC, and CISO confirms that EVs were not at all a factor in grid failures or strain



HEALTH IMPACTS

Truck pollution has both climate and health impacts

- In U.S., even with big improvements in the past couple decades, PM2.5 is the largest environmental health risk factor, responsible for about **2/3 of deaths** from environmental causes



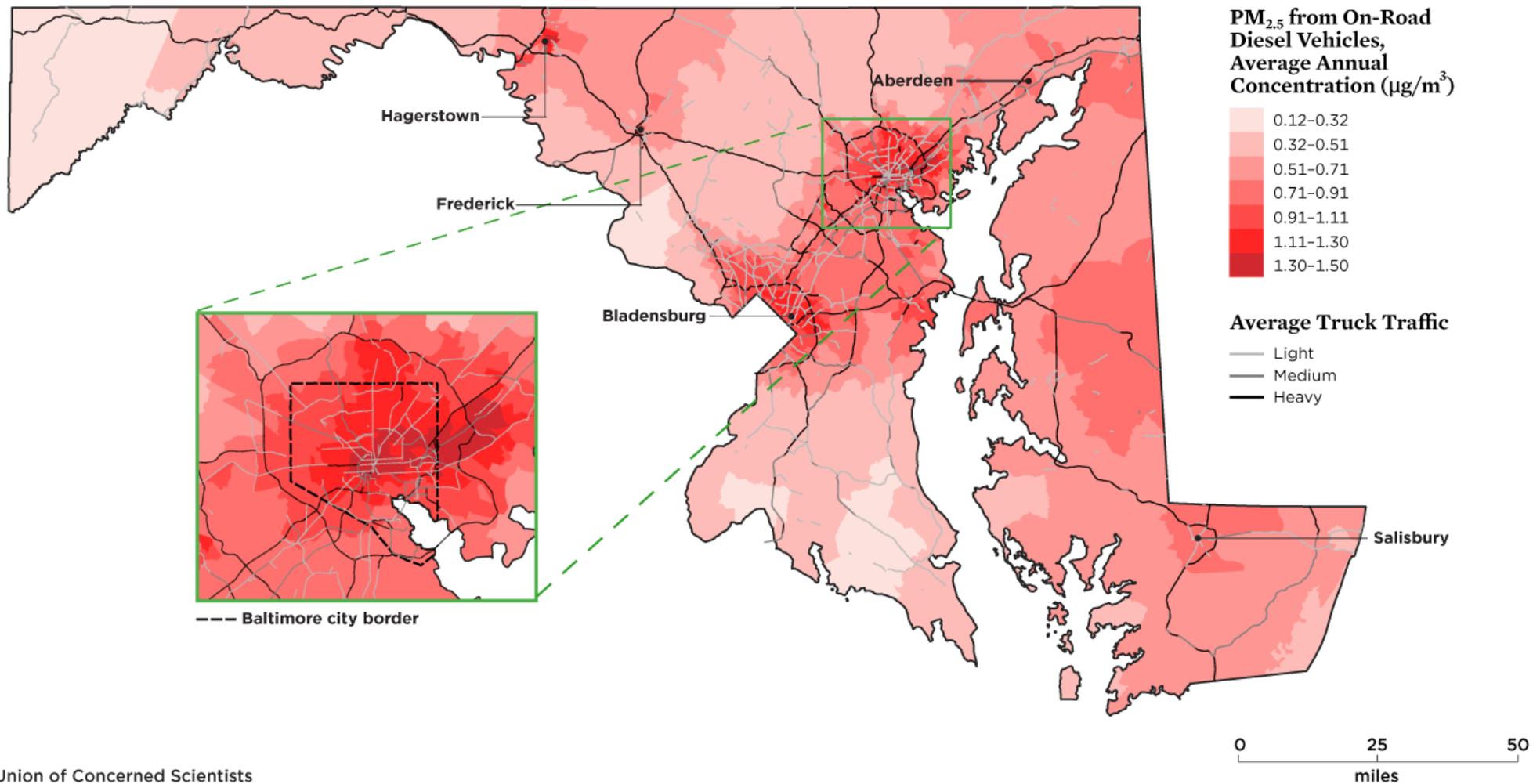
- Increased risk of death from cardiovascular and lung diseases, including slow lung function in children.
- Increased risk of lower birth weight and infant mortality
- Links with prenatal exposure and autism
- Damage to nervous system, including cognitive effects

The ACT and HDO rules would bring over **\$2.2 billion** in public health benefits to Maryland from 2020-2050, by avoiding:

- over **314** hospital admissions and emergency room visits,
- **370** premature deaths, and
- **158,100** cases of respiratory illnesses like asthma.

Source: [ICCT](#), with further analysis by Kevin Shen, Union of Concerned Scientists

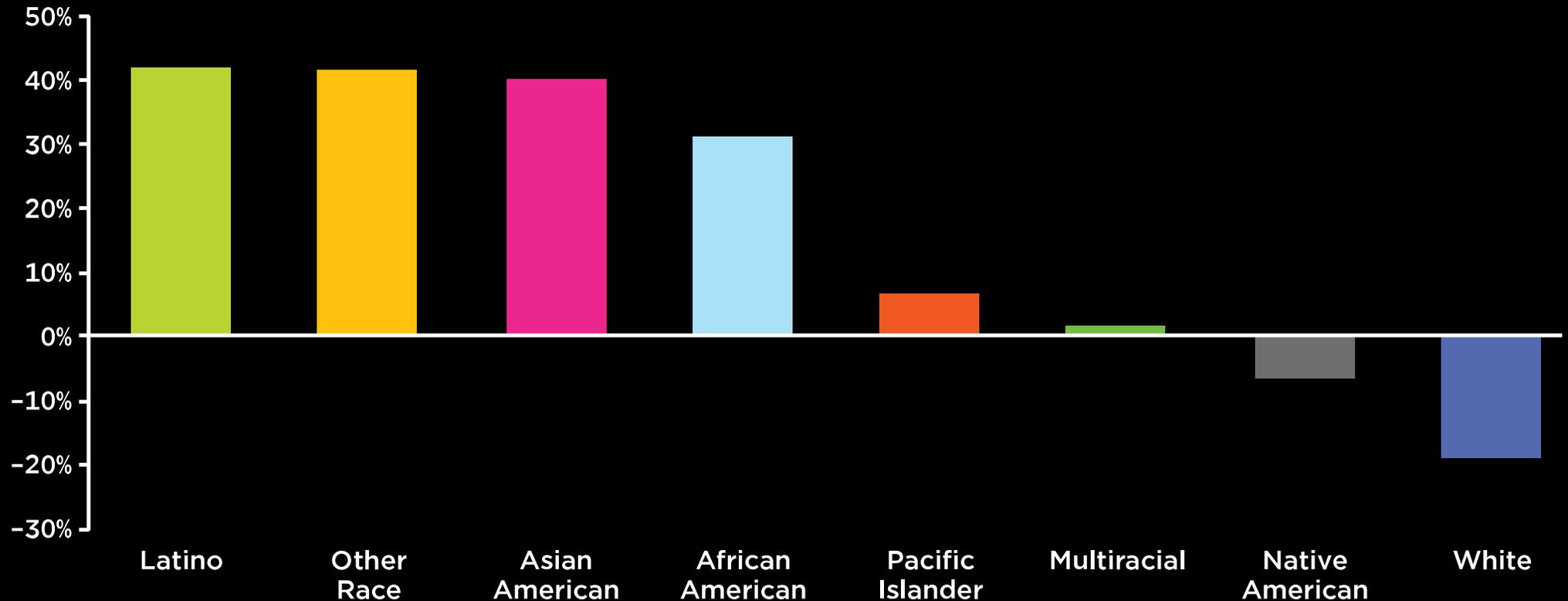
Exposure to Diesel Pollution in Maryland



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Residents of Color across the Northeast/Mid-Atlantic are on average exposed to **66% more** PM_{2.5} than White residents

Population-Weighted
PM_{2.5} Exposure
(relative to regional average)



Source: <https://www.ucusa.org/resources/inequitable-exposure-air-pollution-vehicles>

Conclusion

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2. By 2025, require the procurement of *zero-emission buses for locally-operated transit systems*.
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{ Thank you

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CLUB

Questions?

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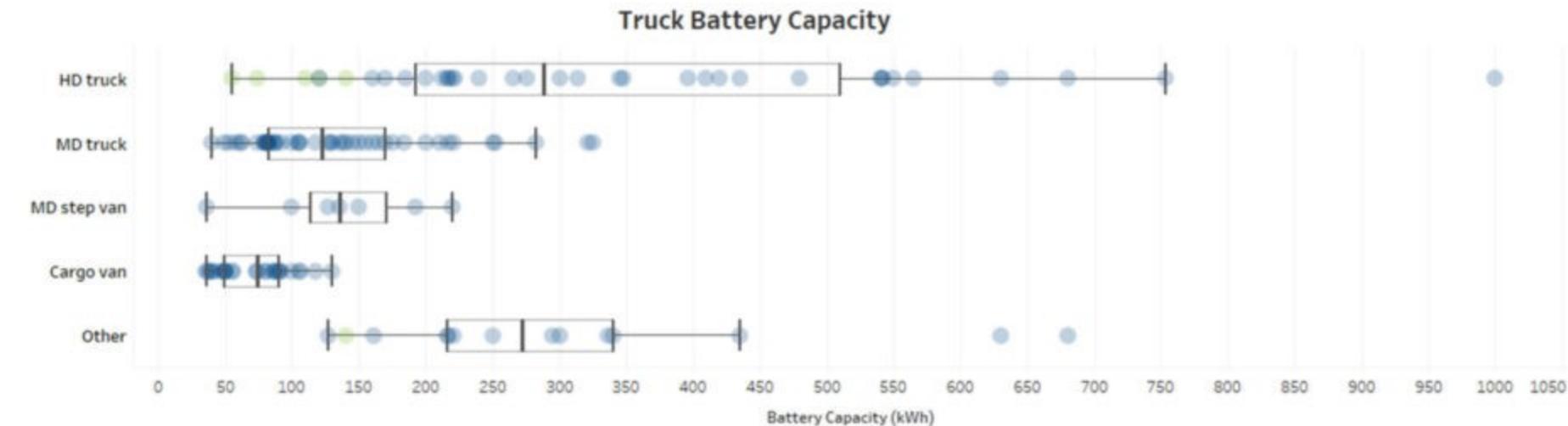
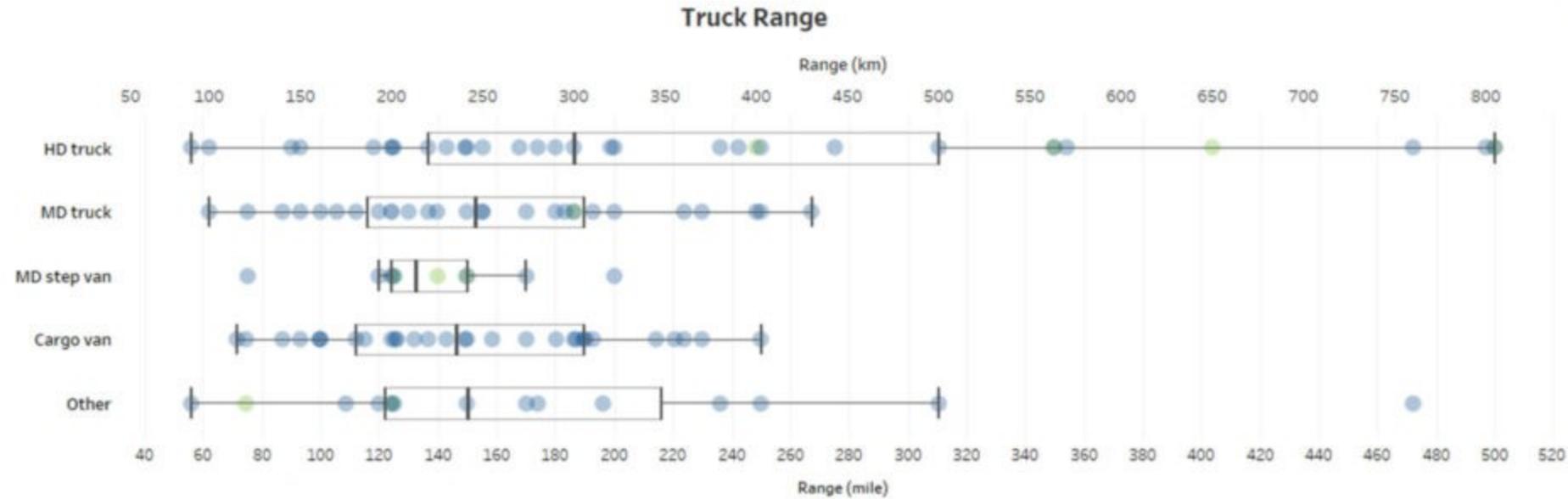
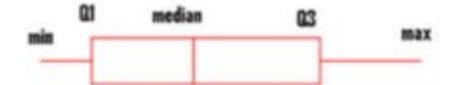
hieu.le@sierraclub.org

Extra Slides

Global ZET Median Range & Battery Capacity Growing to Cover Majority of Urban Duty Cycles



Technology
 Electric
 Fuel Cell

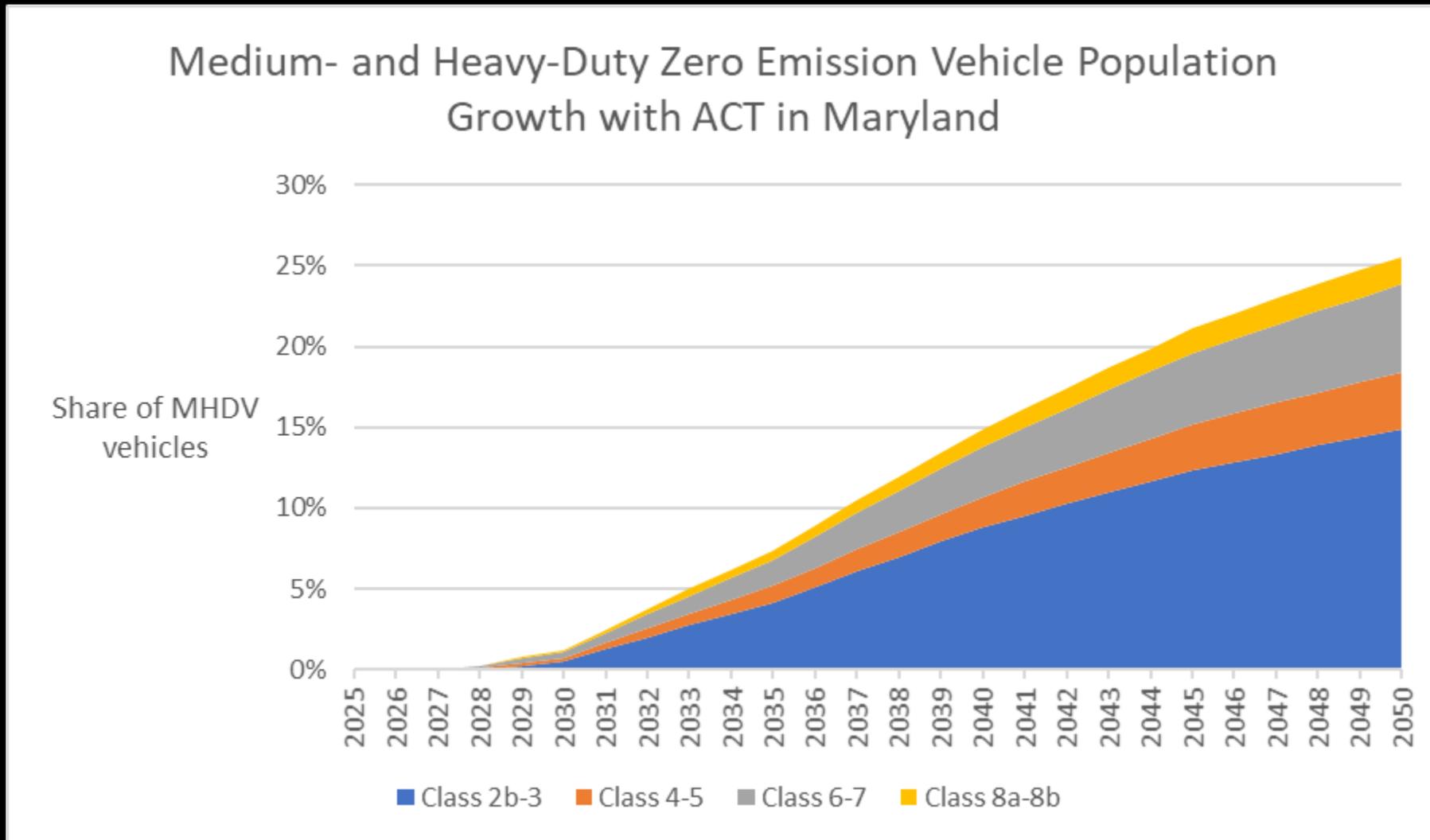


How to Read a Box Plot

A boxplot is a way to show a five number summary (min, Q1, median, Q3, max).

- The box shows the range of the middle 50%, aka interquartile range (IQR), bordered by the first quartile (Q1 or 25% mark) and the third quartile (Q3 or 75% mark).
- The center line of the box shows the median (Q2 or 50% mark).
- The far left and far right (called whisker) are usually the min and the max. With more extreme outliers (dots beyond whiskers), the whisker will be drawn to $Q1 - 1.5 * IQR$ or $Q3 + 1.5 * IQR$, where $IQR = Q3 - Q1$.

Even with the ACT, fleet turnover will be slow



Why not biodiesel or “renewable diesel”?

More than 80% of biodiesel is made from vegetable oil through a pretty simple chemical process.

Biodiesel is a small share of diesel fuel, but has a large footprint on agricultural markets. There is not enough vegetable oil to meet future biodiesel demand without electrifying trucks.

We need to use limited biodiesel stocks strategically for harder to electrify applications, such as aviation. MHDV should be electrified.

See <https://blog.ucsusa.org/jeremy-martin/all-about-biodiesel/> and <https://theicct.org/publication/lipids-cap-ca-lcfs-aug22/>

Total cost of ownership studies

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Pediatric asthma rates in MD are high

Pediatric asthma attributable to nitrogen dioxide, of which transportation is a significant source, is demonstrated in visual detail in the map below. In the Baltimore metro region, nitrogen dioxide pollution contributes to more than 1,300 new childhood asthma cases every year; and, in some areas of the city, as many as 1 in 4 new childhood asthma cases are attributable to pollution.

