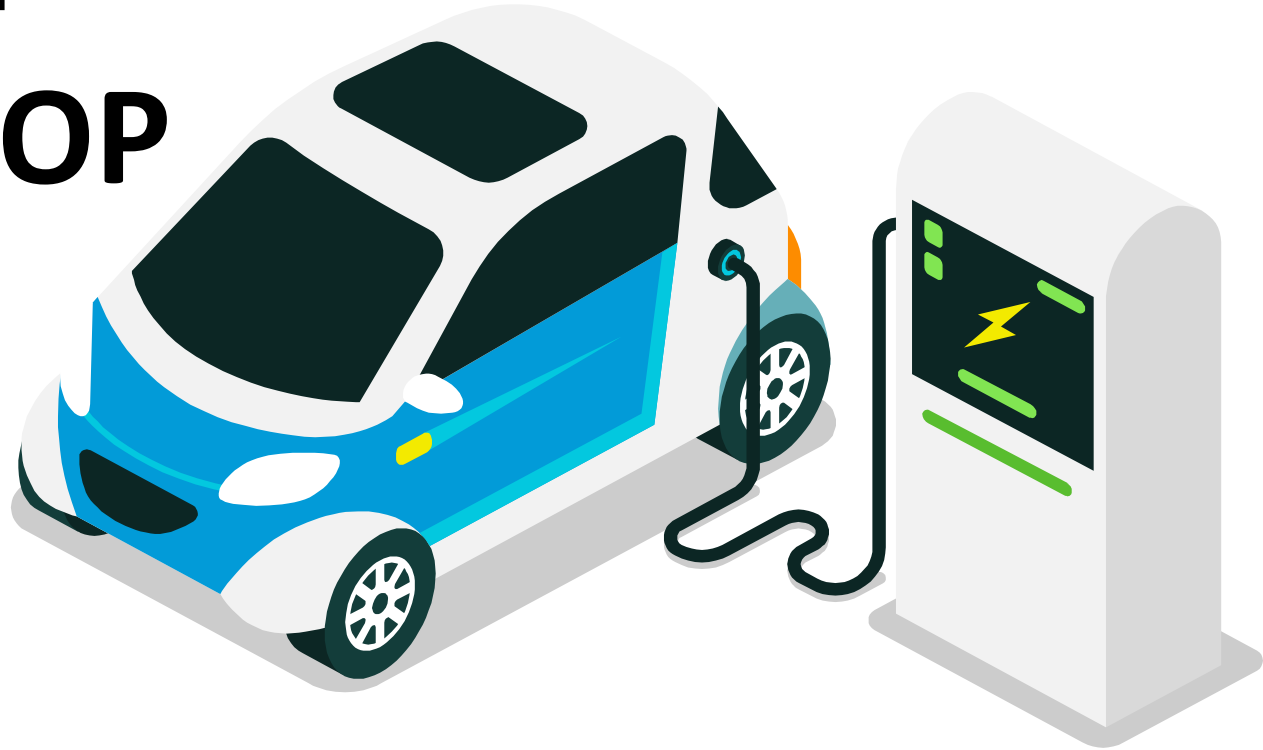


EV 101 WORKSHOP



Pratiksha Ganesan
Transportation Energy Specialist - MEA
Christopher K. Green
Stakeholder Liaison - IRS

WORKSHOP GOALS

Goal of Today's Presentation:
Present information to give the community a better understanding of EV basics.



Review EV plans throughout the State

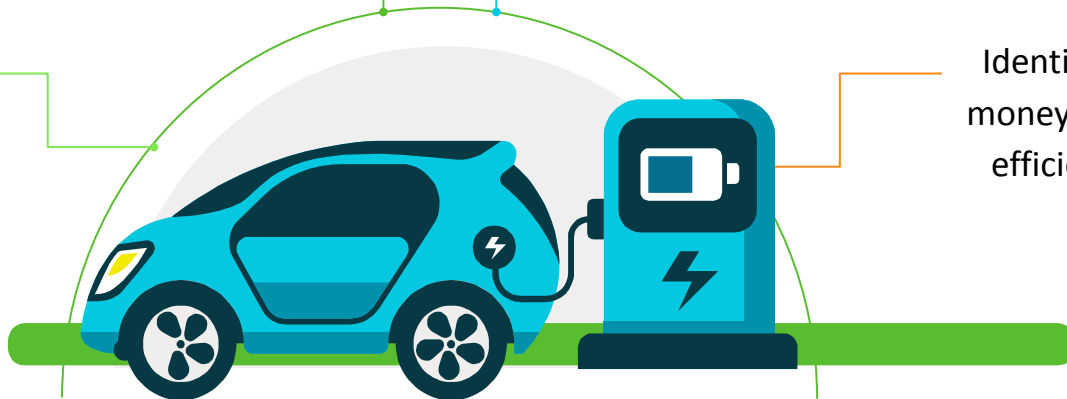
Learn about EV chargers, costs and map routes



Understand types of electric vehicles



Identify ways to save money through energy efficiency programs



ICEBREAKER

How many of you have driven an electric car?

Who owns an Electric car?





ELECTRIC VEHICLE 101: INTRODUCTION & BASICS

BASICS: ELECTRIC DRIVE VEHICLES



HYBRID ELECTRIC VEHICLE (HEV)

- Powered by an engine and improved by an electric motor
- Does not charge the battery
- 10 – 50 miles added fuel economy



PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV)

- Powered by an electric motor and engine
- Uses an electric charger and regenerative braking to charge the battery
- 20-50 miles electric range



ALL-ELECTRIC VEHICLE (EV/BEV)

- Powered by an electric motor
- Uses an electric charger and regenerative braking to charge the battery
- 80 – 500 miles electric range

EV BENEFITS

VS

EV CONSIDERATIONS



Increased energy security



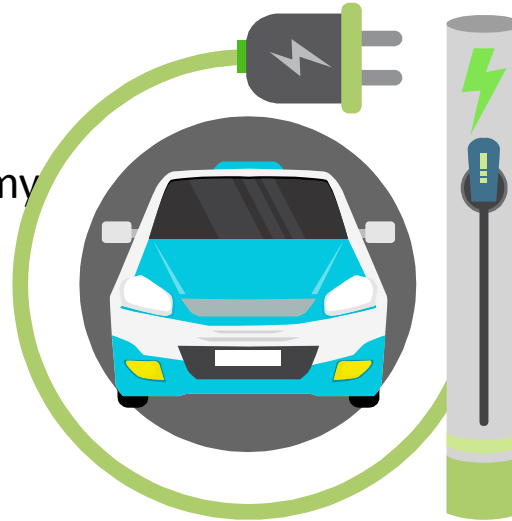
Improved fuel economy



Lower fuel and maintenance costs



Low or zero tailpipe emissions



Higher initial vehicle cost



Limited infrastructure availability

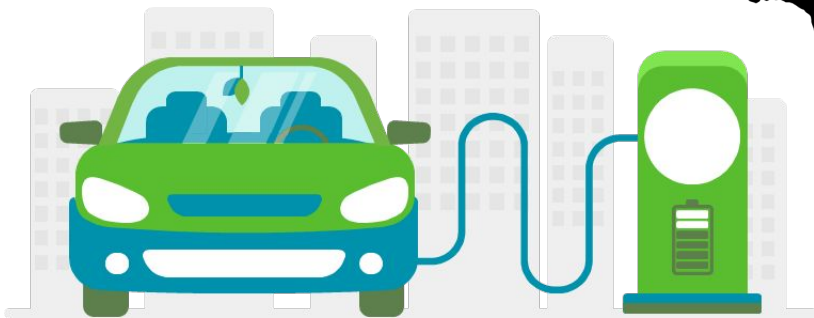


Battery life



Reduced all-electric range





EVs & MARYLAND

WHY EVS MATTER TO MARYLAND

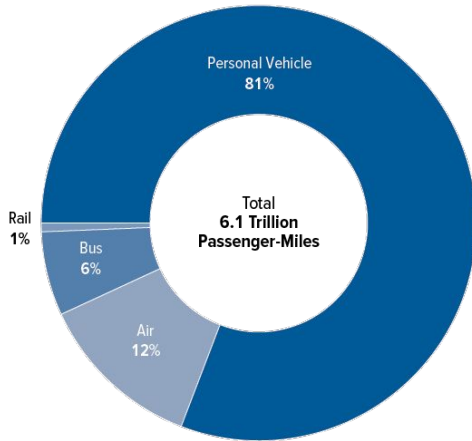
ENVIRONMENT

- Tailpipe emissions contribute to ozone and fine particulate matter (PM2.5)
- These pollutants are linked to respiratory problems such as asthma
- Driving an EV creates less than half the carbon emissions than driving a gas-powered car

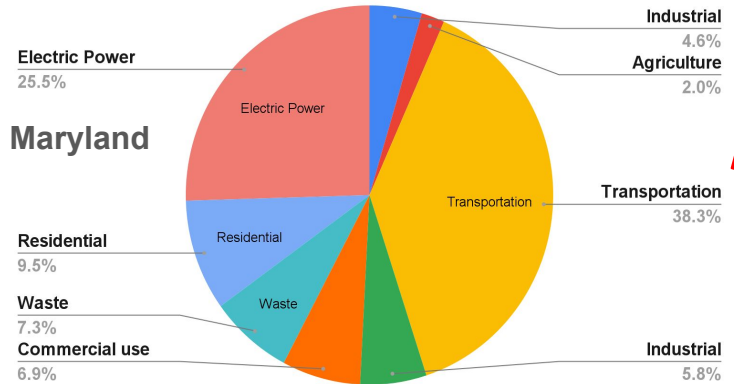
ECONOMY

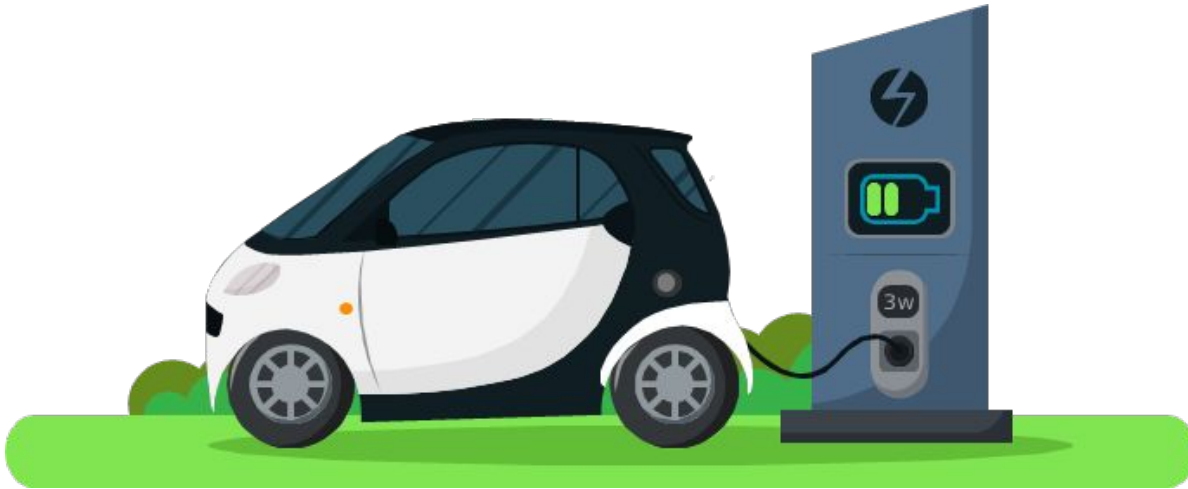
- The average household in Maryland spends nearly 18% of its budget on transportation
- Electricity is less expensive than gasoline and EVs are more efficient than gasoline vehicles
- On average, it costs less than ½ to travel the same distance in an EV than a conventional vehicle

GHG Emissions by mode of transport, 2019



GHG Emissions in Maryland by sector, 2022





EV CHARGING COSTS

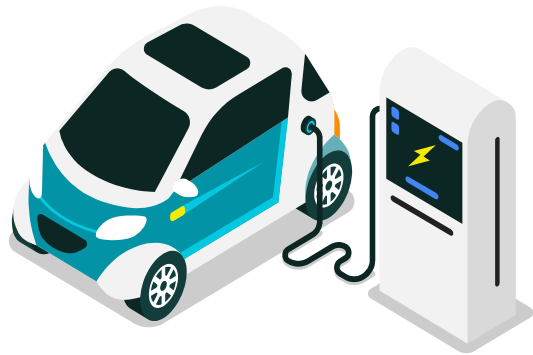
WHAT DOES ELECTRIC VEHICLE INFRASTRUCTURE LOOK LIKE?

Electric Vehicle Supply Equipment (EVSE):

All the equipment needed to deliver electrical energy from an electricity source to a PEV battery



WHERE DO I CHARGE MY EV?



80% - HOME



- On-street
- Multi unit dwelling
- Single family residential garages and driveways

15% - WORKPLACE



- Business offices
- Office parks or campuses
- Industrial facilities
- Fleets

5% - PUBLIC

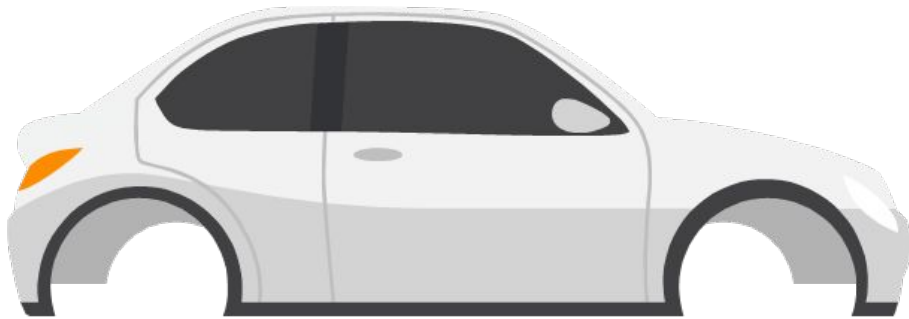


- Parking lots/garages
- Public/municipal
- Retail
- Transportation hubs
- Hotels

HOW DO I CHARGE MY EV



	EVSE	Base Cost to Install	Cost to fully Charge a nissan leaf (15 ¢/kWh)	Charging Time	Range per hour of charge	Primary Use	
LEVEL 1	<p>Level 1 120V</p> <p>Standard 120V outlet</p>	<ul style="list-style-type: none"> Regular GFI Outlet Available everywhere 	None	\$9.00	12-24 hours	2 to 5 miles	Residential
LEVEL 2	<p>Level 2 240V</p> <p>240V outlet, can also be hardwired</p>	<p>Charging infrastructure (need electrician)</p> <p>\$500-2000</p> <p>*5k+ Smart connected</p>	\$9.00	3-8 hours	10 to 20 miles	Residential/ Commercial	
DC FAST	<p>Level 3 480V DC Fast Charger</p>	<p>Charging infrastructure (need electrician)</p> <p>\$60k-120k+</p>	<p>(24-40 ¢/kWh)</p> <p>\$14-\$24</p>	30 min-2 hours	60 to 80 miles	Commercial	



EV MAINTENANCE



MAINTENANCE AND SAFETY

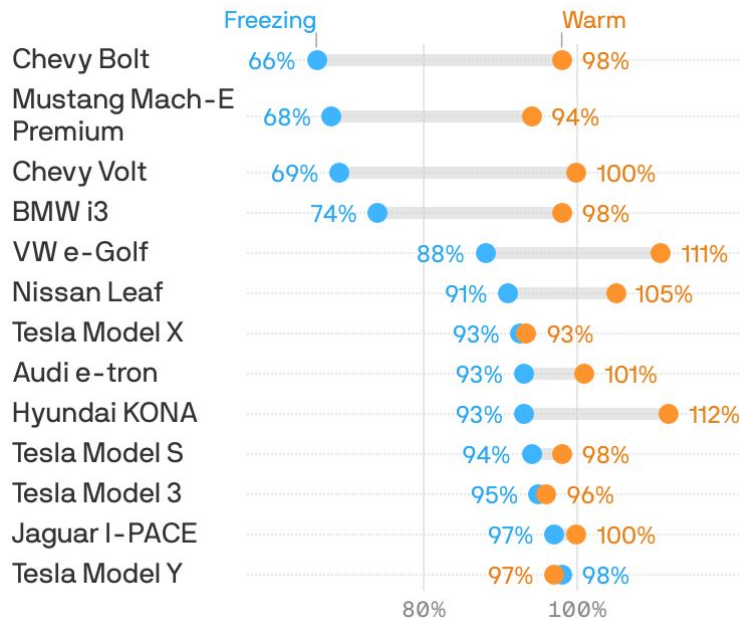
- **HEVs and PHEVs have similar maintenance requirements** as conventional vehicles
- **EVs typically require less maintenance** than conventional vehicles:
 - Battery, motor require little to no maintenance
 - Fewer fluids to change
 - Brake wear is reduced due to regenerative braking
 - Fewer moving parts
- Electric drive vehicles **must meet the same safety standards** as conventional vehicles

- A manufacturer's warranty of a battery typically covers **8 years/100,000 miles**.
- Expected battery lifetime is **10-12 years** under normal operating conditions.
- For additional safety information, refer to the [AFDC EV Guide](#)

EV Battery Range and Weather Change

How weather affects EV battery range

Percentage of EPA range in freezing (20-30°F) and warm (70°F) weather



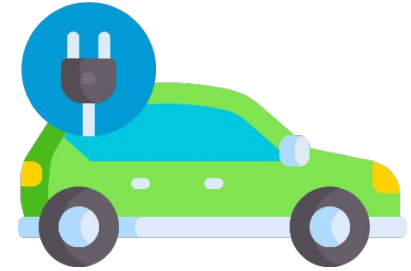
Tips to Minimize Range Loss

- Park your car in a garage.
- Heat the passenger, not the car.
- If you need to heat or cool the cabin, make time to “pre-heat” or cool down the inside of the vehicle while still connected to the charger.
- Inflate your tires.
- Activate the “eco” mode.
- Smooth driving habits.

Remember:

- High vehicle use does not equal higher battery degradation.
- EVs on average lose 20% of their range in colder climate.
- EVs charge more slowly in cold temperatures.
- Lower-power charging methods promote longer battery health.

Maintenance - HEVs & PHEVs



- Because HEVs and PHEVs have an internal combustion engine (ICE), their maintenance requirements are similar to those of conventional vehicles.
- Electrical systems (battery, motor, and associated electronics) require minimal scheduled maintenance. A manufacturer's warranty of a battery typically covers 8 years/100,000 miles. Expected battery lifetime is 10-12 years under normal operating conditions.
- EVs have less maintenance requirements because they have fewer moving parts and fluids to change.

For additional safety information, refer to the DOE

Maintenance and Safety Guide: [afdc. energy.gov/vehicles/electric_maintenance.html](https://afdc.energy.gov/vehicles/electric_maintenance.html)

Battery Maintenance

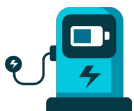


- The advanced [batteries](#) used in these vehicles have a limited number of charging cycles (the number of times the battery can be charged and discharged, also called "cycle life").
- Some automotive battery systems use liquid coolant to maintain safe operating temperatures. These systems may require regular checks. Ask your dealer or refer to your owner's manual for more information.
- The batteries in electric-drive vehicles are generally designed to last for the expected lifetime of the vehicle.
- Several manufacturers offer 8-year/100,000-mile warranties for their PEV batteries.
- Manufacturers typically do not publish pricing for replacement batteries, but if the battery does need to be replaced outside the warranty, it is expected to be a significant expense.
- However, battery prices are expected to decline as technology improves and production volumes increase.

Safety Requirements



- EVs have high-voltage electrical systems range from 100 to 600 volts.
- Encased in sealed shells and meet testing standards that subject batteries to conditions such as overcharge, vibration, extreme temperatures, short circuit, humidity, fire, collision, and water immersion.
- Manufacturers design EVs to deactivate when a collision or short circuit occurs.
- EVs tend to have a lower center of gravity, more stable and less likely to roll over.



EV CHARGING AND IMPACTS ON THE GRID

Electricity Demand and Grid Impact

Growing EV adoption leads to higher electricity demand, particularly during peak hours, necessitating grid upgrades and smart management.

Environmental Impact

EVs generally produce lower lifecycle emissions compared to conventional vehicles, especially when charged with renewable energy sources.



Mitigation Strategies

Leveraging renewable energy and Vehicle-to-Grid (V2G) technologies can mitigate grid impacts and enhance energy efficiency.

Policy and Planning

Policies promoting off-peak charging and investment in grid infrastructure are essential for sustainable EV integration.

60% Increase in EV Adoption Would Result In an 18% Increase in Overall Energy Demand

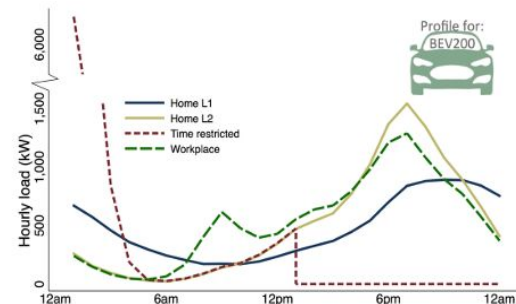


Figure 7. BEV load profile by scenario

Note: The scale in the figure is capped at 1,500 kW for presentation purposes (the time restricted scenario peaks at 6,200 kW at 12 a.m.).

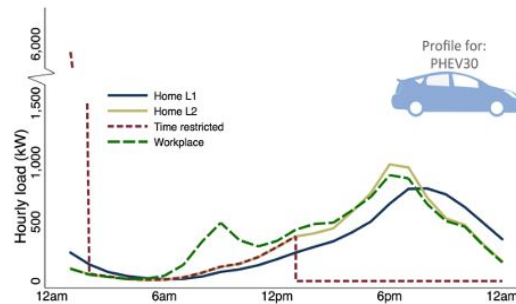
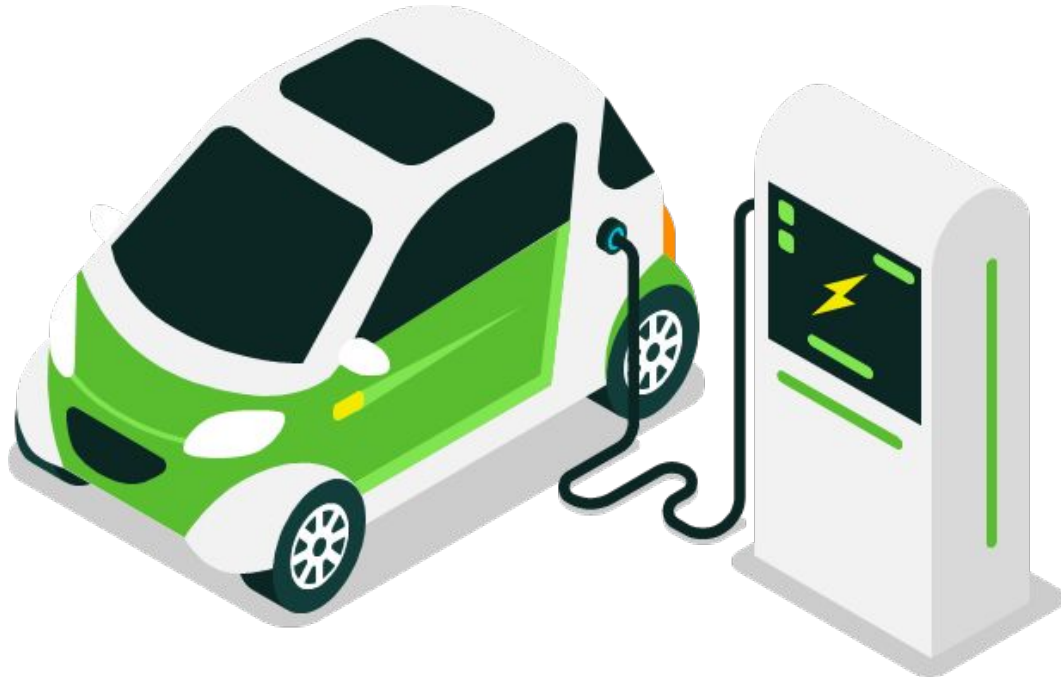


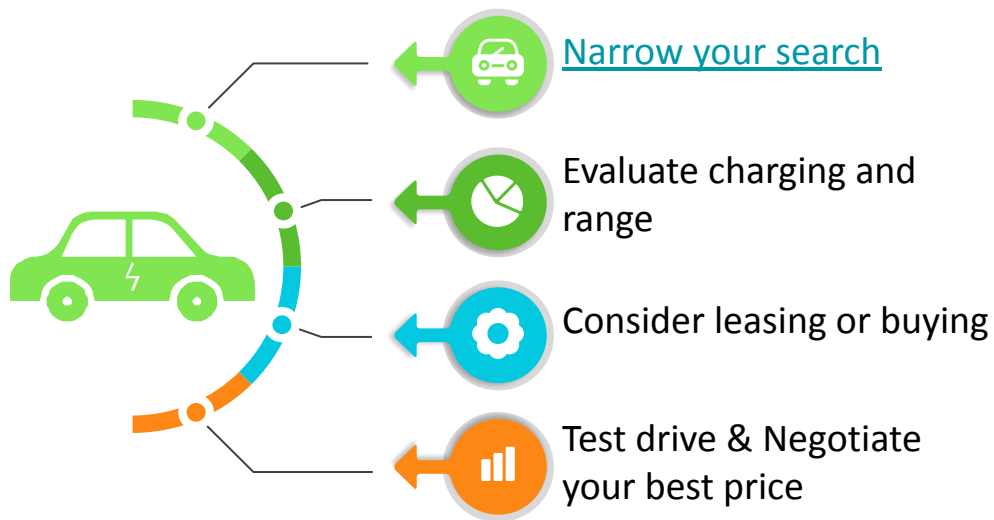
Figure 8. PHEV load profile by scenario

Note: The scale is capped at 1,500 kW for presentation purposes (the time restricted scenario peaks at 5,700 kW at 12 a.m.).



BUYING AN EV?

STEPS TO PICK YOUR BEST EV











QUESTIONS TO ASK YOURSELF

- How many miles do I drive each day?
- Do I have regular access to charging at home or at work?
- How much would the electricity costs be?
- Do I need a faster charging option, or can I charge overnight with a regular outlet?
- How often do I travel beyond the electric range?
- Are there charging stations in my local area or travel corridors? (Check out [PlugShare.com](https://www.plugshare.com) and the Energy Department's Alternative Fuels Data Center and related apps.)



WHY OR HOW TO START FINDING AN EV?

<p>Personalize</p> <p>Edit Vehicles</p>	<p>2024 Toyota Corolla Hybrid X</p> <p>Hybrid Vehicle Gasoline</p>  <p>1.8 L, 4 cyl, Automatic (variable gear ratios)</p> <p>MSRP: \$23,500 - \$27,250</p>	<p>2024 Tesla Model S X</p> <p>Electric Vehicle</p>  <p>Automatic (A1)</p>	<p>2024 Ford Explorer RWD X</p> <p>Gasoline Vehicle</p>  <p>3.0 L, 6 cyl, Automatic (S10), Turbo</p> <p>MSRP: \$36,760 - \$54,670</p>	<p>2024 BMW M440i Coupe X</p> <p>Hybrid Vehicle Gasoline</p>  <p>3.0 L, 6 cyl, Automatic (S8), Turbo</p> <p>MSRP: \$61,450</p>
<p>EPA Fuel Economy 1 gallon of gasoline=33.7 kWh</p> <p>Show electric charging stations near me</p>	<p>Regular Gasoline</p> <p>50 MPG combined city highway 2.0 gal/100mi</p> <p>Gasoline  565 miles Total Range</p>	<p>Electricity</p> <p>122 MPGe combined city highway 28 kWh/100 mi</p> <p>Electricity  402 miles Total Range</p> <p>About All-Electric Cars</p>	<p>Regular Gasoline</p> <p>20 MPG combined city highway 5.0 gal/100mi</p> <p>Gasoline  358 miles Total Range</p>	<p>Premium Gasoline</p> <p>27 MPG combined city highway 3.7 gal/100mi</p> <p>Gasoline  421 miles Total Range</p>



STATE PROGRAMS, TAX INCENTIVES, AND OTHER RESOURCES



Inflation Reduction Act:

Clean Vehicle Credits



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Information for Consumers Purchasing a New or Used Clean Vehicle



Buyers purchasing a new or used clean vehicle must walk away from dealership with an IRS Energy Credits Online accepted Clean Vehicle (CV) Time-of-Sale report.

The report will contain the following information:

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Seller/dealer name, address, and shortened taxpayer ID number (last four digits) • Buyer's name, taxpayer ID type, and shortened taxpayer ID number (last four digits) • Vehicle identification number • Model year | <ul style="list-style-type: none"> • Date of sale • Sale price  | <ul style="list-style-type: none"> • Maximum credit allowable • Seller/dealer certification of information contained in the report • Buyer certification and signature if credit transferred to seller/dealer • New vehicles, verification the buyer is the original user |
|--|---|---|

The buyer that can claim the clean vehicle tax credit must use their legal name listed with the Social Security Administration.

Buyers will need the information on the accepted CV Time-of-Sale report when filling their tax return to show the vehicle's eligibility.

Buyers can also transfer their CV credit, up to \$7500 for new or up to \$4000 for used vehicles, to the dealer as an upfront down payment.

Visit www.irs.gov/cleanvehicles or scan the QR code to get more information on new or used CV credits. Additional details are in:

- [Publication 5899 Clean Vehicle Credit Transfer: Information you need to provide to the registered dealer](#)
- [Publication 5900 Important Information for Consumers Transferring Clean Vehicle Tax Credits](#)





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Credit for Clean Vehicles

What is the **credit for new clean vehicles**?

If you are interested in claiming the clean vehicle credit for purchasing a **new** clean vehicle after Aug. 16, 2022, a tax credit is available only for qualifying clean vehicles.

Here is what you should know:

- The maximum amount of the credit is \$7,500 per vehicle purchased that year.
 - The amount of the credit allowed can't exceed the amount of tax you owe.
- The credit is allowed for vehicles with manufacturer's suggested retail price less than or equal to:
 - \$80,000* for vans, sport utility vehicles, pick-up trucks
 - \$55,000* for other vehicles

* Base retail price suggested by the manufacturer, plus the retail price suggested by the manufacturer for each accessory or item of optional equipment attached to the vehicle.



What are the **income limits** for the credit?

You may be eligible for the credit if your modified adjusted gross income* (MAGI) for the current year or prior year is less than or equal to:

- **\$300,000** for married filing jointly or filing as a qualifying surviving spouse or a qualifying widow(er)
- **\$225,000** for head of household
- **\$150,000** for all other filers

* Modified adjusted gross income means adjusted gross income increased by any amount excluded from gross income because it was received from a foreign source.

What clean **vehicles** qualify for the credit?

- Final assembly
 - Final assembly must occur within North America (effective 08/17/2022).
 - To identify the manufacture location for a specific vehicle, please search the vehicle identification number (VIN) of the vehicle on the [VIN Decoder](http://www.nhtsa.gov/vin-decoder) website at www.nhtsa.gov/vin-decoder.
- Manufacturer: The vehicle manufacturer must be a Qualified Manufacturer. Visit FuelEconomy.gov for a list of qualified manufactures.
- Battery: The battery must have at least 7 kWh of capacity with external charging gross vehicle weight rating of less than 14,000 lbs.
- Vehicle type: The vehicle must be a plug-in, hybrid electric, or electric vehicle, or a hydrogen fuel cell vehicle.



Scan the QR code to watch a YouTube video

WWW.IRS.GOV/CLEANVEHICLES



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Used Clean Vehicle Credit

What is the credit for used clean vehicles?

If you are interested in claiming the clean vehicle credit for purchasing a **used clean vehicle** beginning in 2023, a tax credit is available only for qualifying clean vehicles.



Here is what you should know:

- The credit is available to all qualified buyers who are not claimed as a dependent on someone else's tax return.
- The maximum amount of the credit is: Lesser of \$4,000 or 30% of the sales price.
- Qualified buyers cannot claim the credit more than once every three years.
- The credit is allowed if the sale price is less than \$25,000.

What are the **income limits** for the credit?

You may be eligible for the credit if your modified adjusted gross income* (MAGI) for the current year or prior year is less than or equal to:

- **\$150,000** for married filing jointly or filing as a qualifying surviving spouse or a qualifying widow(er)
- **\$112,500** for head of household
- **\$75,000** for all other filers

* Modified adjusted gross income means **adjusted gross income** increased by any amount excluded from gross income because it was received from a foreign source.

What **vehicles** qualify for the credit?

- The used vehicle has a model year at least 2 years earlier than the calendar year when you buy it. For example, a vehicle purchased in 2023 would need a model year of 2021 or older.
- The used vehicle transfer to the qualifying buyer must be the first transfer to a qualified buyer since August 16, 2022.
- The used vehicle must be purchased from a dealer and weigh less than 14,000 pounds.
- The used vehicle must be a plug-in hybrid electric, or electric vehicle, or a hydrogen fuel cell vehicle.



Scan the QR code to watch a YouTube video

WWW.IRS.GOV/CLEANVEHICLES



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Clean Vehicle Resources

- [Frequently Asked Questions About the New, Previously-Owned and Qualified Commercial Clean Vehicles Credit Publication](#)
- [Publication 5724, Credit for Used Clean Vehicles](#)
- [Publication 5724-A, Credit for Clean Vehicles](#)
- [Publication 5724-D, Credit for Previously Owned Clean Vehicles](#)
- www.FuelEconomy.gov/newtaxcredit
- www.NHTSA.gov/vin-decoder

www.IRS.gov/CleanVehicles



Questions???

Contact information

- Name - ***Christopher K. Green***
- Phone Number - ***443-853-5302***
- E-Mail Address - ***Christopher.K.Green@irs.gov***



NEXT STEPS:

Ask questions and get resources on:

- Fleet or business transportation planning
- Vehicles and infrastructure
- Local, state and federal incentives
- Location for current stations
- Technology installation and integration



EV WEBINAR SERIES



WEBINAR 1: THE BASICS OF EVS

Title: The basics of EVs

Description: How they work, the benefits of driving electric, and the different types of EVs available.

Date: Thursday, August 1st

Time: 2:00 PM - 3:00 PM ET



WEBINAR 2: EV CHARGING

Title: EV Charging:

Understanding different charging options

Description: How to find charging stations, and how to charge your EV at home.

Date: Tuesday, August 13th

Time: 10:00 AM - 11:00 AM
ET



WEBINAR 3: EVS FOR FLEETS

Title: EVs for Fleets: How businesses can benefit from electrifying their fleets

Description: Including cost savings, environmental benefits, and improved efficiency.

Date: Thursday, August 29th

Time: 9:00 AM - 10:00 AM
ET

Register Here: <https://forms.gle/J3GkNDq9VJOSN4bJ6>

THANK YOU! QUESTIONS ?

