Maryland Electric Vehicle Initiatives

Mitigation Working Group of the
Maryland Commission on Climate Change

Sept. 26th, 2016

Maryland State Agency Roles

Maryland Department of the Environment

Maryland Energy Administration
Powering Maryland's Future

ZEV MOU	EVIP & AFIP	Install EVSE
Maryland Clean Cars Program	EV / EVSE (Incentives / Rebates)	Chair / Staff EVIC
	Accelerating Maryland's Clean Cities Transportation Future	Track EV Registrations

Maryland Clean Car Program

- Adopted in 2007; Implemented in 2011
- Incorporates CALEV Program in MD
- ZEV mandate
  - requires all automobile manufacturers to make an increasing percentage of their new vehicles zero emission vehicles
  - Mandate began in 2011 and steadily increases to 22% in 2025

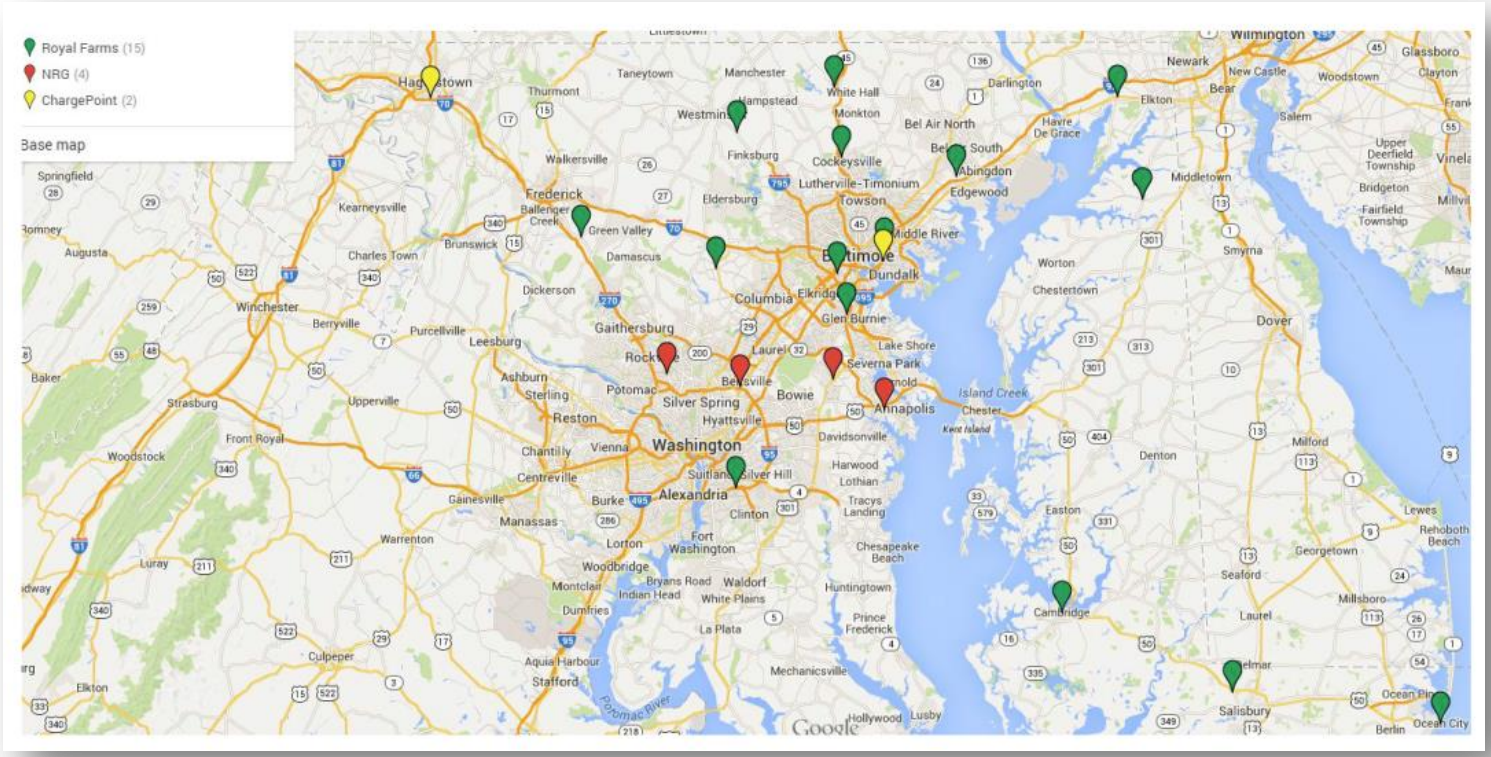
Maryland Department of the Environment

ZEV Memorandum of Understanding

- Signed October 2013 (CA, CT, MD, MA, NY, OR, RI and VT)
- Develop a ZEV environment/infrastructure to support ZEV requirements under the CALEV Program
- Highlights key commitments (Lead by Example, Harmonize Building Codes, Evaluate and Establish Incentives, etc…)
- Multi-State Action Plan Released May 2014
  - 11 specific recommendations to:
    - Support MOU goals
    - Guide interstate coordination
    - Advise state-specific action

Maryland Department of the Environment

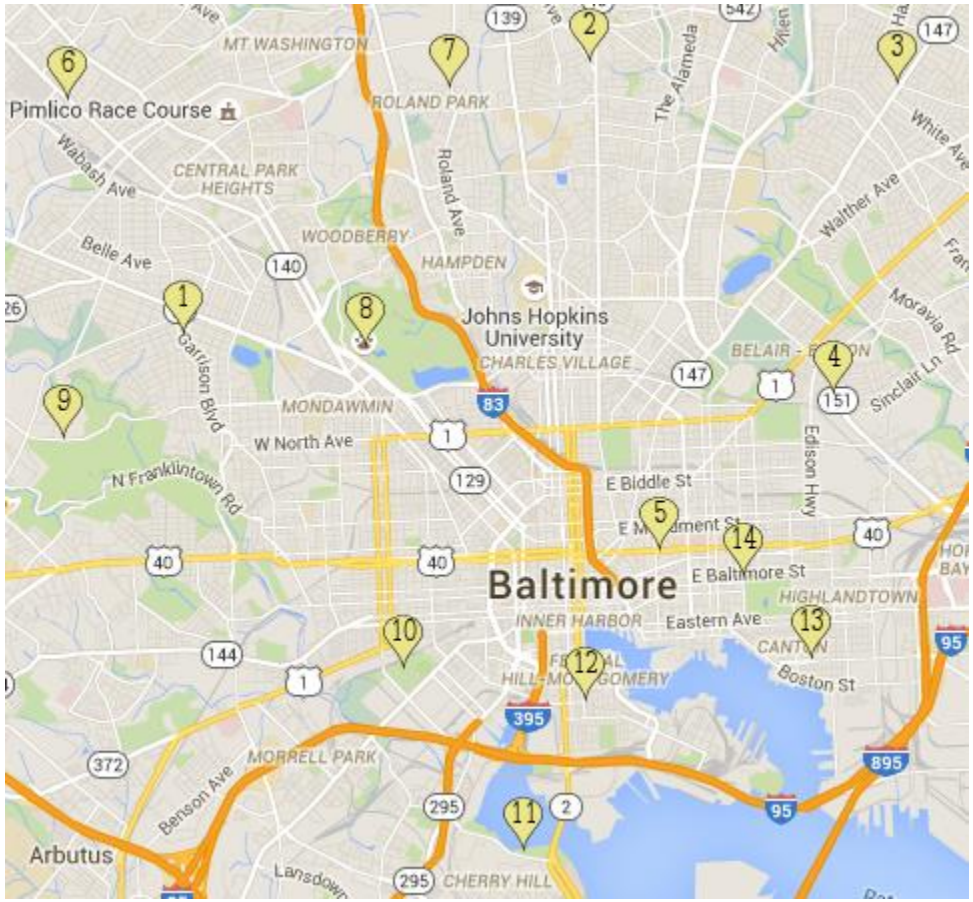
EVIP [Electric Vehicle Infrastructure Program]



- DC Fast Charging
- $1M; 50% match

Maryland Energy ADMINISTRATION
Powering Maryland's Future

AFIP [Alternative Fuel Infrastructure Program]



- DC Fast Charging
- Min. 50% match
- Max. EV Award $45K
- FY 2017 up to $2M

Maryland Energy ADMINISTRATION
Powering Maryland's Future

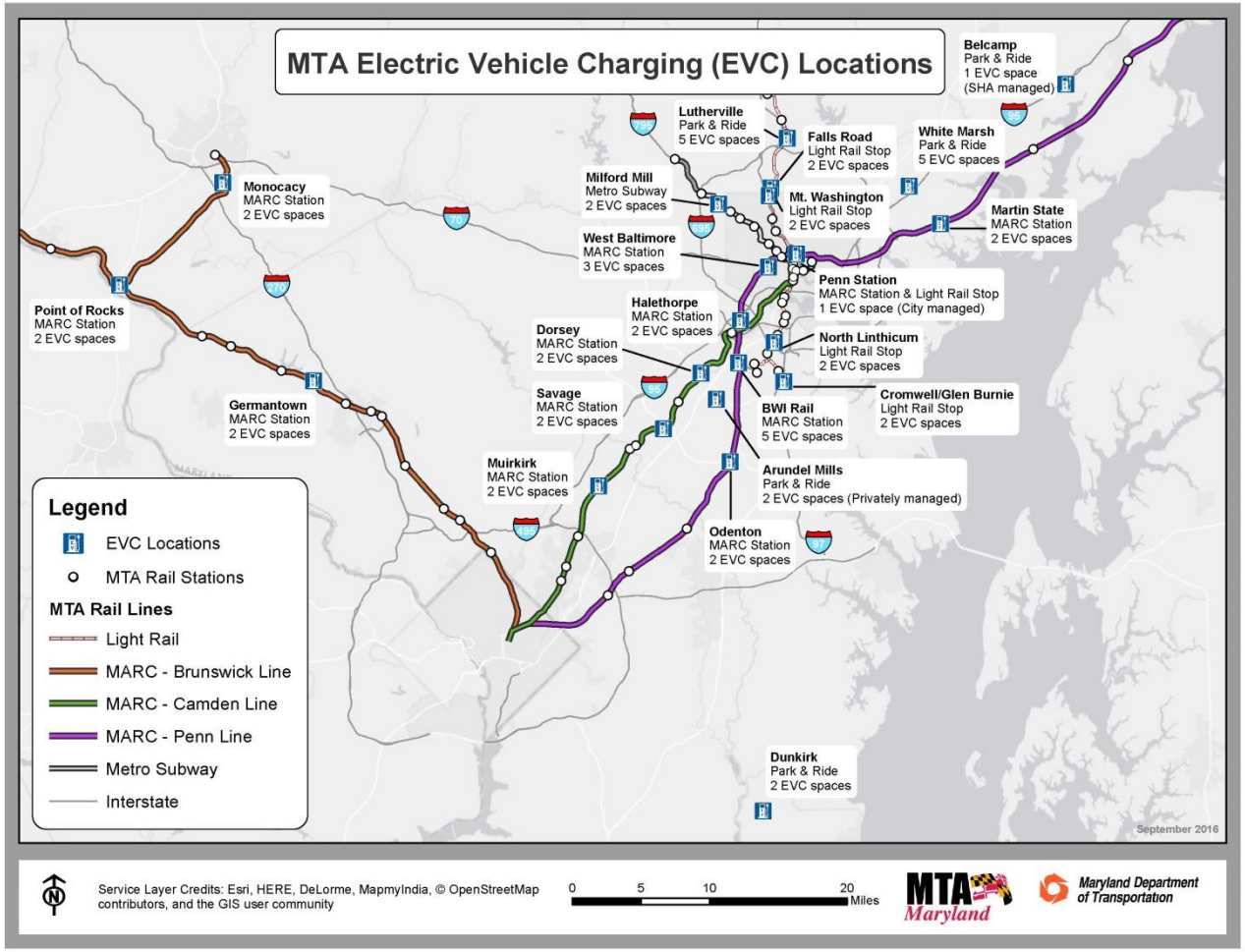
Additional Incentives

- EV Excise Tax Credit up to $1.8M (FY 14-17)
- EVSE Rebate up to $600K (FY 14-17)
- HOV Lane Exemption Permits for PEVs
- MD Freedom Fleet Voucher (FFV) Program

Maryland Energy ADMINISTRATION
Powering Maryland's Future

MDOT EVSE Installations

- TSO
- MTA
- MAA
- SHA
- MdTA
- MPA



EVIC [Electric Vehicle Infrastructure Council]

- Formed 2011; Extended through June 2020
- Council Members Defined in Statute & Appointed
- Chaired / Staffed by MDOT
- 2012 Action Plan
  - 32 Recommendations
- Starting in Feb. meet every other month
- Priorities Identified at 1st meeting in 2016

EVIC [Electric Vehicle Infrastructure Council]

- Priorities Identified during 1st Meeting in 2016
  - Identify legislative needs in advance of 2017 Session
  - Identify and address infrastructure limitations
  - Coalesce around central marketing theme
  - Identify technical and policy issues associated with workplace and urban charging, including
    - Interoperability
    - Paid vs. unpaid
  - Identify Economic Development Opportunities
- 4 Workgroups

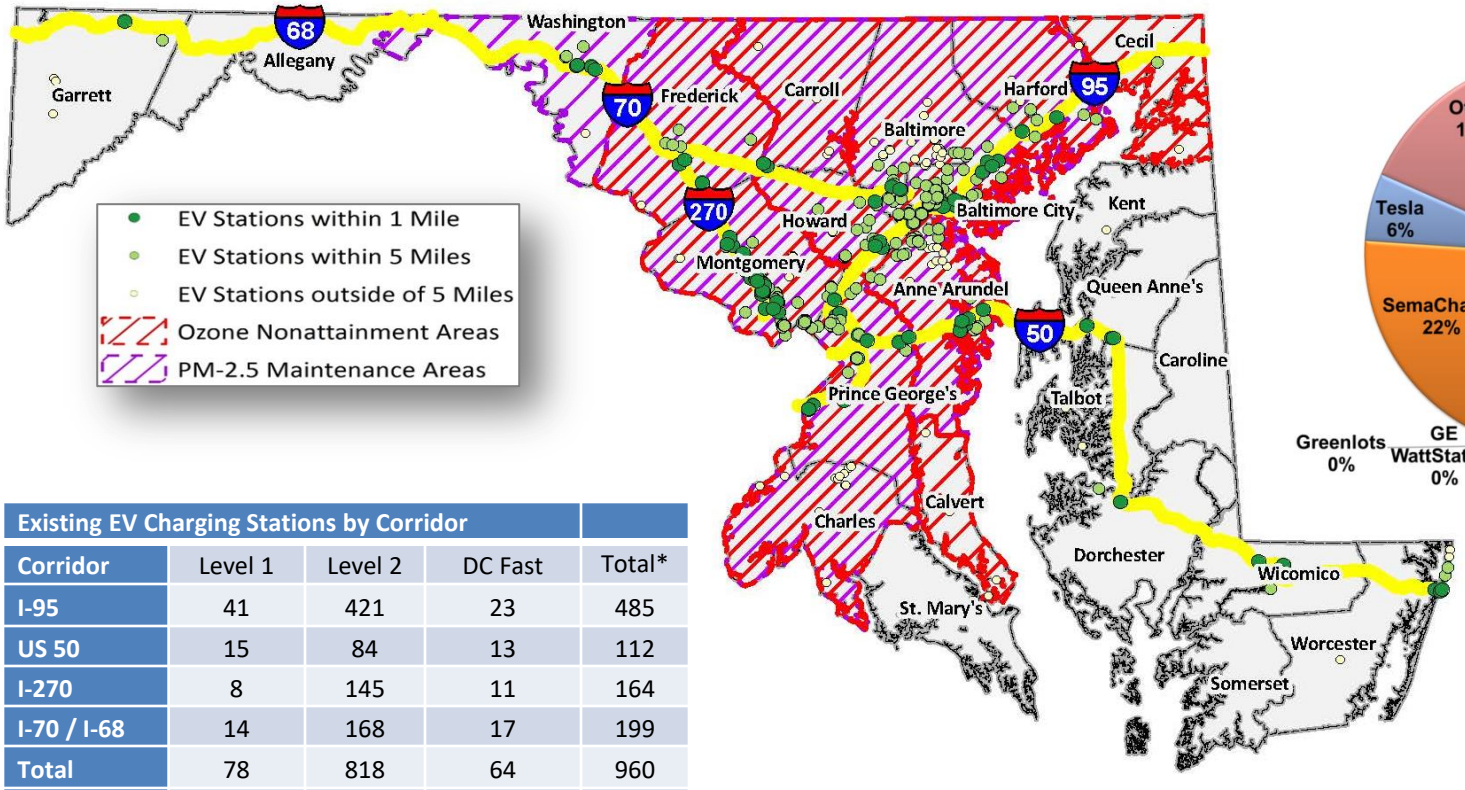
2017 Legislation

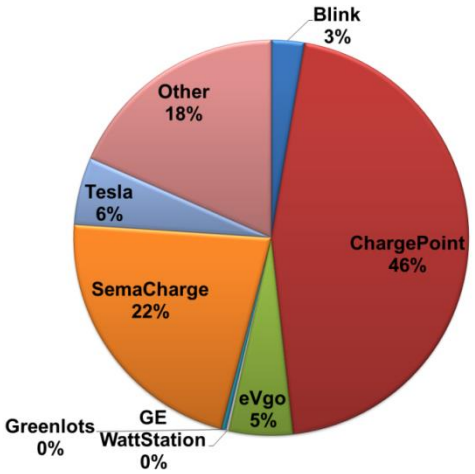
- MD EV Tax Credit and EVSE Rebates [Expires FY 17]
- Installation of EVSE
  - Address barriers related to rented housing, multi-unit dwellings, homeowners' associations, etc.
- Reserved EV Parking Spaces
  - Anti-Icing
  - Signage / Fines

FAST Act Alt. Fuel Corridors

- MDOT Submitted Nominations August 2016
- Expect FHWA to Announce Selections this Fall
- Support from Multiple Partners / Stakeholders

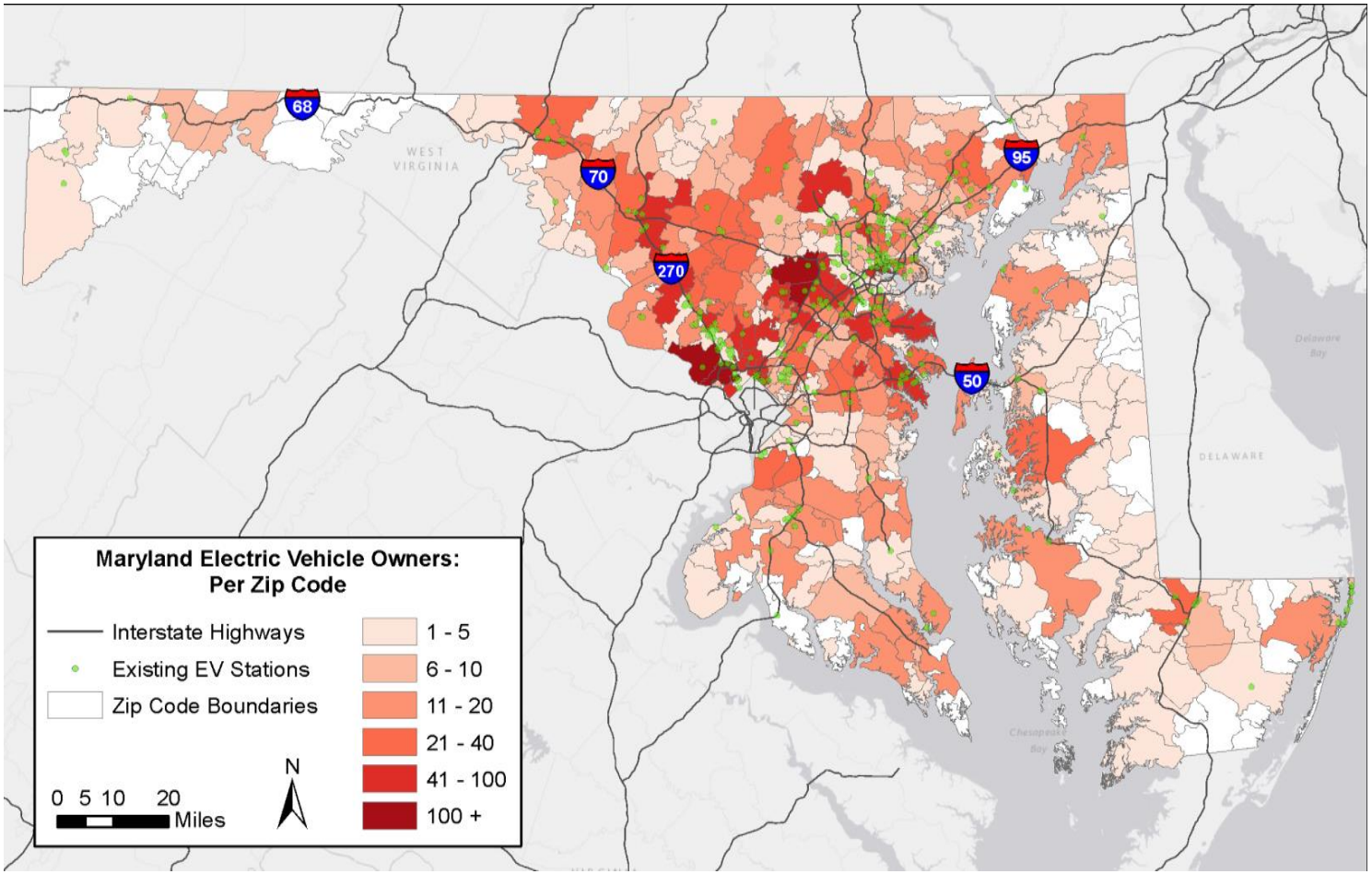
Maryland's Existing EVSE





Existing EV Charging Stations by Corridor				
Corridor	Level 1	Level 2	DC Fast	Total*
I-95	41	421	23	485
US 50	15	84	13	112
I-270	8	145	11	164
I-70 / I-68	14	168	17	199
Total	78	818	64	960
% of Total	8%	85%	7%	

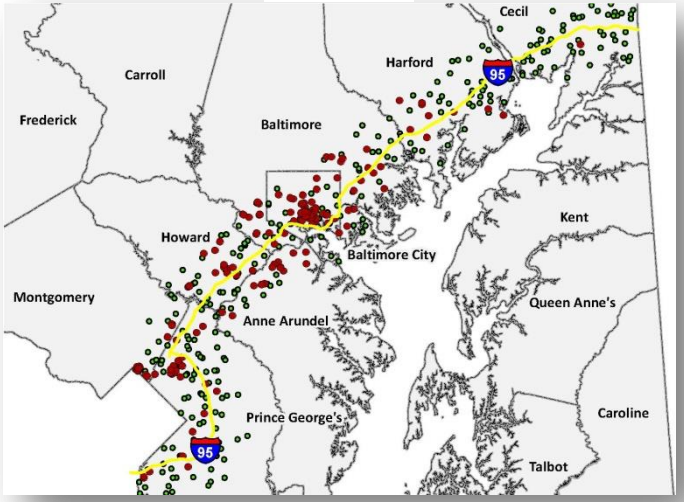
Maryland's Existing EV Registrations



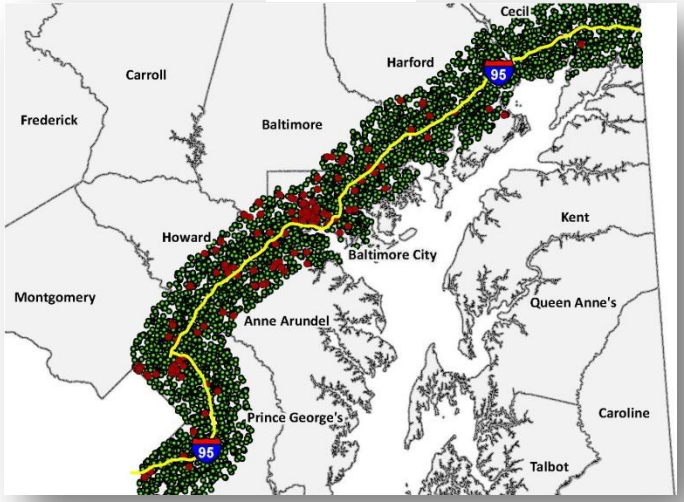
Forecast EVs and EVSE

- 100,000 EVs and 2,227 Chargers in 2020
- 1.4 Million EVs and 32,713 Chargers in 2040

2020



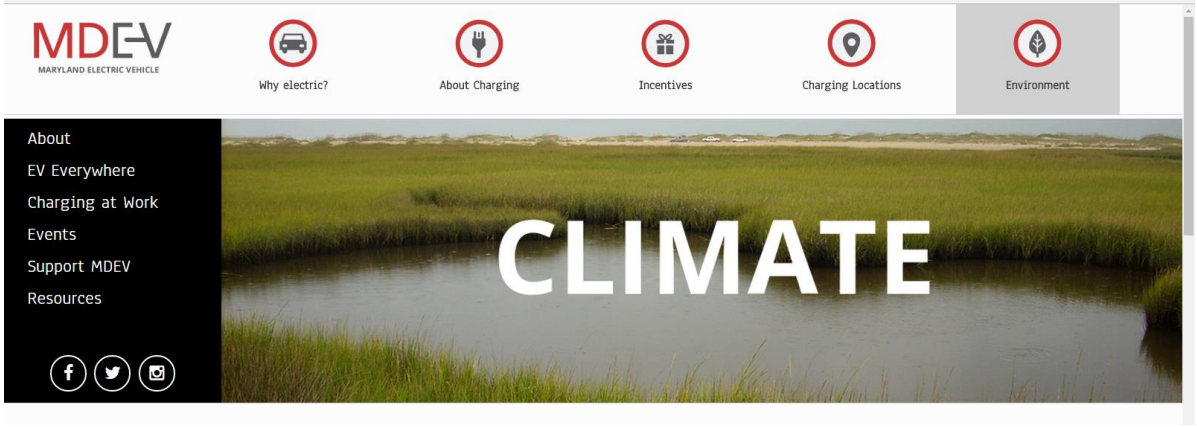
2040



- Existing Station
- Forecast Station

		Level 1	Level 2	DC Fast	Totals
2020	**Chargers**	47	1,009	64	**1,119**
	Cost	$46,824	$5,043,148	$5,378,205	**$10,468,177**
2040	**Chargers**	688	14,816	940	**16,444**
	Cost	$687,811	$74,080,090	$79,001,833	**$153,769,735**

Outreach Efforts



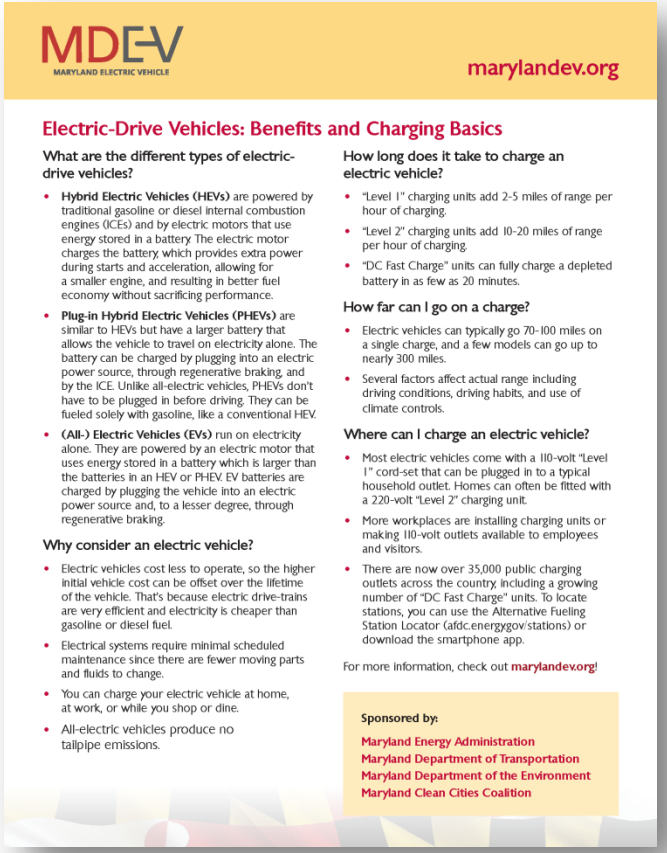
Maryland Energy ADMINISTRATION
Powering Maryland's Future

Maryland Department of the Environment

- Public
- Workplace
- Dealership

Maryland State Fair Outreach

- 505 Contacts
- 66 Completed Surveys
- General Findings:
  - Lack of Knowledge
    - Maryland Incentives
    - Charging Station Availability
  - Range Anxiety
  - Multi-Unit Dwelling Challenges
  - EV Model Diversity



MDEV
MARYLAND ELECTRIC VEHICLE

marylandev.org

Electric-Drive Vehicles: Benefits and Charging Basics

What are the different types of electric-drive vehicles?

- **Hybrid Electric Vehicles (HEVs)** are powered by traditional gasoline or diesel internal combustion engines (ICEs) and by electric motors that use energy stored in a battery. The electric motor charges the battery, which provides extra power during starts and acceleration, allowing for a smaller engine, and resulting in better fuel economy without sacrificing performance.
- **Plug-in Hybrid Electric Vehicles (PHEVs)** are similar to HEVs but have a larger battery that allows the vehicle to travel on electricity alone. The battery can be charged by plugging into an electric power source, through regenerative braking, and by the ICE. Unlike all-electric vehicles, PHEVs don't have to be plugged in before driving. They can be fueled solely with gasoline, like a conventional HEV.
- **(All-) Electric Vehicles (EVs)** run on electricity alone. They are powered by an electric motor that uses energy stored in a battery which is larger than the batteries in an HEV or PHEV. EV batteries are charged by plugging the vehicle into an electric power source and, to a lesser degree, through regenerative braking.

Why consider an electric vehicle?

- Electric vehicles cost less to operate, so the higher initial vehicle cost can be offset over the lifetime of the vehicle. That's because electric drive-trains are very efficient and electricity is cheaper than gasoline or diesel fuel.
- Electrical systems require minimal scheduled maintenance since there are fewer moving parts and fluids to change.
- You can charge your electric vehicle at home, at work, or while you shop or dine.
- All-electric vehicles produce no tailpipe emissions.

How long does it take to charge an electric vehicle?

- "Level 1" charging units add 2-5 miles of range per hour of charging.
- "Level 2" charging units add 10-20 miles of range per hour of charging.
- "DC Fast Charge" units can fully charge a depleted battery in as few as 20 minutes.

How far can I go on a charge?

- Electric vehicles can typically go 70-100 miles on a single charge, and a few models can go up to nearly 300 miles.
- Several factors affect actual range including driving conditions, driving habits, and use of climate controls.

Where can I charge an electric vehicle?

- Most electric vehicles come with a 110-volt "Level 1" cord-set that can be plugged in to a typical household outlet. Homes can often be fitted with a 220-volt "Level 2" charging unit.
- More workplaces are installing charging units or making 110-volt outlets available to employees and visitors.
- There are now over 35,000 public charging outlets across the country, including a growing number of "DC Fast Charge" units. To locate stations, you can use the Alternative Fueling Station Locator (afdc.energygov/stations) or download the smartphone app.

For more information, check out **marylandev.org**!

Sponsored by:

Maryland Energy Administration
Maryland Department of Transportation
Maryland Department of the Environment
Maryland Clean Cities Coalition

Morgan State University Survey

2016 Survey of 1,323 EV Owners in MD

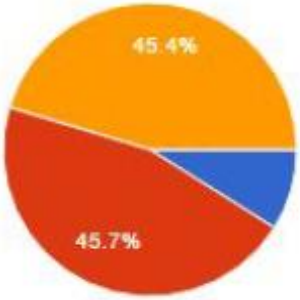
What is your age?

Under 20	2	0.2%
20 to 24 years old	3	0.2%
25 to 29 years old	19	1.4%
30 to 39 years old	125	9.5%
40 to 49 years old	284	21.6%
50 to 59 years old	402	30.6%
60 to 69 years old	345	26.3%
70 and older	132	10.1%

67%
50 & Older

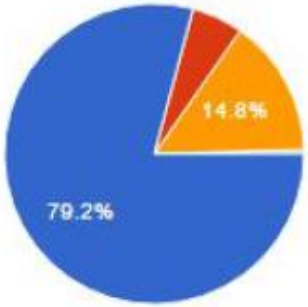
89%
40 & Older

How many vehicles does your household have?



One	117	8.9%
Two	600	45.7%
Three or more	595	45.4%

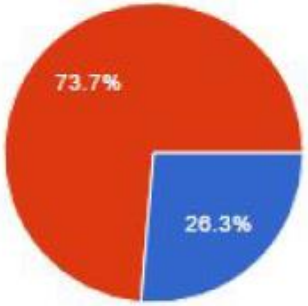
Where does the primary driver charge the EV mostly?



Home	700	79.2%
Work	49	5.5%
Both	131	14.8%
Don't know (Not sure)	4	0.5%

Morgan State University Survey

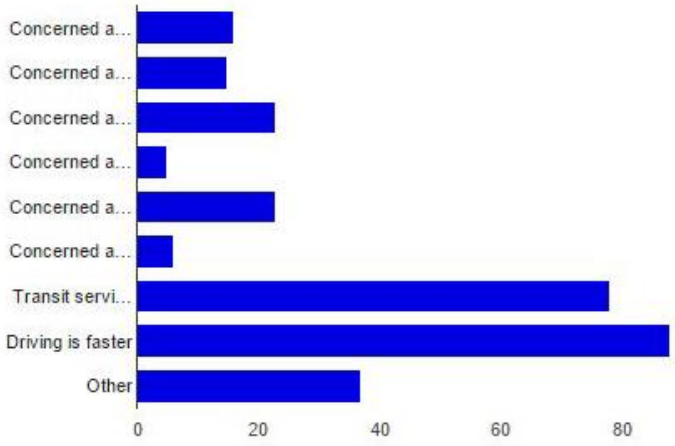
Would access to a charging facility influence the driver to use rail transit?



Yes	49	26.3%
No	137	73.7%

186 Responses

What are the reasons for not using a charging facility and taking rail transit for the rest of the commute?

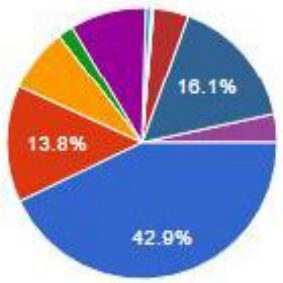


Concerned about vandalism of vehicle	16	11.9%
Concerned about other crime in the parking lot	15	11.1%
Concerned about not finding an available charging facility	23	17%
Concerned about taking too long to hook up to charging facility	5	3.7%
Concerned about cost for charging vehicle	23	17%
Concerned about EV being hooked up to charging for too long	6	4.4%
Transit service is inconvenient	78	57.8%
Driving is faster	88	65.2%
Other	37	27.4%

291 Responses

Morgan State University Survey

What were the top three reasons for your household purchasing or leasing an electric vehicle (EV)?



Environmental concerns, e.g., air quality, pollution	561	42.9%
Price of electricity vs. gasoline	181	13.8%
Tax breaks and net price of vehicle	101	7.7%
Single occupant access to HOV lane	24	1.8%
Advanced technology	119	9.1%
Safety features of vehicle	8	0.6%
Status of EV ownership	3	0.2%
Available charging facilities	1	0.1%
Vehicle performance	55	4.2%
Reduce dependence on petroleum	210	16.1%
Make or model of vehicle	44	3.4%

	Choice		
Reason	**1st**	**2nd**	**3rd**
Env. Concerns, e.g. Air Quality	561	252	143
Reduce Dependence on Petroleum	210	294	192
Price of Electricity v. Gasoline	181	211	164
Advanced Technology	119	138	161
Tax Breaks & Net Price of Vehicle	101	190	193
Vehicle Performance	55	88	148
Make or Model of Vehicle	44	47	101
Single Occupant Access to HOV Lane	24	31	60
Safety Features of Vehicle	8	26	42
Status of EV Ownership	3	10	45
Availability of Charging Facilities	1	11	24

Rankings

1st

2nd

3rd

Next Steps

- EVIC
  - Annual Report Due Dec. 1st
  - Legislative Session
- Transportation Climate Initiative (TCI)
- ZEV MOU
- Outreach
- Lead by Example

CONTACTS

Colleen Turner, MDOT

cturner@mdot.state.md.us

410.865.2773

Tim Shepherd, MDE

tim.shepherd@maryland.gov

410.537.3236

Mike Jones, MEA

michael.jones1@maryland.gov

410.537.4071

Dr. Z. Andrew Farkas

National Transportation Center

Morgan State University

andrew.farkas@morgan.edu

443.885.3761