Electric Vehicles (EVs) in the Baltimore-Washington Region

Presentation for The Clean Air Partners Board

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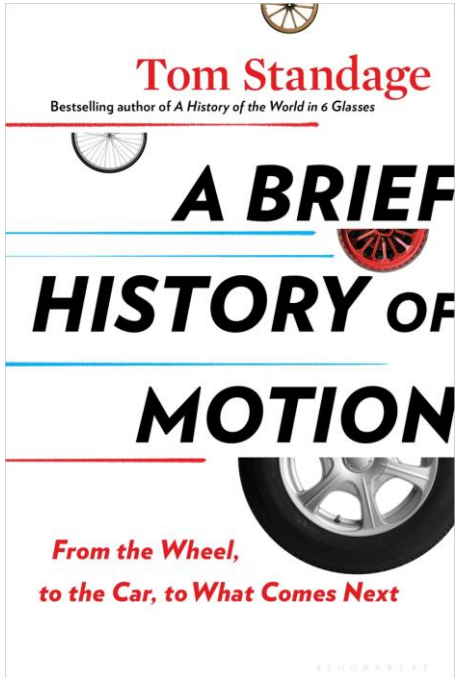
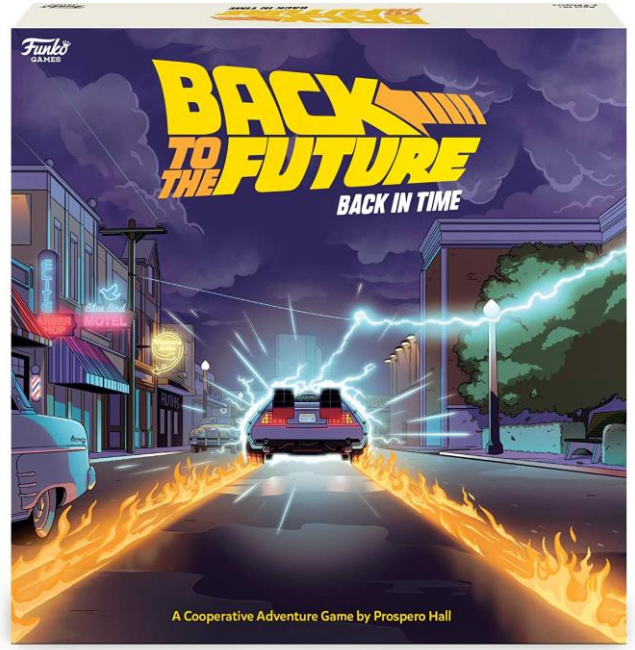
Government Policy & Programs Manager
September 2021

SemaConnect

Introduction: What's Old Is New Again





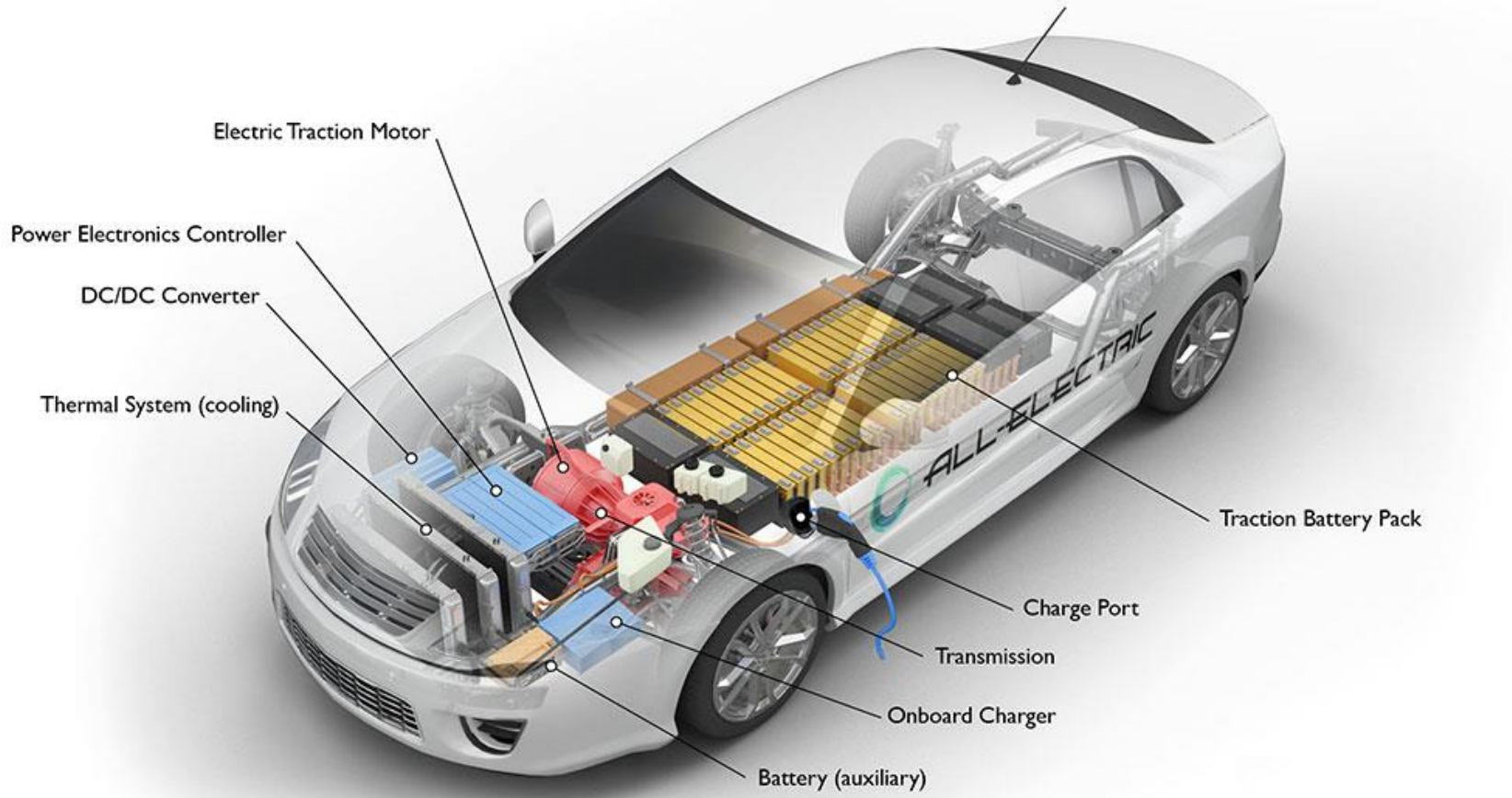
"Sales of electric cars peaked in the early 1910s"… "The failure of electric vehicles in the early 20th century, and the emergence of the internal combustion engine as the dominant form of propulsion, has much to do with liquid fuel providing far more energy per unit mass than a lead-acid battery can" … "**Buyers of private cars, then as now, did not want to feel limited by the range of an electric vehicle's battery, and the uncertainty of being able to recharge it.**"

EVs and EV Charging 101

BEV: Battery Electric Vehicle

PHEV: Plug-in Hybrid Vehicle

All-Electric Vehicle

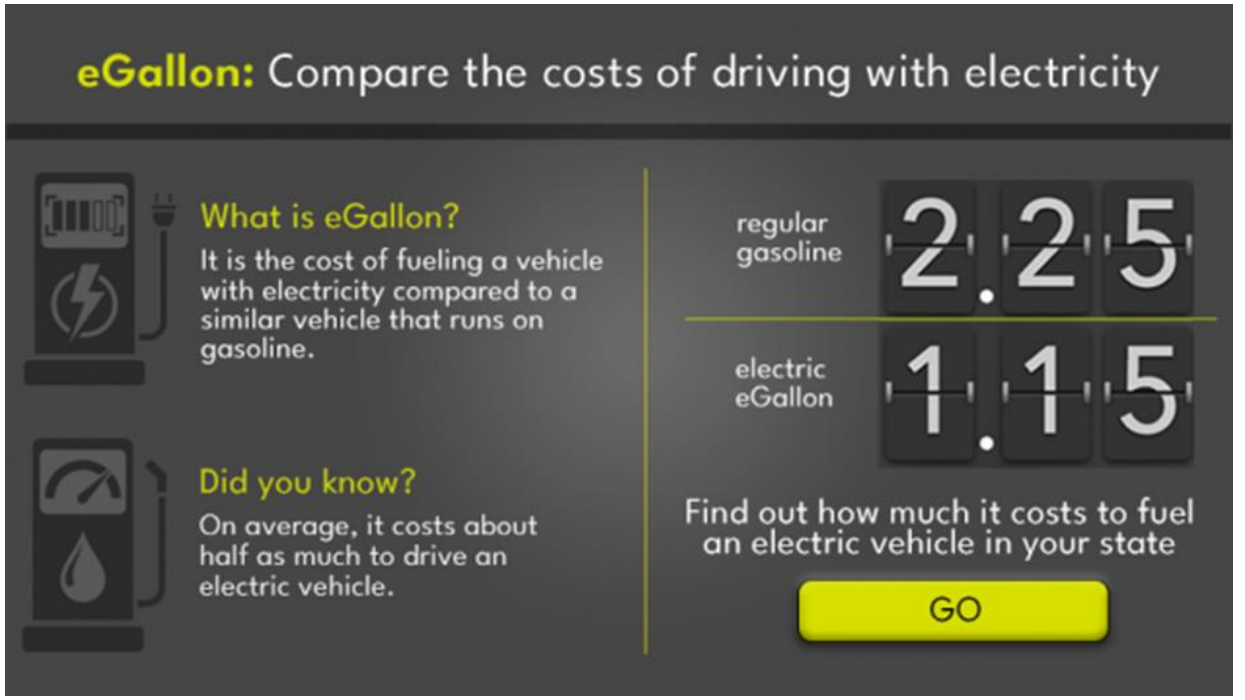


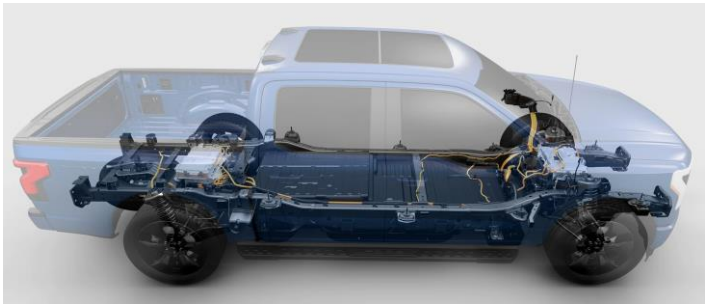
Why Switch to Electric Vehicles?

	CONVENTIONAL	HYBRID	PLUG-IN HYBRID	ALL-ELECTRIC
SOURCES OF ENERGY				
CONSUMPTION				
EMISSIONS				

EV Charging 101: Fuel Cost Comparison

Ford F-150 *Lightning*
$53,000 sticker price
It goes on sale in 2022.
The F-150 is the best-selling truck for the past 44 years.





- **<u>1,239</u> new EV registrations in August brought Maryland's total EV registrations to <u>36,080</u>.**
- **The Hogan administration has a goal of putting 300,000 zero-emission vehicles on Maryland roads by 2025.**

EV Charging 101: Types of Charging Levels

Source: Carolina Country Magazine

KNOW YOUR EV CHARGING STATIONS

AC Level One

VOLTAGE
120v 1-Phase AC

AMPS
12–16 Amps

CHARGING LOADS
1.4 to 1.9 KW

CHARGE TIME FOR VEHICLE
3–5 Miles of Range Per Hour

AC Level Two

VOLTAGE
208V or 240V 1-Phase AC

AMPS
12–80 Amps (Typ. 32 Amps)

CHARGING LOADS
2.5 to 19.2 kW (Typ. 7 kW)

CHARGE TIME FOR VEHICLE
10–20 Miles of Range Per Hour

DC Fast Charge

VOLTAGE
208V or 480V 3-Phase AC

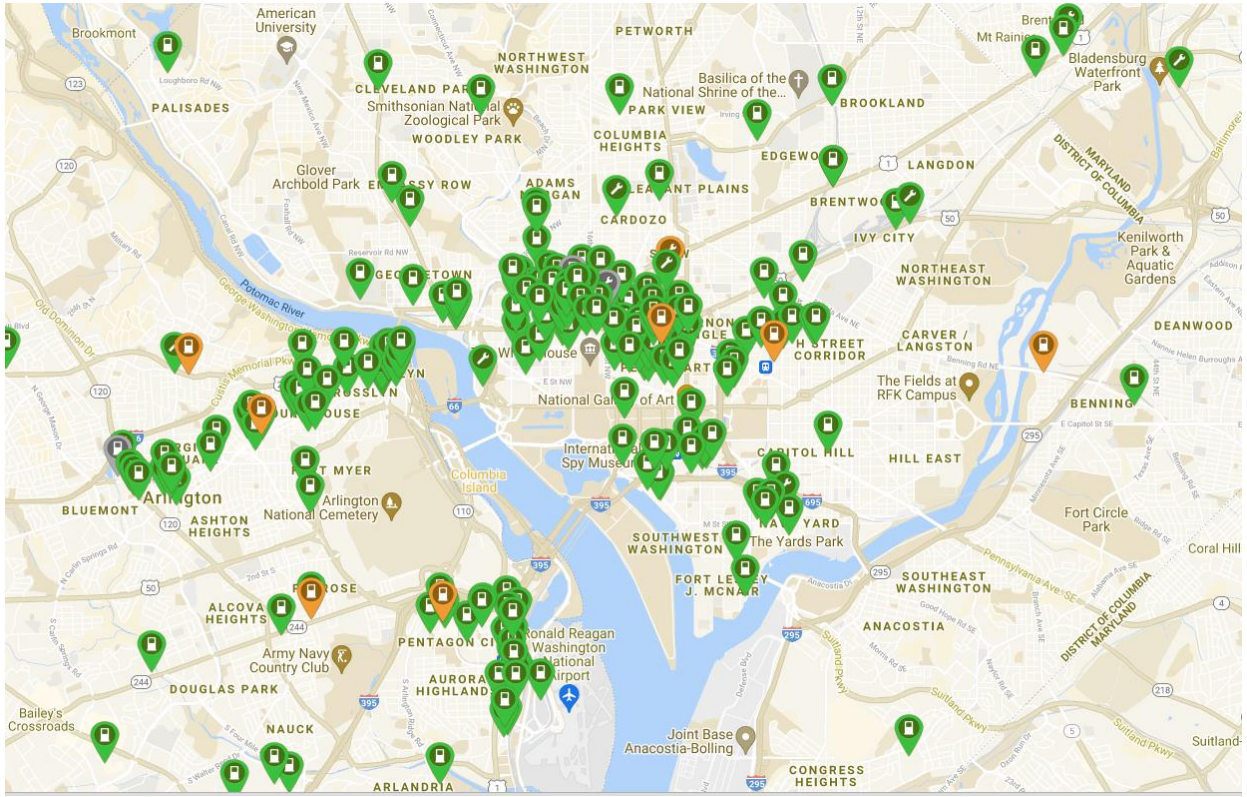
AMPS
<125 Amps (Typ. 60 Amps)

CHARGING LOADS
<90 kW (Typ. 50 kW)

CHARGE TIME FOR VEHICLE
80% Charge in 20–30 Minutes

Finding a charging station is as easy as opening an app…

Source: PlugShare



Follow the Money: Automakers' EV Sales Targets, Investments and Capital Expenditure (Capex)

Percents and Millions

Automaker electric vehicle sales targets

	Electric vehicle sales target or goal	Year
Volkswagen	50% EV sales in U.S., 70% in Europe, 50% in China	2030
Mercedes-Benz	50% EV sales	2025
Stellantis	40% EV sales in U.S., 70% in Europe	2030
GM	1 million EV sales for the year	2026
Ford	40% EV sales	2030

Sources: Companies, BloombergNEF
Note: Volkswagen is Volkswagen brand only, not Volkswagen Group

Investing Billions

Automakers' 2020 investment and announced electric vehicle and digital investment

	2020 R&D and capital expenditure	Announced EV and digital investment	Investment horizon
Volkswagen	$28.7 billion	$ 83 billion	5 years
Mercedes-Benz	13.8	46	10
Stellantis	13.0	34	5
GM	11.5	35	6
Ford	12.8	30	5

Sources: Companies, BloombergNEF

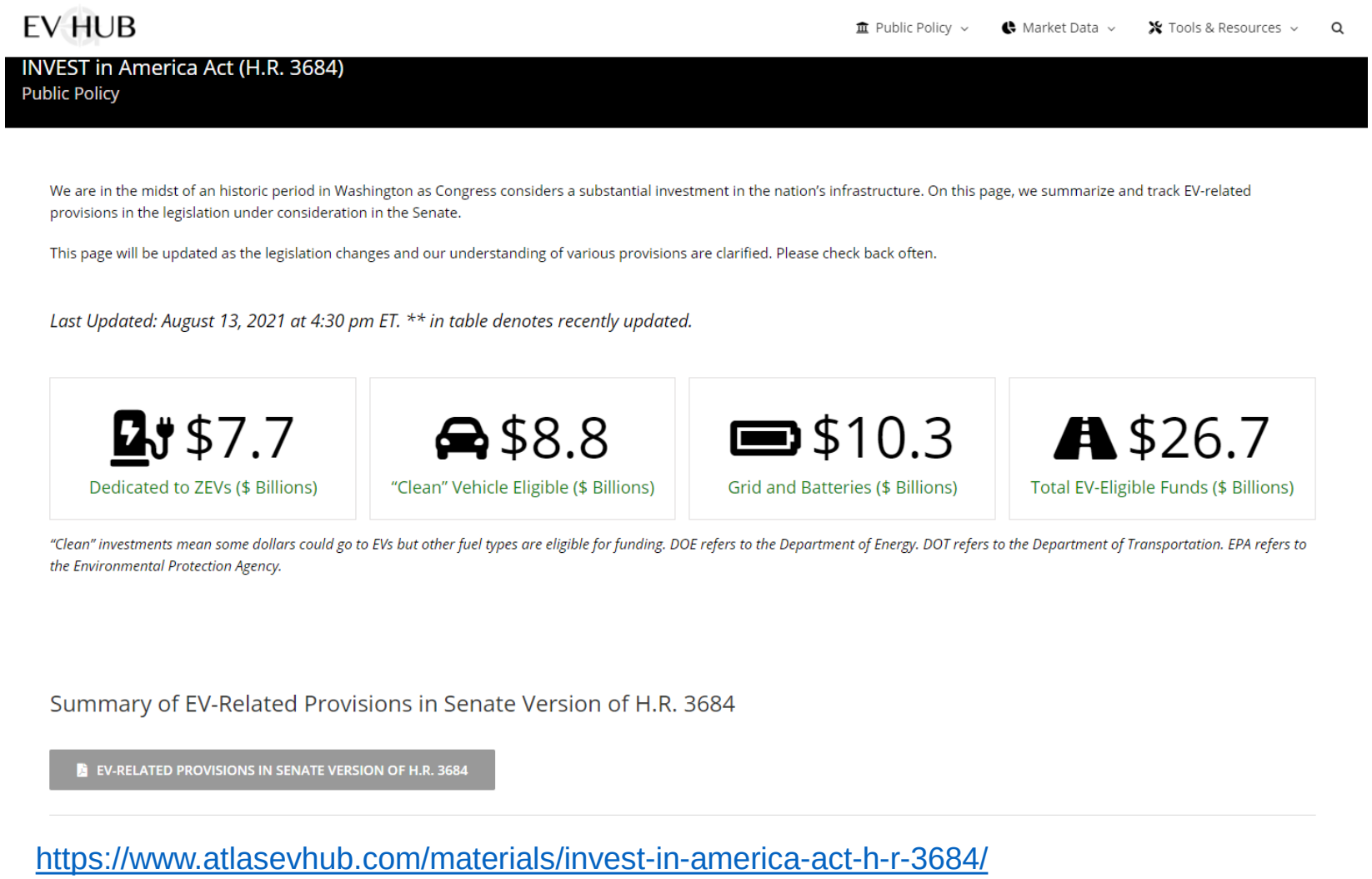
Capex Is Destiny

Automakers' electric vehicle and digital R&D and capex commitments as a percentage of total R&D and capex

Sources: Companies, BloombergNEF
Note: calculated as equal annual investment over companies' stated investment periods, divided by 2020 R&D and Capex.

Source: "Automakers Are Investing in EVs Like They Mean It," Bloomberg News, Aug. 5, 2021

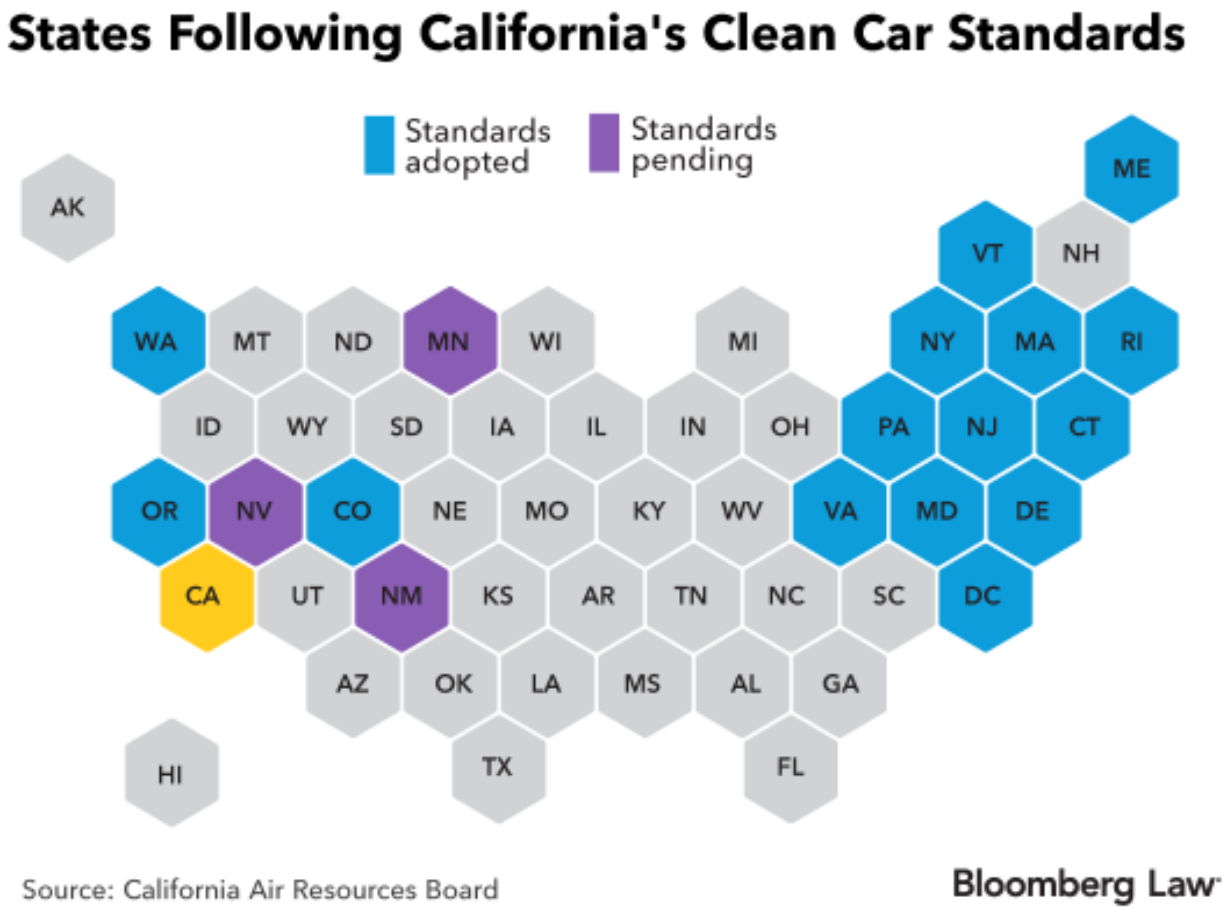
EV Charging in the Bipartisan Federal Infrastructure Bill



https://www.atlasevhub.com/materials/invest-in-america-act-h-r-3684/

- **$5 billion** for a national formula program for EV charging infrastructure.
- **$2.5 billion** for zero-emission school buses only.
- **Another $2.5 billion** for both low-emission and zero-emission school buses.
- **$200 million** for electric drive vehicle battery recycling and second-life applications program… and more!
- Link to NYT interactive page.

Many states are considering or have passed legislation to promote low-emission or zero-emission vehicles.



- Colorado's $5.4 billion transportation bill, now signed into law, includes $700 million+ for EV charging stations, EV incentives, and electrifying buses
- Minnesota has adopted CA clean car standards to take effect in January 2024
- Oregon has passed a bill mandating 100% carbon-free, renewable energy by 2040
- Virginia also has passed a clean cars bill this year and it enacted SB630, a "right to charge" law, for multifamily dwellings in 2020
- Washington state has passed new legislation to regulate the EV charging industry, broadly similar to California's EVSE regulations

Introducing SemaConnect

A FEW OF OUR CLIENTS

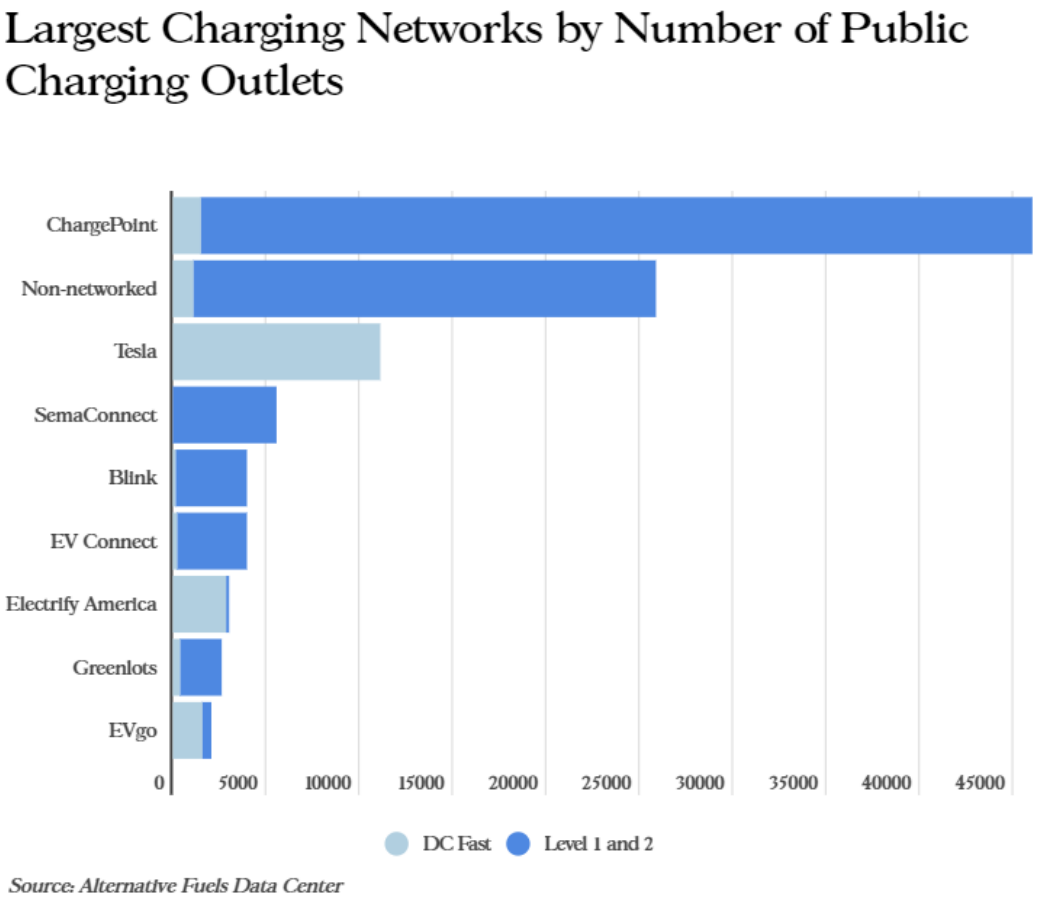
CBRE

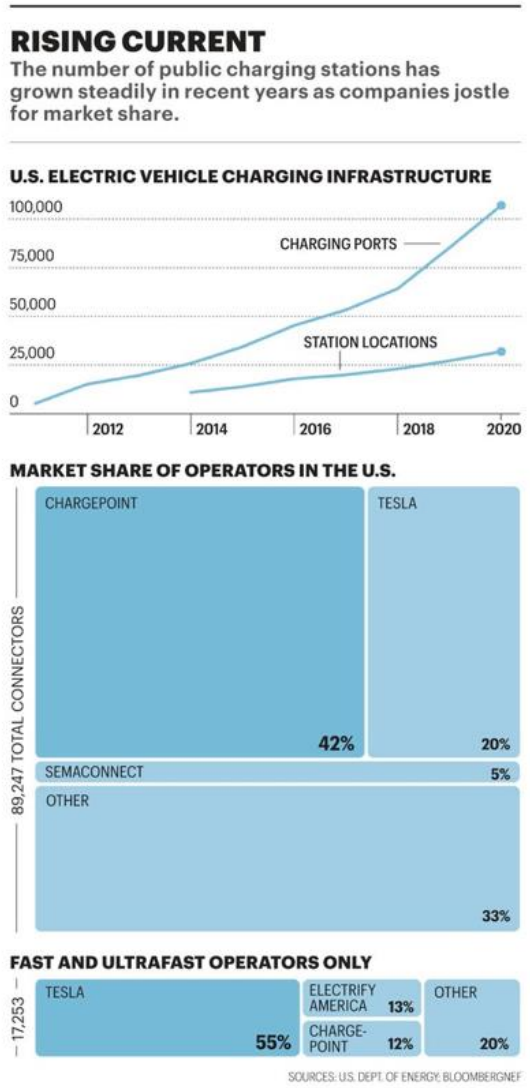
AvalonBay COMMUNITIES, INC

PIEDMONT OFFICE REALTY TRUST

LINCOLN PROPERTY COMPANY

US Electric Vehicle Charging Networks





Bipartisan Policy Center: "Electric Vehicle Charging Infrastructure: Where the U.S. Stands Today", by Owen Minott, August 10, 2021

Fortune magazine: "The war to charge your electric car is powering up", by Adrian Croft, August 4, 2021

Shift to EVs is Altering the Fueling Paradigm

Today, fueling is done predominantly via gas station, but given typical low trip range, low installation costs and considerable vehicle down time, routine level 2 ("L2") charging is expected to dominate as EVs become more prevalent

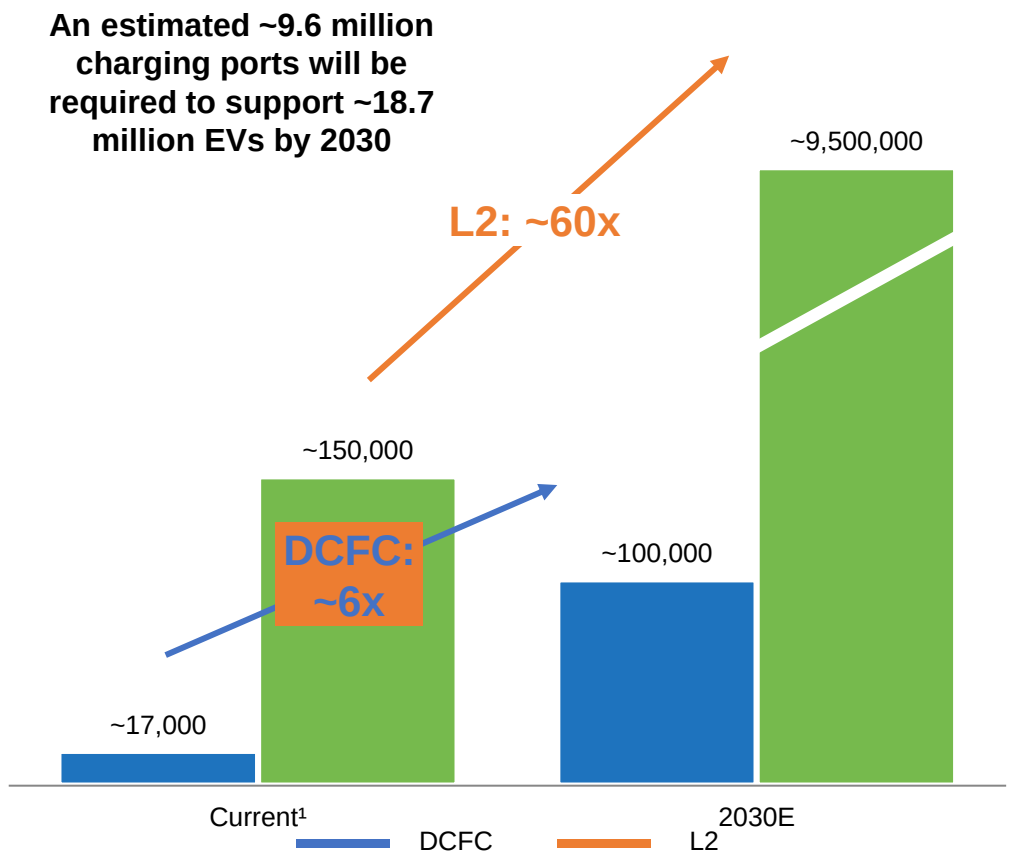
L2 Charging Offers Significant Advantages over DCFC

- ✓ *~90% of all household vehicle trips in the U.S. cover less than 100 miles*
- ✓ *Cars are not in use ~90% of the time*
- ✓ *L2 requires much lower up front costs vs DCFC*
- ✓ *No grid upgrades required for L2*
- ✓ *Less time and training required for installation and replacement*
- ✓ *Well suited for fleet operations*

"Level 2 charging at home and work offers the greatest opportunity for managed charging to offer grid benefits, for example by avoiding on-peak charging, increasing off-peak charging, and integrating off-peak generation of renewables"

Great Plains Institute (July 2019)[2]

U.S. Level 2 vs DCFC Commercial Ports



Sources: Alternative Fuels Data Center (U.S. DOE); Edison Electric Institute; Institute for Electric Innovation; Great Plains Institute; BNEF

Notes:

1 Based on U.S., current as of February 2021; include public and private stations

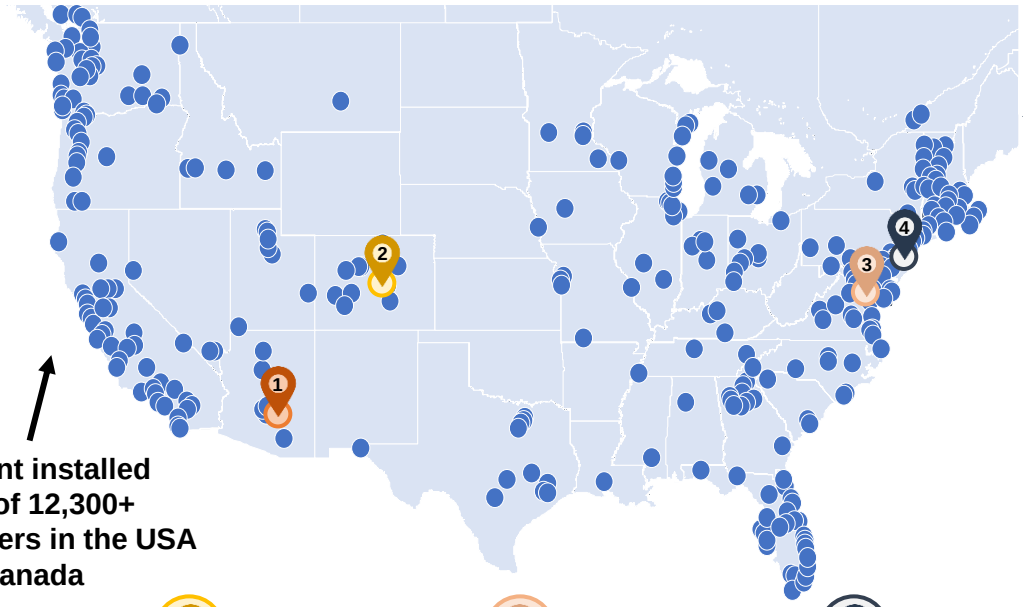
2 Great Plains Institute – Overcoming Barriers to Expanding Fast Charging Infrastructure in the Midcontinent Region, July 2019

SemaConnect: Leading Provider of EV Charging Solutions

Our proven technology, integrated solutions and intimate blue-chip customer relationships have created a strong foundation to provide the charging solutions required for the expected rapid EV adoption and charging industry growth

Proven Technology	• Comprehensive smart hardware and software solutions • Large portfolio of intellectual property with successful defense of patents
Vertically-Integrated	• End-to-end solution provider
Robust Customer and User Base	• 1,550+ marquee accounts across key end markets • Managed over five million charging sessions to date and counting
Project Management	• Completed most demanding multi-family and workplace program in industry (Electrify America)
Partnerships	• Strong partnerships with leading commercial real estate firms, network providers, fleet management companies, and owner/operator customers

Top-2 Market Share in the U.S.



Current installed base of 12,300+ chargers in the USA and Canada

1

CBRE
Phoenix, AZ

2

JLL
Denver, CO

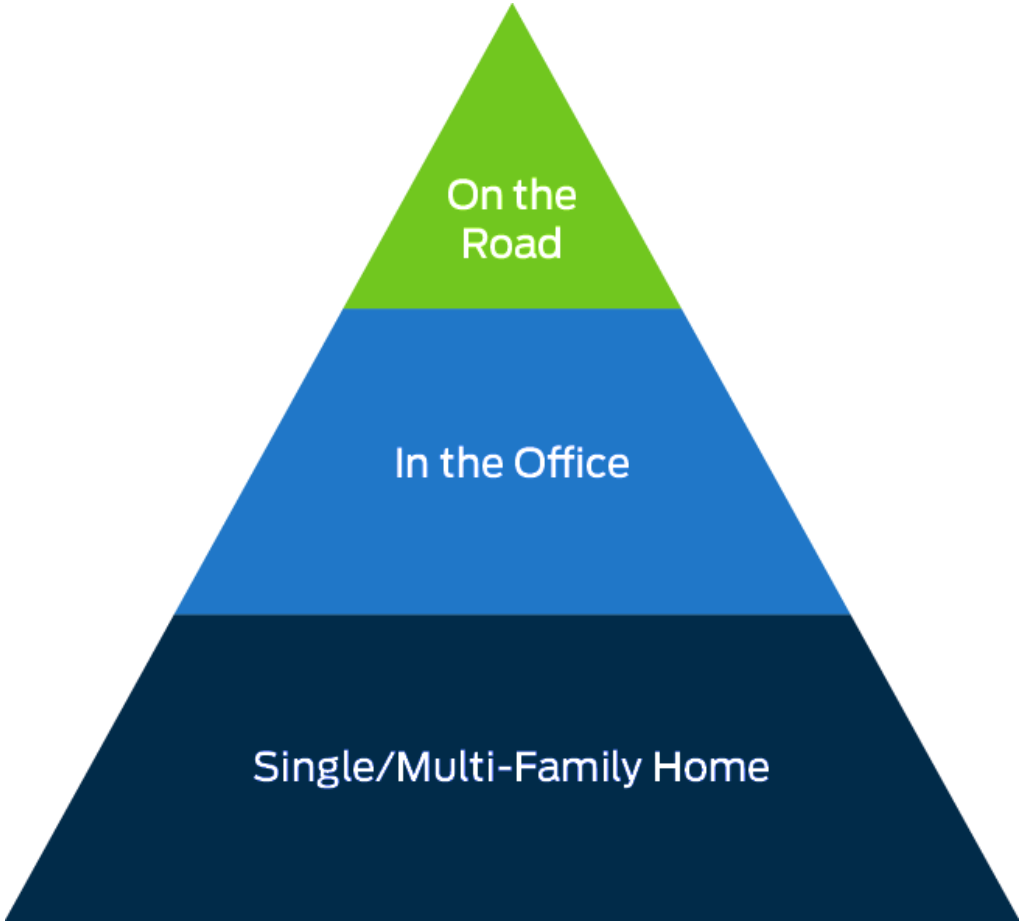
3

bxp Boston Properties
Reston, VA

4

WYNDHAM WORLDWIDE
Parsippany, NJ

Where Will Drivers Charge?



Charging Stations are the **newest green amenity** for commercial properties

SemaConnect Solution – Smart EV Charging

Compact Design | Easy Installation | Simple Service Fee | Easy to Manage | Generate Revenue | Smart Grid Ready

Sleek Features

- ✓ Sleek, elegant design
- ✓ Compact form factor
- ✓ Commercial-grade aluminum body
- ✓ "At-a-Glance" LED status
- ✓ Rugged outdoor-rated enclosure
- ✓ Full Warranty Replacement Policy
- ✓ "No Assembly Required"

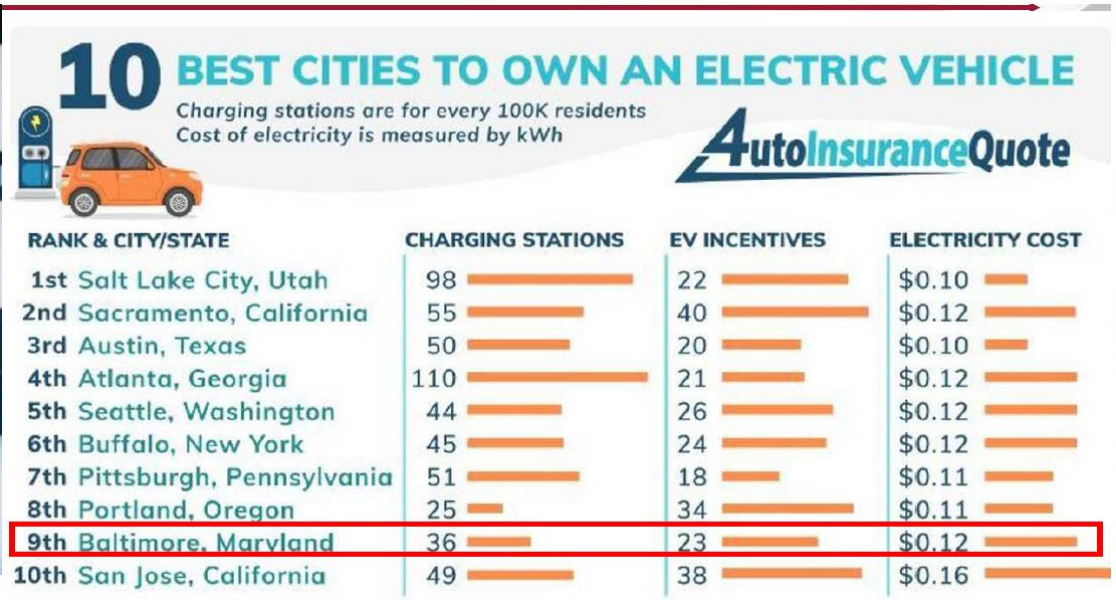
Smart Features

- ✓ Station Owner Web Portal
- ✓ Fleet Manager Web Portal
- ✓ EV Driver Account Portal & App
- ✓ Access Control, Pricing, Reporting
- ✓ Automatic Billing and Payment
- ✓ Fleet Vehicles Controls, Reporting
- ✓ Advanced Load Management
- ✓ Open to leading driver programs: PlugShare, EVgo, ChargeHub, etc.

Leading industry partners

PlugShare EVgo GILBARCO VEEDER-ROOT

EVs in the Baltimore-Washington Region



RANK & CITY/STATE	CHARGING STATIONS	EV INCENTIVES	ELECTRICITY COST
1st Salt Lake City, Utah	98	22	$0.10
2nd Sacramento, California	55	40	$0.12
3rd Austin, Texas	50	20	$0.10
4th Atlanta, Georgia	110	21	$0.12
5th Seattle, Washington	44	26	$0.12
6th Buffalo, New York	45	24	$0.12
7th Pittsburgh, Pennsylvania	51	18	$0.11
8th Portland, Oregon	25	34	$0.11
9th Baltimore, Maryland	36	23	$0.12
10th San Jose, California	49	38	$0.16

Cardin Tours Bowie-based SemaConnect in Latest Made in Maryland Business Visit

by Bethany Villarreal | Jun 22, 2021 | Press Releases

Minority-Owned Small Business Manufactures and Distributes Electric Vehicle Charging Stations

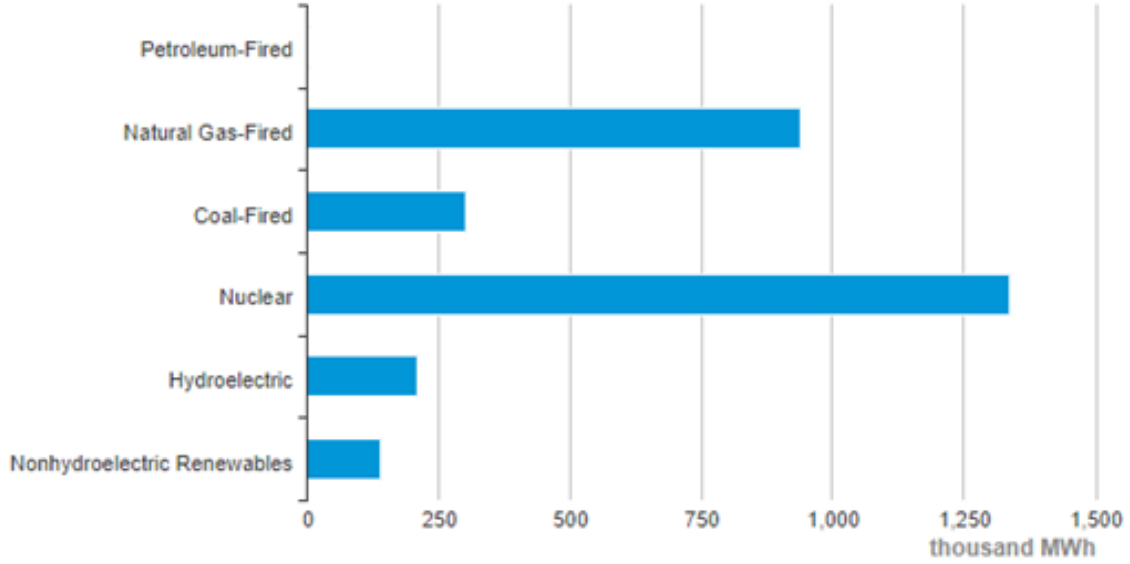
For Immediate Release
June 21, 2021

(Washington, D.C.) – U.S. Senator Ben Cardin (D-Md.), Chair of the Senate Committee on Small Business & Entrepreneurship and Chair of the Senate Environment and Public Works Subcommittee on Transportation and Infrastructure, today made his latest "Made in Maryland" visit to SemaConnect, an electric vehicle charging station manufacturer based in Bowie, Maryland.

Electricity Generation Sources

Consumption by Source | Consumption by Sector | Production | **Electricity** | Prices

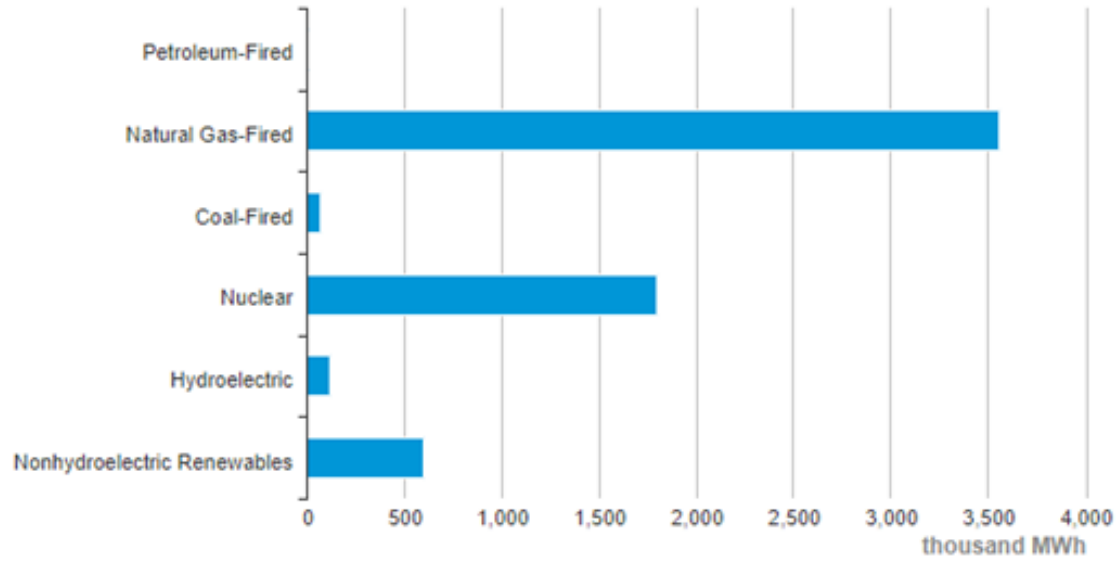
Maryland Net Electricity Generation by Source, May. 2021 DOWNLOAD



eia Source: Energy Information Administration, Electric Power Monthly

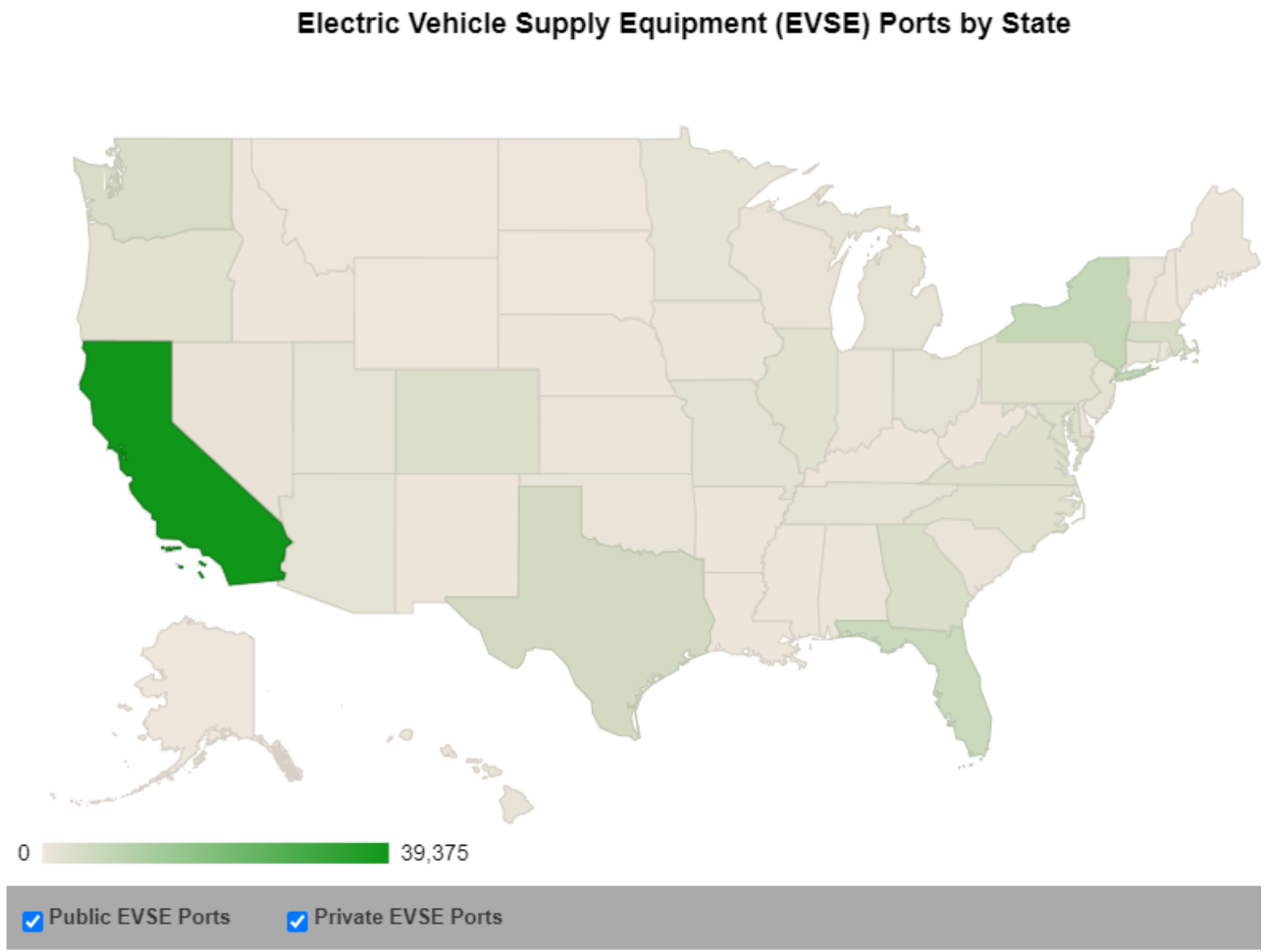
Consumption by Source | Consumption by Sector | Production | **Electricity** | Prices

Virginia Net Electricity Generation by Source, May. 2021 DOWNLOAD



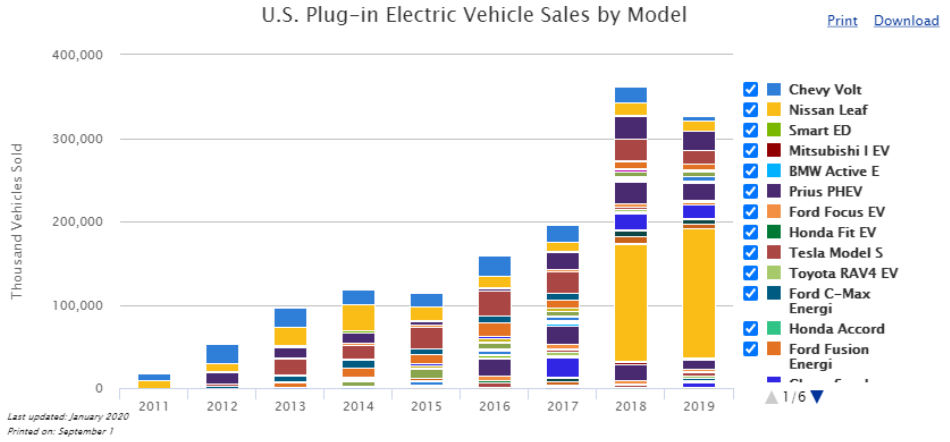
eia Source: Energy Information Administration, Electric Power Monthly

California Leads the Country in EV Charging



Source: AFDC Alternative Fueling Station Locator Data

Location	Charging Ports (Public and Private)
California	39,375
District of Columbia	500 (public only)
Maryland	3,128
Virginia	2,959

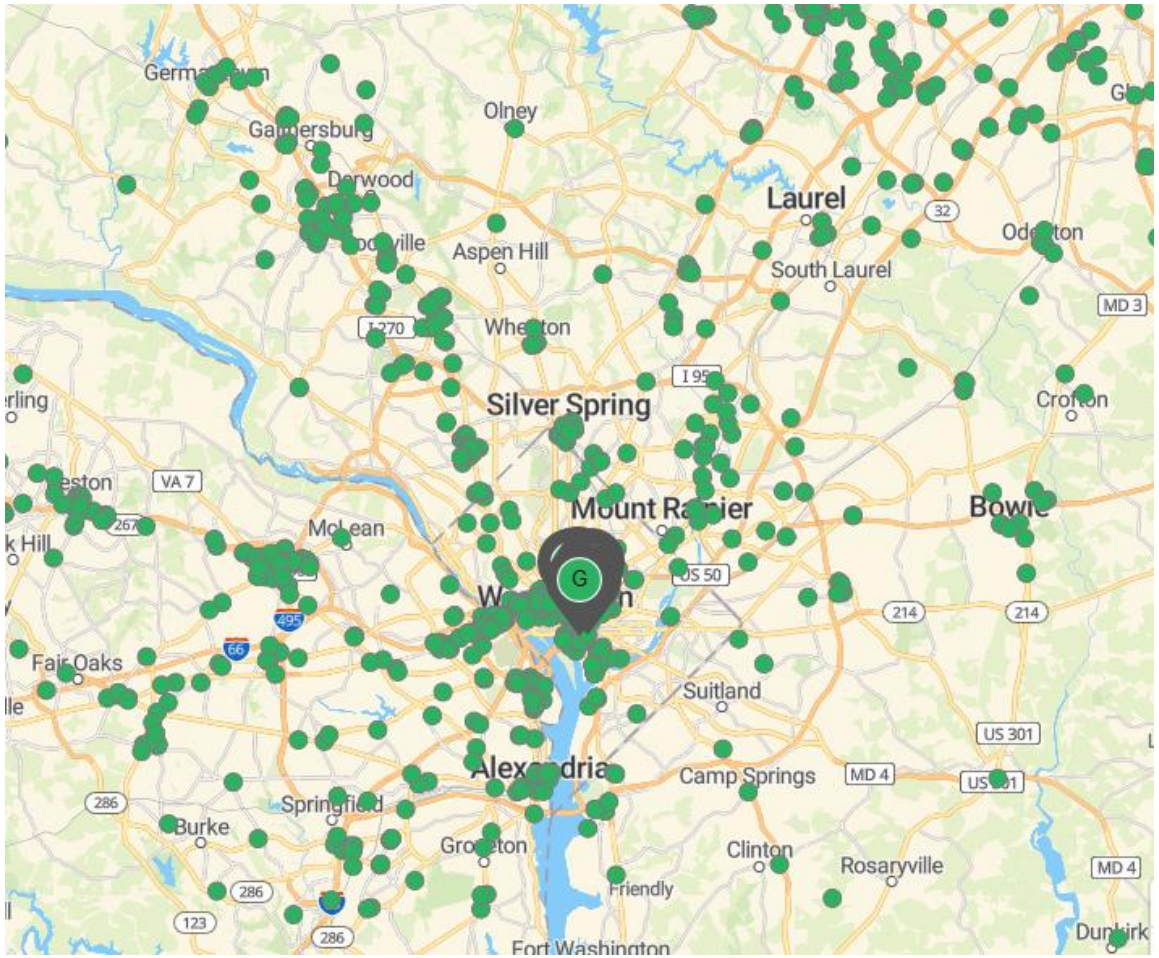


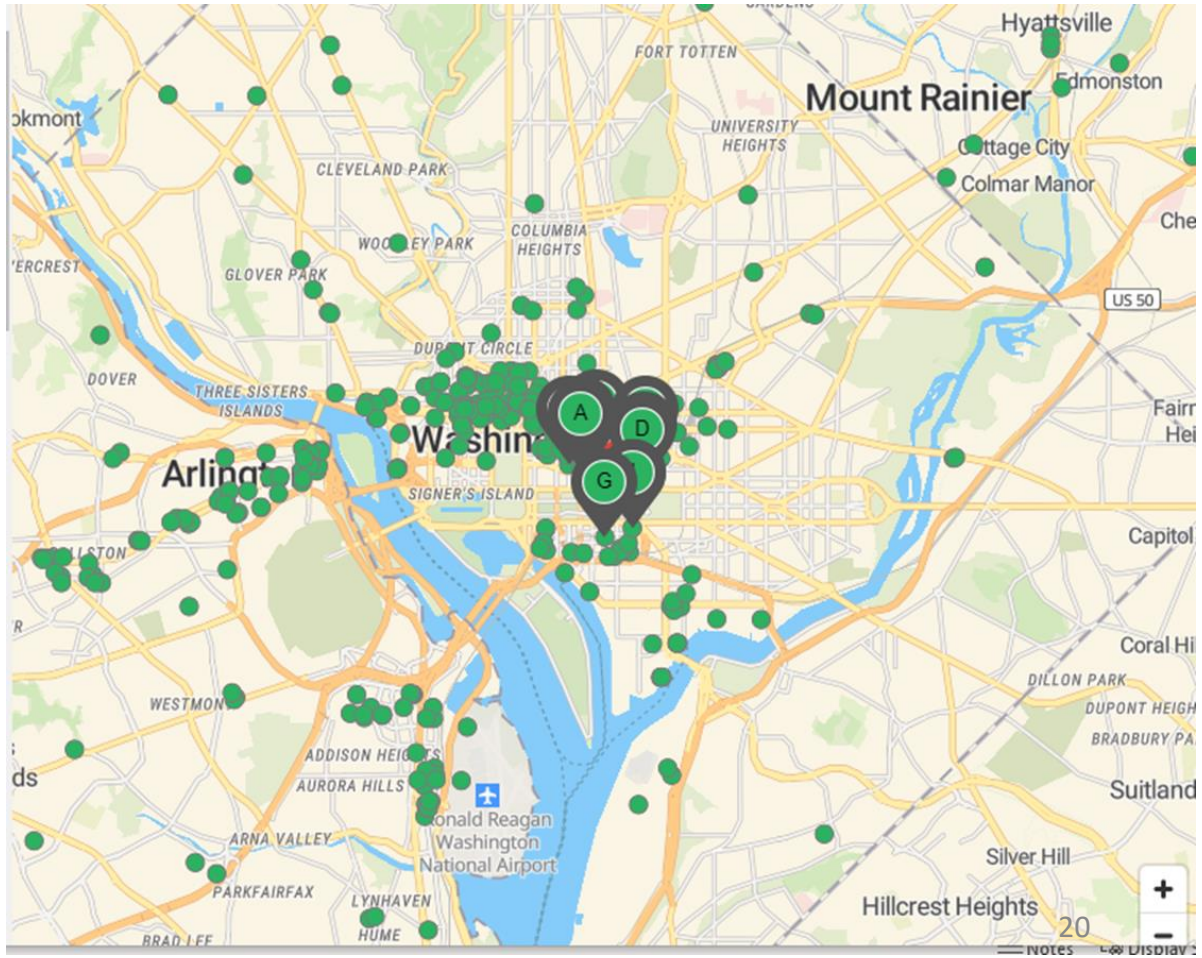
Source: Transportation Research Center at Argonne National Laboratory

Sales of plug-in electric vehicles (PEVs) grew rapidly from 2011 to 2018. Technology improvements, cost reduction, increasing model choice, maturing charging infrastructure, and economic recovery have continued to influence and support increased sales. Until 2018, the Chevrolet Volt had been on the market the longest and had the most overall sales, but the model was discontinued in 2019. In 2018, the newly introduced Tesla Model 3 rapidly increased vehicle sales and established the vehicle as the best-selling plug-in electric vehicle with nearly 50% of the market share.

EV Charging Stations in the Baltimore-Washington Region

- Currently, EV charging stations are not distributed evenly by geography and income level.





Regional EV Policies

- The District offers a tax exemption for EVs and high efficiency vehicles. Motor vehicles with fuel economy in excess of 40 mpg, including EVs, are eligible for an exemption for paying the vehicle excise tax. In 2019, the median excise tax per vehicle purchase was $680.
- A new motor vehicle with an EPA estimated average city fuel economy of at least 40 mpg is eligible for a reduced vehicle registration fee of $36 (for two years).

- Maryland Excise Tax Credit up to a maximum of $3,000 for Electric Vehicle or Plug-in Hybrid. Funding is currently depleted for this Fiscal Year.
- Maryland offers a rebate of 40% of the cost of Electric Vehicle Charging Equipment and Installation. The rebate is up to $700 for individuals; $4,000 for businesses; and $5,000 for retail service stations.
- Federal EVSE credit of up to 30% or $1,000 for charging station equipment for residential homes or 30% or $30,000 for businesses.

- House Bill 1965 (2021) helps reduce air pollution by requiring car manufactures to sell a certain percentage of electric or hybrid electric passenger cars. Transportation is the leading source of greenhouse gas pollution in Virginia.
- House Bill 2282 (2021) directs the State Corporation Commission to report on policy proposals that will increase the use of electric vehicles.

EV Market Share (2019)

	Battery Electric Only	BEV + PHEV	Ranking by Market Share
	5.16%	7.44%	#1
	3.87%	5.41%	#2
	1.98%	2.49%	#8
	1.53%	1.89%	#13

Public Outreach from State & Local Governments

DC.gov Department of Energy & Environment

DOEE Home | Environmental Services | Energy in the District | Resources | Laws & Regulations

DEPARTMENT OF ENERGY & ENVIRONMENT

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Monday to Friday, 9 am to 5 pm

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Tommy Wells
Director

Electric Vehicles Resources

Plug-in electric vehicles are a cleaner alternative to traditional vehicles, and with generous purchasing subsidies and lower fuel and operating costs, they can also be a cheaper alternative, too. The federal government, for example, offers a tax credit of up to $7,500 for an electric vehicle purchase. Pepco offers EV charger rebates and other incentives. And, fuel costs for EVs are about half that of traditional fuels, according to the the Depart of Energy's eGallon tool. This page is designed to provide a list of these and other incentives, as well as general information on electric vehicles for District residents and businesses.

Resources for Residents and Business

Informational resources

Here are a number of resources that provide information on electric vehicle (EV) ownership in the District.

- Electric vehicle basics: EV 101
- Charging your electric vehicle: EV Charging 101
- Pepco's EV Savings calculator
- Transportation Electrification Roadmap - Stakeholder Engagement Sessions

Rebates, tax incentives and funding

Federal tax incentives

Federal tax incentives of up to $7,500 are still available for District residents and private fleet owners. An updated list of eligible vehicle make and models is available.

High Efficiency Vehicle Excise Tax Exemption

The District offers a tax exemption for EVs and high efficiency vehicles. Motor vehicles with fuel economy in excess of 40 mpg, including EVs, are eligible for an exemption for paying the vehicle excise tax. In 2019, the median excise tax per vehicle purchase was $680. The excise tax is expected to be revised in 2021.

Utility incentives for EV chargers and charging infrastructure

MARYLAND ZERO EMISSION
Electric Vehicle Infrastructure Council

About the Council

The Electric Vehicle Infrastructure Council (EVIC) was established by State legislation in 2011. In 2019, the membership, responsibilities, and reporting requirements of EVIC was expanded to include zero emission vehicles (ZEVs) and fuel cell electric vehicles (FCEVs). To reflect the expanded responsibilities of the council, EVIC was renamed the Maryland Zero Emission Electric Vehicle Infrastructure Council (ZEEVIC). In 2020, the membership of ZEEVIC was expanded further and the Council's termination date was extended to 2026.

Maryland by the Numbers*:

- **36,080** Registered EVs
- **1,048** Stations **2,767** Outlets
- **22** Alt. Fuel Corridors

As of July 31, 2021

Top 5 Reasons to Electrify your Ride

1. Save Money
Better fuel economy, low maintenance costs, and no oil changes! Avg. 4¢/mile for an EV compared to 12¢/mile for ICEs

2. Reduce Emissions
Dramatically lower life cycle emissions!
Clean Energy = Local Energy = Clean Air

3. Enjoy Yourself
EVs are quick, quiet, and loads of fun! EVs are more responsive than traditional ICEs.

4. Join a Movement
Join the EV community! Connect with your local EV Club.

5. Contribute to Energy Independence
Driving an EV lessens our dependence on foreign oil markets

Electrify Virginia Together

Learn more about EVs at DriveElectricVA.org

MDEV MARYLAND EV | EV 101 | HYDROGEN 101 | EV CHARGING | INCENTIVES | RESOURCES | NEWS

I'm not pumped,
I'M CHARGED!

Make the switch to electric and get charged about driving! Choose an electric vehicle that's right for you and your lifestyle. Save on fuel, maintenance and taxes, all while contributing to a cleaner environment.

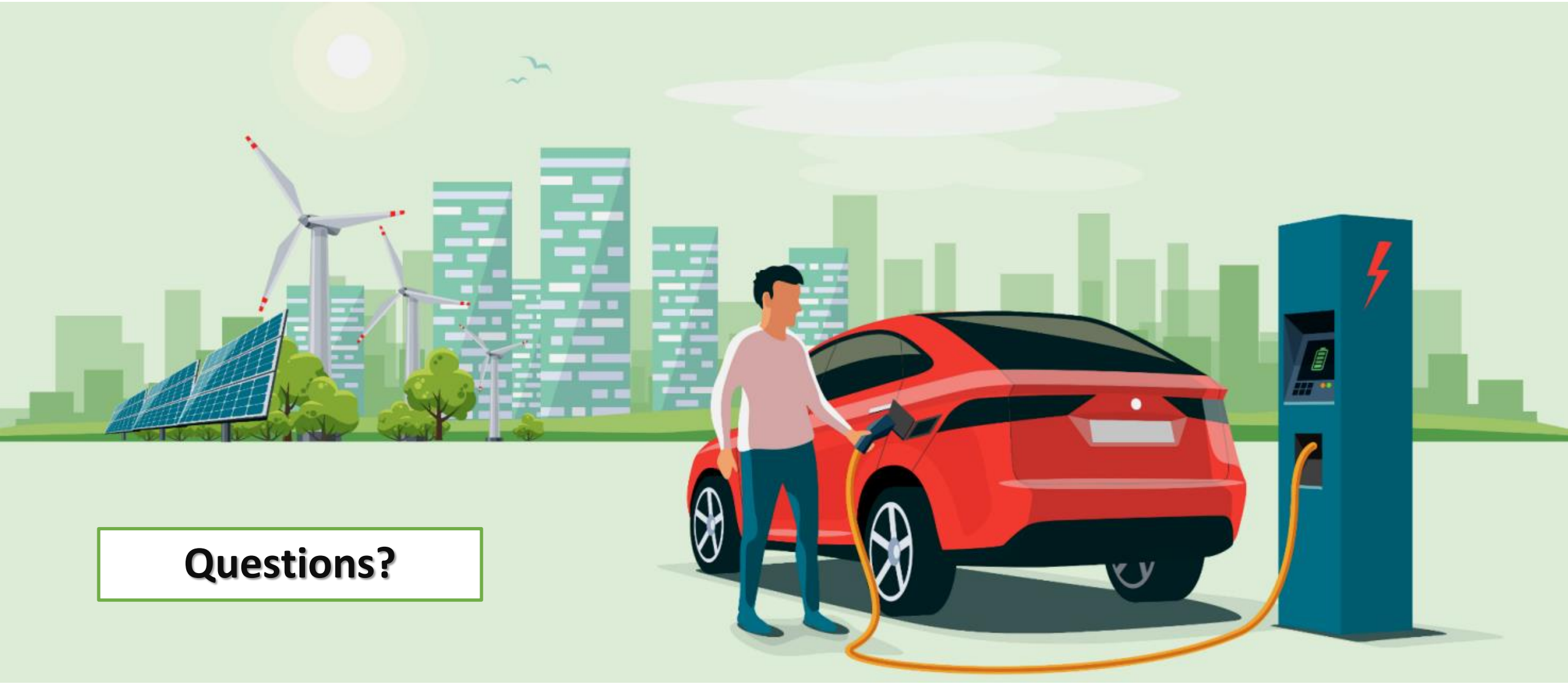
New to EVs? Start Here!

Potential Obstacles to EV Adoption

- **Federal Policy**: The federal tax credit for EV charging infrastructure is set to expire in December 2021 but may be extended for a ten-year term to 2031 and expanded in the $3.5 trillion budget reconciliation package:
  - From a 30% credit with $30,000 cap per location to 30% credit with a cap of $200,000 per charger.
  - An expansion of the $7,500 EV automotive credit to $12,500 has been proposed ($4,500 for cars made in the USA with union labor and another $500 for batteries made in the USA).
  - Proposed new caps on the credit would vary by vehicle type:
    - $55,000 for sedans, $64,000 for vans, $69,000 for SUVs, and $74,000 for pickup trucks.

- **State Policy:** California, New Jersey, and Washington state are introducing regulations for EV charging (e.g., governing accuracy of fuel dispensed) following NIST Handbook 44.
  - Other states will follow, but it's unclear how closely or not they will adhere to Handbook 44 and/or California's regulations.

- **Consumer Preferences:** Unfamiliarity with driving and charging EVs, range anxiety, higher up-front cost/purchase price, accessibility of charging stations, battery safety, etc.



Questions?