

MCCC GHG MWG - Mid-project update: Accelerating light-duty ZEV adoption across Maryland

February 16, 2023

Russ Owens, Sustainable Transportation
Program Manager
rowens@energetics.com



Dylan Voorhees
Senior Consultant
dvoorhees@veic.org



Project Goals

- Evaluate the current status of Maryland's light-duty zero emission vehicle (ZEV) and charging infrastructure plans, programs, and other efforts → **Determine if they are sufficient to meet the State's goal of reducing GHG emissions by at least 60% by 2031**
- Evaluate the effectiveness of existing Maryland programs to determine if: 1) **they can be improved** and 2) **whether they should continue**
- Identify/**develop potential policy frameworks for improved/new programs** to increase adoption to meet/exceed the State's goals

Project Tasks

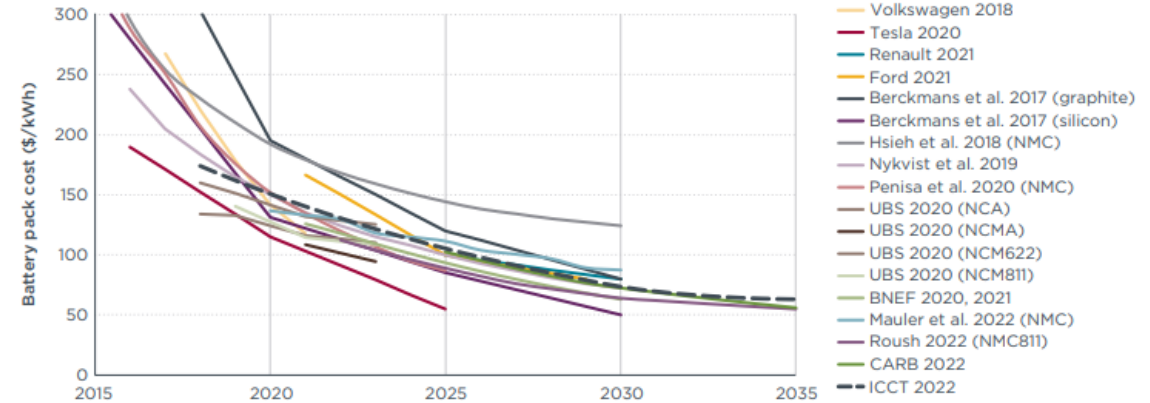
- Task 1 – Reference Case Analysis
- Task 2 – Recommendations for State Action
- Task 3 – Recommendations for Equitable ZEV Charging Solutions

Stakeholder Interviews

- Utilities – SMECO, Exelon
- Charging network service provider/EVSE OE – ChargePoint
- Auto industry
 - Alliance of Automotive Innovation (OEs)
 - Maryland Auto Dealers Association
 - Washington, Maryland, Delaware Service Station and Automotive Repair Association (WMDA/CAR)
 - Mid-Atlantic Petroleum Distributors Association (MAPDA); fuel providers and fueling stations
- Rural population – Maryland Farm Bureau

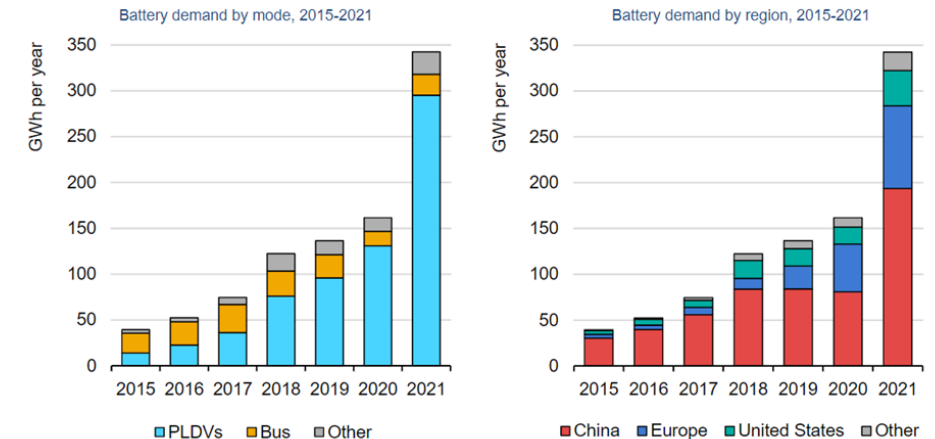
Factors that may Limit ZEV Adoption

- **Charging infrastructure** – Many stakeholders mentioned as key barrier, even with lower price vehicles
 - Vehicle OEs, dealers, MUD, rural population that commutes to work in metro areas
 - Even if not need for daily charging, need mental reassurance that charging is available
- **Industry limitations (raw materials, chip shortage, etc.)** – Near-term chip issues & supply chain out of OE's control; expect to ease in ~1-2 years. Longer-term Federal role; onshoring, U.S. mine permitting could impact ZEV production, credit availability, and adoption
- **High battery costs** – Critical metals (Li, Co, Ni) and high cost → OEs developing battery chemistries with less/no Co and Ni. Long-term sourcing. New mines.
- **High demand for EV batteries** – Competition with rest of US and world for ZEVs and other consumer electronics
- **(Resulting in) High vehicle prices** – See following slides



Source: ICCT; [Assessment of Light-Duty Electric Vehicle Costs and Consumer Benefits In The United State In The 2022-2035 Timeframe](#)

Global battery demand doubled in 2021, driven by electric car sales in China



Notes: GWh = gigawatt-hours; PLDVs = passenger light-duty vehicles; other includes medium- and heavy-duty trucks and two/three-wheelers. This analysis does not include conventional hybrid vehicles. IEA. All rights reserved.

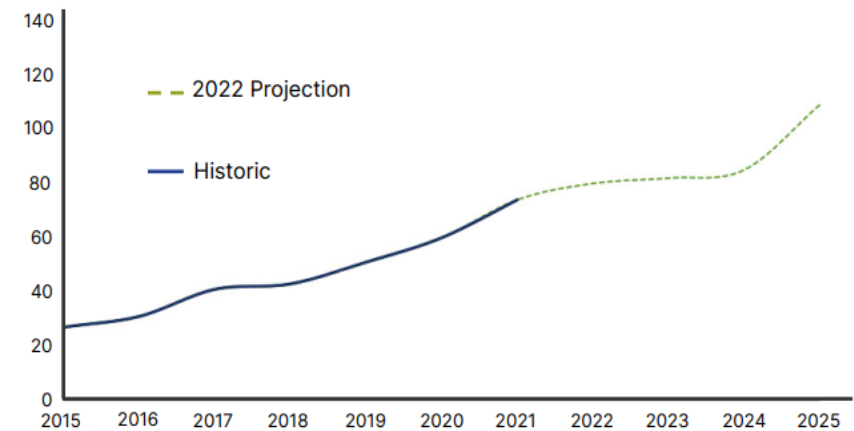
Source: IEA analysis based on [EV Volumes](#).

Major LDV OEMs' ZEV Plans and Prices

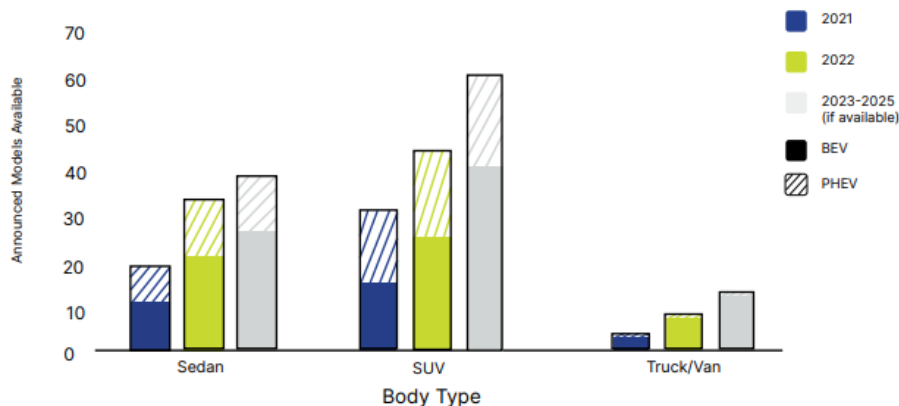
Projected PEV Model Availability

- Driven by upcoming regulations and consumer demand, automakers are investing billions of dollars into ZEV and battery development and production over the next decade
- Most major automakers have announced plans to electrify most of their product categories by 2030

Total Light-Duty Vehicle PHEV and BEV U.S. Models Available by Year



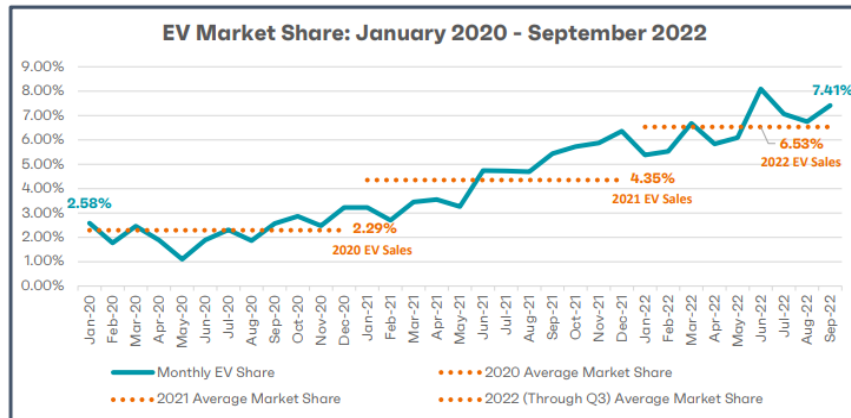
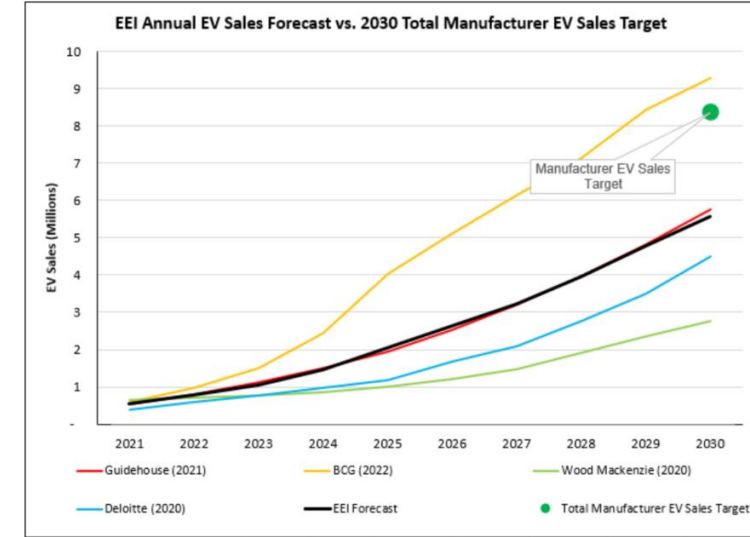
Cumulative Announced U.S. Light-Duty BEV and PHEV Models by Body Type



- (As known) crossovers, SUVs, and pickup truck segments are projected to have more growth than the sedan segment
- This follows the general market trends of ICE vehicle segments as well
- MD Auto dealers excited to have capable product they can (much more easily) sell
- **Takeaway:** OEs are releasing many vehicle options across the brands and vehicle types that matches consumer demand

ZEV Sales and Production

- EV sales volume increased by 4.2% from 2020 to 2022, despite COVID-related supply chain issues (more models, lower \$ options)
- Along with expanding model lines for PEVs, manufacturers must significantly ramp up production volumes to meet customer demand & **ZEV mandates**
- EEI estimate of national EV sales volume in the year 2030 shows ~50%
- **Takeaway:** OEs need to meet ZEV sales targets in CA states (or else fines), so ZEV vehicle availability (#s) will be higher in these states
- **Takeaway:** All major OEs are increasing ZEV models and production. Most mass market brands are planning to be ~50% EV by 2030



Manufacturer	EEI estimated light-duty vehicle sales in U.S. in 2030	Manufacturer announced EV sales targets in 2030*	Estimated EV sales in 2030
BMW	420,000	50%	210,000
Ford	2,150,000	40%	860,000
General Motors	2,580,000	50%	1,290,000
Honda	1,660,000	40%	664,000
Hyundai-Kia	1,650,000	50%	825,000
Jaguar Land Rover	120,000	100%	120,000
Mazda	370,000	25%	92,500
Mercedes	370,000	100%	370,000
Nissan	1,230,000	40%	492,000
Stellantis	2,010,000	50%	1,005,000
Subaru	680,000	40%	272,000
Tesla	880,000	100%	880,000
Toyota	2,540,000	30%**	762,000
Volkswagen	720,000	55%	396,000
Volvo	140,000	100%	140,000
Total	17,520,000	48%	8,378,500

*Percentages are based on most recently announced sales targets for EVs.
 **Estimated based on announced global EV sales target of 3.5 million in 2030.

Projected Trends in ZEV Price

- ICCT and CARB predicts significant reduction in BEV prices from 2022-2035
- Reduced battery and R&D costs are cited as the primary drivers for this decrease – also sales volume and improved manufacturing costs
- Smaller BEVs with lower range reach cost parity with comparable ICE vehicles sooner than large, long-range BEVs. (**Red lines** indicate BEV300)
- Alliance of Automotive Innovation - Does expect price & utility parity; but not sure when. Not if; when.
- **Takeaway:** all BEVs are projected to cost less than their ICE counterparts by 2035
- **Takeaway:** PHEVs are not projected to ever reach cost parity



Current Market Trends, Forecasts, and Projections

- **EVSE**

- Lit review results are varied
- For ZEVs needing public charging – EV:EVSE ratio in the 10:1 - 15:1 range, with some saying 7:1
- Though each country, region, and state, needs to tailor EVSE planning/deployment according to the expected growth of EV population and use
- Currently NREL's EVI-Pro *Lite* seems to be the best tool for estimating public EVSE (workplace AC L2, AC L2 public chargers, and public DCFC)
 - Current tool has limited functionality and limits
 - NREL developing a public version of the (full) EVI-Pro tool
- Installing higher power AC L2 would increase ZEVs served
- EVSE device costs (smaller % of total cost) may come down some with increasing sales volumes
- EVSE installation costs and electrical infrastructure upgrades likely not decreasing

Current Market Trends, Forecasts, and Projections

- **Projections**

- U.S. EIA – 2022 Annual Energy Outlook – Only public source of detailed national trends/data
- **MD 2030 GGRA Plan (2021, 2017 data) best and most detailed MD-specific data and projections

- **Calculation tool**

- Developed based on MD 2030 Plan framework/assumptions
- Updated with EIA VMT and vehicle class adoption trends
- MVA – Provided detailed annual snapshot registration data (2020-2022)– Stock, sales; by year, vehicle OE, vehicle type, powertrain, etc. → Updating tool sales data
- Current scenarios: (MD) Reference, (MD) GGRA, (MD) MWG, ACC II (all BEV), ACC II (20% PHEV), ACC II *
- Projects ZEV sales, ZEV stock, net GHG avoided, NOx estimates, and public EVSE. Baseline with MVA data and industry sales projections and for program scenario evaluations.

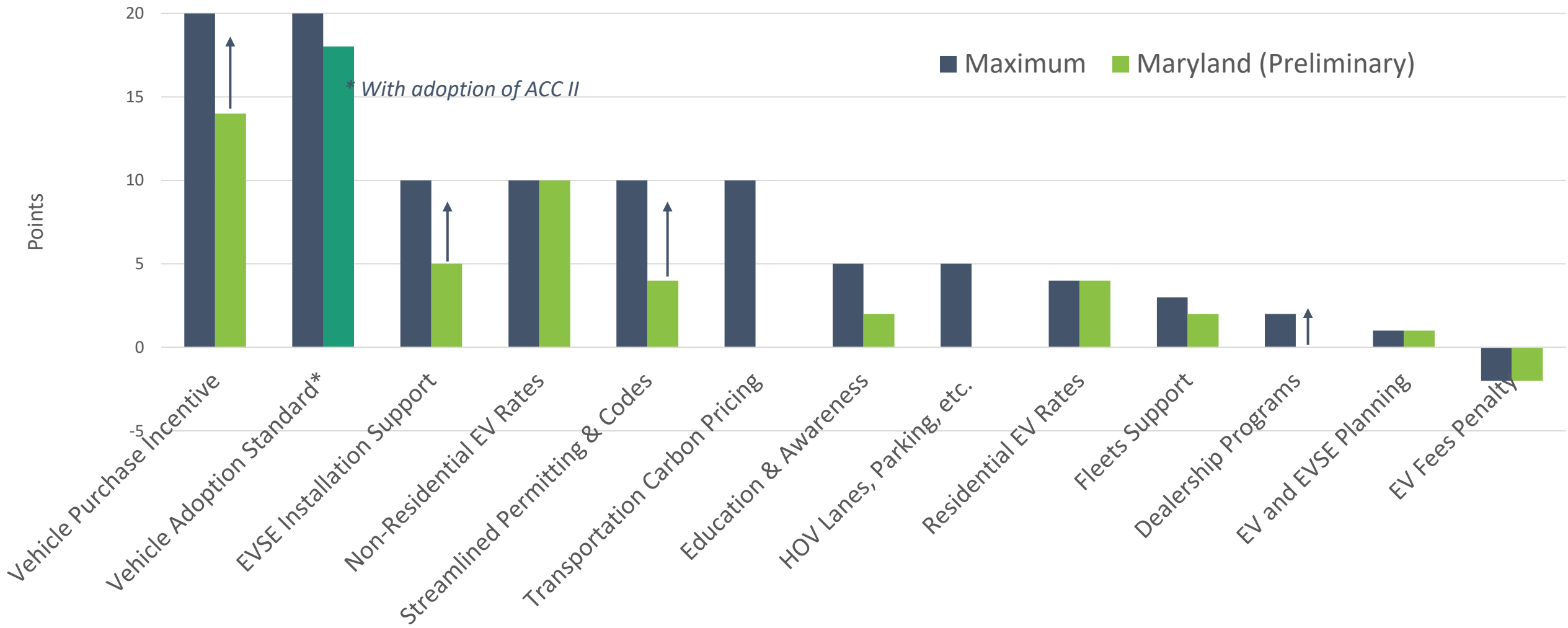


Recommendations for State Action

Determine practical actions Maryland could take to achieve the greatest reduction in greenhouse gas emissions from light-duty vehicles by 2031

Use learnings from other states' programs to determine the most appropriate focus for Maryland's program(s)

NASEO ZEV Policy Rubric



Sales Tax Exemption for New ZEV Purchases

- Plug-in vehicles with MRSP <\$50,000 qualify for exemption from sales tax of 6%
 - Maximum value of exemption is therefore \$3,000; however common EVs such as the Nissan Leaf or Chevy Bolt would receive approximately \$1,700-\$1,800
- The sales tax exemption can be applied directly at point-of-sale. This is a best practice for motivating EV purchases.
- No pick-up trucks would currently qualify for any sales tax exemption
- Used vehicles do not currently qualify for any sales tax exemption
- The sales tax exemption is very funding constrained. The FY24 budget (\$8.25 M) will provide approx. 4,000 incentives – and is expected to be gone in 2-3 months
- Start-stop incentives greatly diminishes impact on the market
 - Many car buyers make decisions more slowly or outside of this short window; car dealers invest in sales they can count on all year
 - Ironically, incentives with such limited availability may increase “free ridership”

EVSE Installation Support

- Maryland has multiple existing EVSE programs
- We are gathering data about results and want to understand how they compliment one another or overlap

Three areas of ongoing focus

1. **EVSE funding levels needed to achieve sufficient number of chargers over time**

- Current funding is not consistent with goals for increased vehicle sales and use

2. **Incentive amounts & structure**

- L2: Fleets, Multifamily
- DCFC: Corridor, Local hubs

3. **Access & predictability**

- Fixed rebates vs competitive/notice of funds

Recommendations for State Actions: Summary

1. Ensure annually sustainable funding for state sales tax exemption
2. Increase funding for public charging stations with emphasis on increasing volume of high visibility/easy access L2 charging
3. Initiate a dealer support and engagement program
4. Provide financial and technical support to commercial and high-use governmental fleet conversion
5. Encourage ZEV initiatives and partnerships with ride-hailing services
6. Within 2 years, extend sales tax exemption to used ZEV, introduce incentives for low-income households, and lift the MRSP cap for pickup trucks

Recommendations for State Actions: ZEV Purchase Incentive

- Maryland should plan for annually sustained funding for the sales tax exemption through 2026
 - *We are still estimating a sustainable budget consistent with sales targets*
 - After FY27, the state may be able to end the sales tax exemption on new cars and SUVs (subject to broad availability of federal tax credit)
- Within 2 years, MRSP cap should be increased for pick-up trucks, and potentially large SUVs
 - This higher cap could require the pickup truck/SUV to be full BEV in order to maximize GHG reductions
 - A \$60,000 limit would include the Ford F-150 Lightning (BEV); a \$75,000 limit would also include the Rivian R1T (BEV) – and Jeep Grand Cherokee, (PHEV w/ 26-mile range)
 - Consider an added incentive for pickup trucks, on top of 6% exemption to reduce incremental price

Recommendations for State Actions: Equity in EV Purchases

- New vehicles are inherently out of reach for a large portion of Maryland households, even those not considered “low income”
- Used EV markets are currently very limited, but are expected to grow
- **To increase equity of EV adoption, within 2 years, Maryland should extend the sales tax exemption to used EVs and establish an additional low-income incentive**
- Extending the sales tax exemption to used vehicles is relatively straight forward
 - Each vehicle should receive one used vehicle sales tax exemption in its lifetime.
 - It can be limited to dealership sales
- A low-income incentive should be provided at point-of-sale, to reduce the amount the individual must pay or finance
 - Income eligibility can be demonstrated through multiple means, especially via demonstrated qualification for any existing income-based assistance program

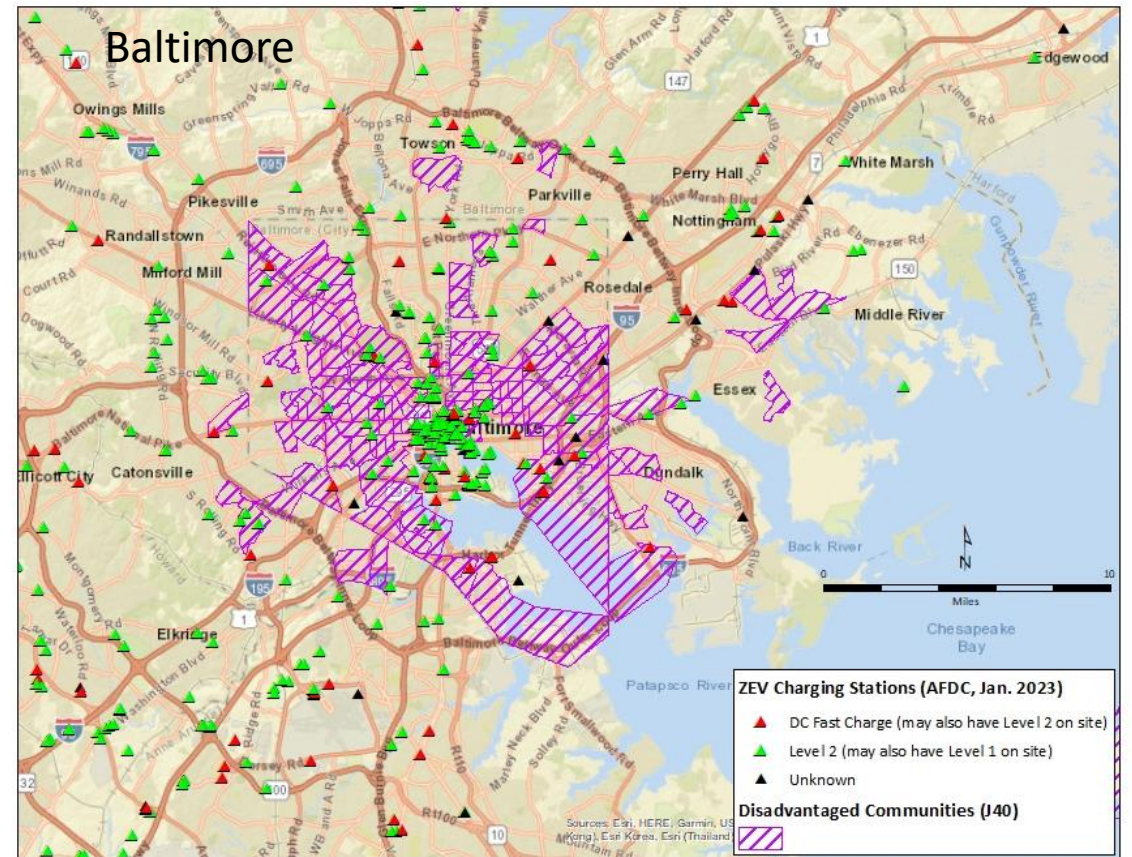
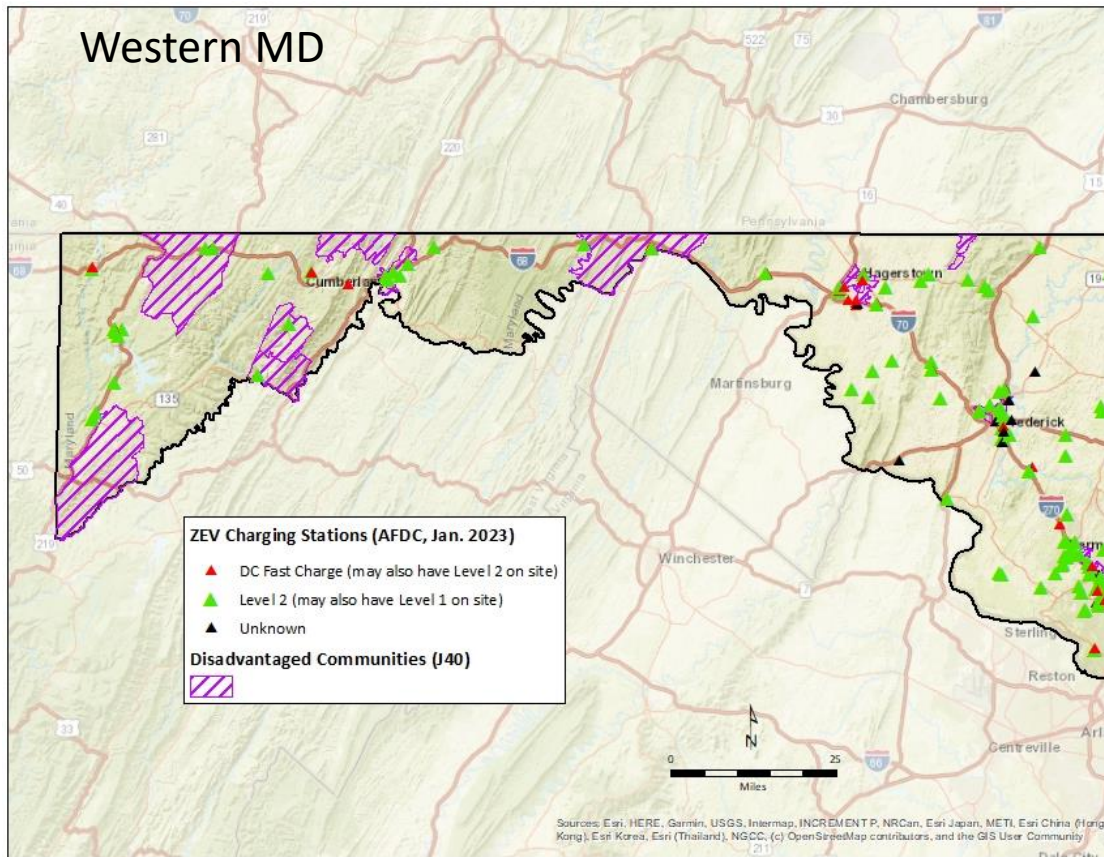
Recommendations for State Actions: Dealer Engagement

- Dealers are a critical link in vehicle purchasing decisions
- Dealerships and manufacturers may provide some training and education, but state programs, such as those in Vermont or Maine, provide more consistent and focused education, training and tools to support the EV sales process
- **Maryland should have a program to increase outreach, education and training support to dealers**
- **Maryland should consider either a per vehicle incentive and/or a stipend for dealers (e.g. \$200) and salespeople who attend training sessions about EVs and customer needs**
- Dealer engagement can also include targeting dealerships for EVSE installation (under existing EVSE incentive programs)

Recommendations for State Actions: Fleet Conversion

- Maryland should target vehicle and EVSE incentive programs at vehicle fleets, which *may* have relatively high VMT/vehicle
- **Providing technical support to help fleet managers understand, assess, and design economic fleet conversion strategies can be a relatively low-cost way to increase fleet conversion**
- In general, commercial fleets with the highest vehicle utilization will be the most economically motivated to begin conversion – and those conversions will also be associated with the highest GHG reduction
- Ride-hailing services such as Uber and Lyft are experimenting in some states with EV strategies, and some jurisdictions (e.g., NYC) will phase in EV requirements
- **Maryland should explore partnerships with ride-hailing companies to promote EV conversion and utilization; this is an area for innovation and creativity (e.g., coordinated marketing at BWI)**

Recommendations for Equitable ZEV Charging Solutions





Recommendations for Equitable ZEV Charging

1. Set specific targets for charging investment in disadvantaged communities
2. Increase funding for charging stations to serve multi-family housing, including through utility programs
3. Update building codes to require charging or charging-ready new construction, especially for multi-family housing

Recommendations for Equitable Charging: Building Codes

- It is far easier and much less expensive to install EV charging infrastructure during new construction; however, **unamended, IECC 2021 does not include provisions requiring EV charging**
- Maryland should adopt model amendments to the IECC 2021 that require EV charging or “Charging-ready” infrastructure in single family, multifamily and/or commercial construction
- It is especially important to incorporate EV charging into new multifamily construction, because this is one of the most challenging spaces for charging retrofits
- The International Code Council documents possible amendments in its publication “[2021 Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reductions](#)”
- Oregon requires 5% of multifamily parking spaces to be EV-ready (all electrical infrastructure short of the charging station itself); St. Louis, MO also requires 2% of spaces to have installed charging
- Dozens of local jurisdictions have similar or stricter requirements



Questions?

Thank you!

www.mde.Maryland.gov/MCCC