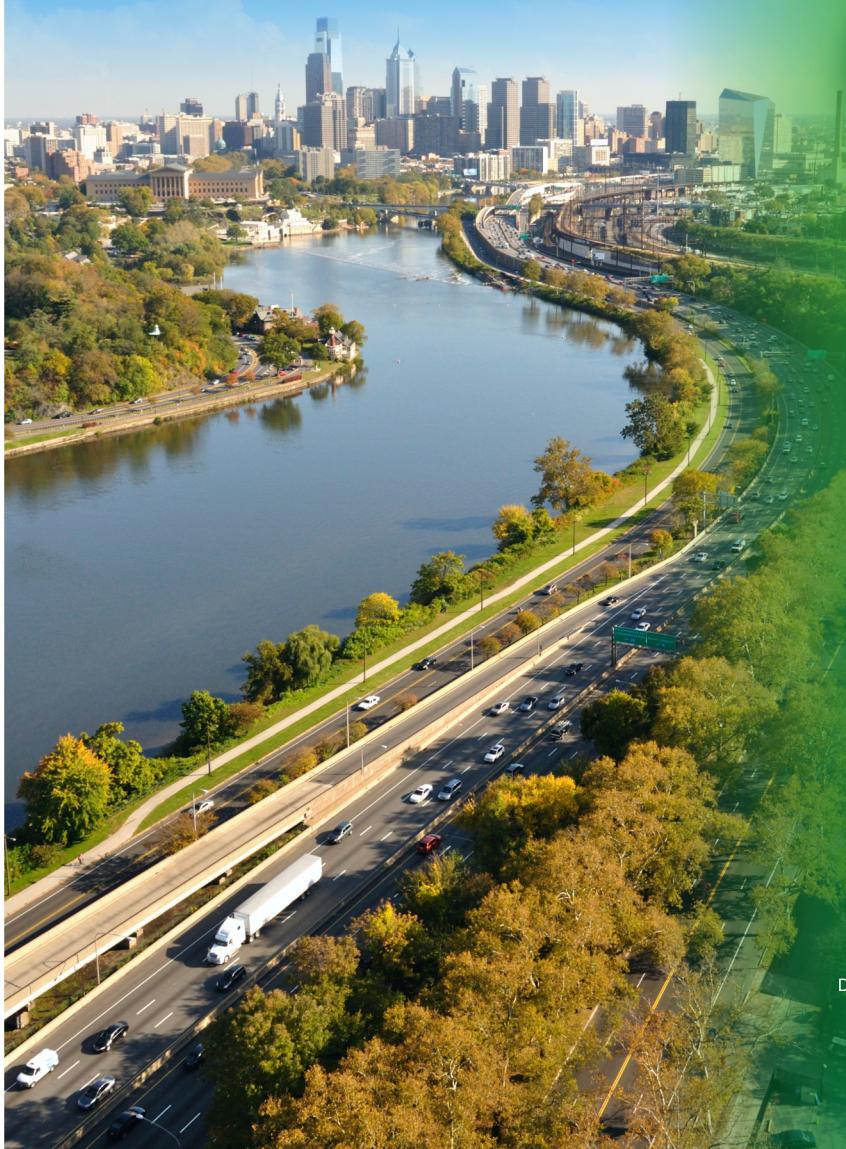


Pennsylvania Electric Vehicle Roadmap: 2021 Update

Progress on the road to better air quality, and how you can be a part of it



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

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Message from Secretary Patrick McDonnell: Join Us on the Road to Better Air Quality

Our transportation decisions affect Pennsylvania today and tomorrow. Whether we're government officials, business owners, school administrators, community leaders, or individual consumers, we can turn in the direction of healthier air quality and less climate change by switching to electric vehicles.

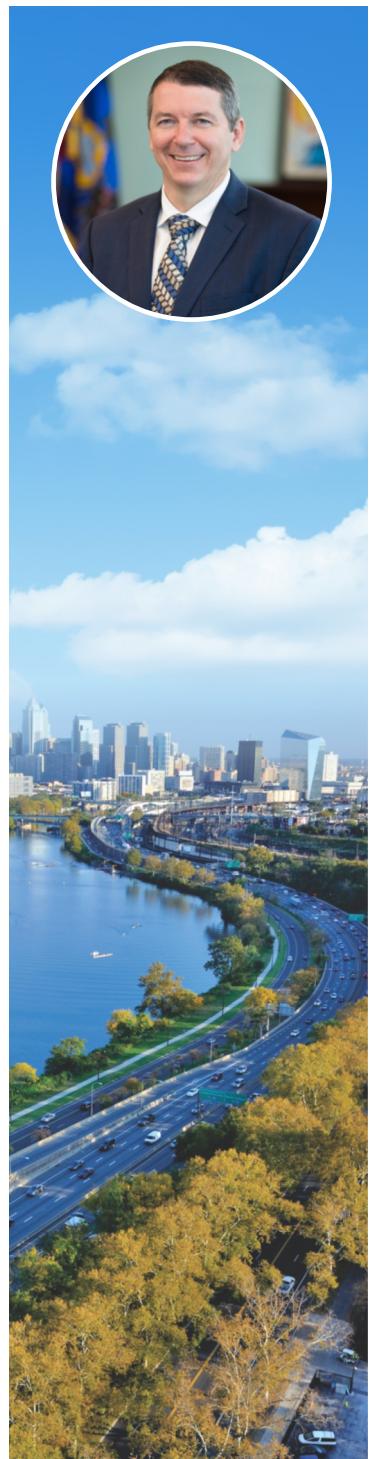
The Department of Environmental Protection recently worked with leaders in a range of sectors across Pennsylvania to identify barriers to electric vehicle use and how to overcome them. We determined more than a dozen strategies that will help increase use of electric vehicles and presented them in the [Pennsylvania Electric Vehicle Roadmap](#).

This 2021 update recaps these strategies in a brief, easy-to-read format and shares the latest data available on electric vehicles and charging infrastructure in Pennsylvania. It highlights current initiatives that are increasing electric vehicle use and looks ahead to more around the bend. I hope you'll find this update a useful quick reference and join us on the road to better air quality in Pennsylvania.



Patrick McDonnell
Secretary
Department of Environmental Protection

For the complete Pennsylvania Electric Vehicle Roadmap:
<http://files.dep.state.pa.us/energy/officeofpollutionprevention/stateenergyprogram/paevroadmap.pdf>



*The consumer
who spends
\$1,200/year on
gasoline would
likely spend
about \$400/year
on electricity for
a comparable
electric vehicle.*



Vehicle Emissions: Impacts on Our Daily Lives

There are more than 12 million registered vehicles in Pennsylvania. Transportation drives our lives, enabling many of our work, family, school, community, and recreational activities.

This convenience comes at a cost, as gasoline and diesel-powered vehicles emit nitrogen oxide, carbon monoxide, carbon dioxide, particulate matter, and hydrocarbons.

Vehicles generate 47 percent of nitrogen oxides in the air statewide, contributing to the formation of ground-level ozone. This affects the health of children; older people; people with lung diseases, such as asthma and emphysema; and those who work or are active outdoors. The Pennsylvania Department of Health has found that asthma-related emergency room visits increase when air quality is very poor.

Vehicles release 21 percent of carbon dioxide in the air statewide, contributing to climate change. Climate change is causing our average temperature to rise and creates more frequent swings of extreme heat, drought, and rainfall.

Air pollution and climate change are happening across the state, with low-income and minority Pennsylvanians disproportionately affected.

Benefits of Electric Vehicles

Electric vehicles have zero tailpipe emissions. Switching to electric vehicles means a Pennsylvania of the near future to breathe easier about:

- Better air quality will lead to:
 - Improved health
 - Fewer respiratory conditions, such as asthma
 - Higher quality of life—more opportunity to work and play without fear of difficulty breathing
 - Improved work productivity
- Electric vehicles generate fewer total greenhouse gas emissions than fossil fuel vehicles. This will help slow down climate change and its impacts and costs.
- Energy security will improve as we rely less on oil imports.
- Electricity rates may be reduced, as charging increasingly occurs overnight during non-peak demand hours.
- New jobs will grow in electric vehicle manufacturing and charging infrastructure installation.
- Electric vehicle owners experience 50-70 percent lower fuel costs; fewer maintenance expenses; and potentially longer vehicle life, as some new batteries can last 500,000 miles or longer.

Electric Vehicles: The Basics

An electric vehicle is any vehicle powered by an electric motor and on-board battery that can be charged using an external electricity source. Battery electric vehicles and plug-in hybrids in electric mode have no tailpipe emissions. In fact, battery electric vehicles don't have a tailpipe.



Types of Electric Vehicles

Battery electric vehicles: These are powered entirely using an electric battery and motor. Most new battery electric vehicles have a range of 150 to 300 miles on one charge.

Plug-in hybrid vehicles: These have both a chargeable electric battery and a gasoline or diesel engine. Plug-in hybrid vehicles typically travel 20 to 50 miles in electric mode and then switch to hybrid mode which also uses an internal combustion engine.



Charging

Charging occurs at a variety of locations, although most occurs at home or at work. There are three different speeds of charging:

Level 1 charging: All electric vehicles can plug in to a regular wall outlet, which typically provides 3-5 miles of driving range per hour of charging. This can be a sufficient charging speed for plug-in hybrid vehicles, though most battery electric vehicle owners use faster charging equipment.

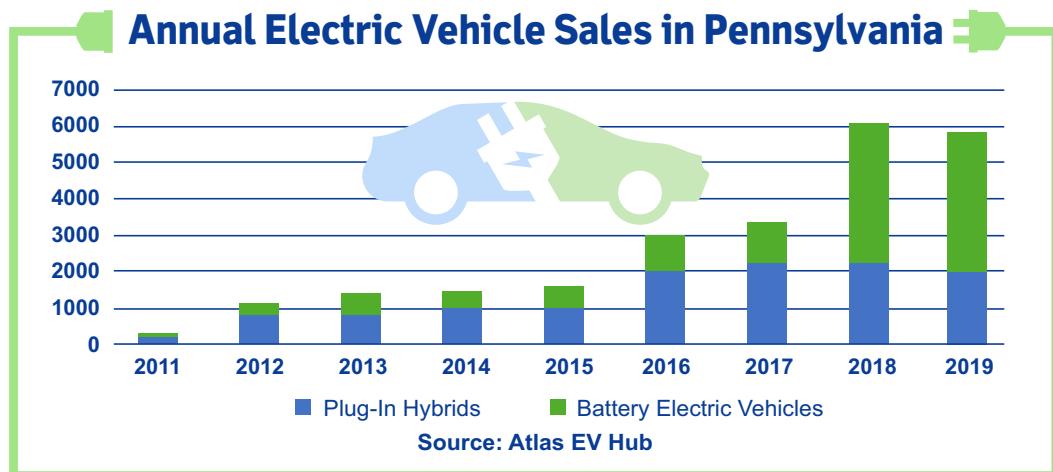
Level 2 charging: Most electric vehicle charging occurs at home, at work, at businesses, and at public parking locations using level 2 charging equipment. Electric vehicles typically receive 10 to 25 miles of driving range per hour from this equipment.

Direct current (DC) fast charging: The fastest form of charging, DC fast charging equipment is typically installed near highway interchanges, in areas with high rates of electric vehicle ownership, and at businesses with heavy-duty electric vehicles. A light-duty battery electric vehicle will get 100 to 250 miles of driving range in 30 minutes from DC fast charging.



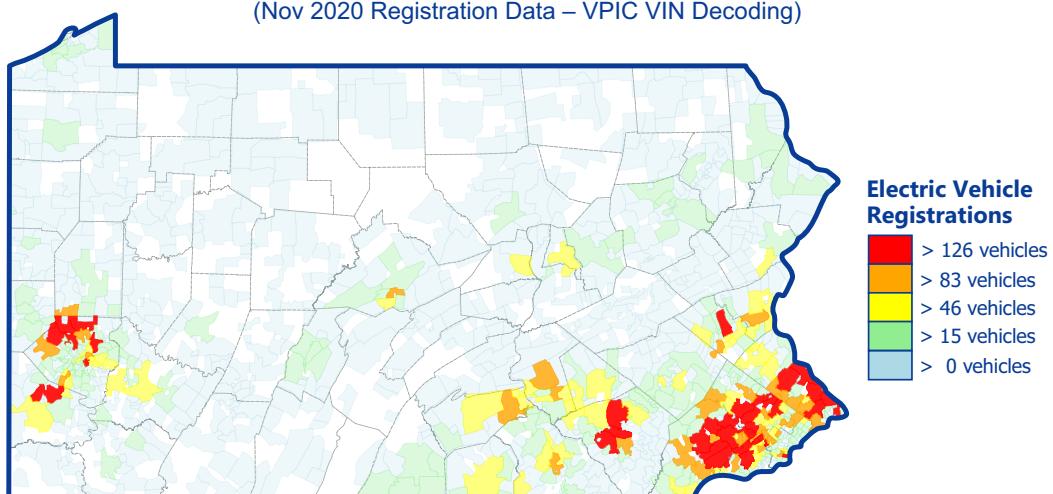
Electric Vehicle Use Today: Small But Growing Statewide

More than 29,000 electric passenger vehicles were registered in Pennsylvania as of November 2020. While this is a fraction of vehicles in the state, it's more than double the number in December 2017.



Pennsylvania Electric Registered Vehicles by Zip Code

(Nov 2020 Registration Data – VPIC VIN Decoding)



Source: <https://s3.amazonaws.com/tmp-map/dot/vpic/pa-registered-vehicles-by-fuel-type-and-zip-code.html>

Overcoming Barriers to Electric Vehicle Use

There are challenges to achieving widespread use of electric vehicles in Pennsylvania. Efforts are underway to overcome them, and much more can be done. Consider how you can join in!

Purchase Price

The initial purchase price of an electric vehicle typically is higher than for comparable gasoline vehicles, but prices are coming down and the driving range of electric vehicles has improved. For example, in 2011 the Nissan Leaf had a range of 73 miles and an MSRP of \$33,600, but in 2020 the Leaf had a range of 150 miles and an MSRP of \$31,600. Manufacturers and industry experts expect electric vehicle prices to continue decreasing and driving ranges to continue increasing.



ROADMAP PROGRESS: In 2019 the DEP Alternative Fuel Vehicles Rebate Program provided Pennsylvanians with over 2,400 rebates, totaling more than \$3.6 million, for the purchase of a new or used battery electric or plug-in hybrid vehicle for personal use. Low-income households are eligible for higher rebate amounts. For more information, see Resources.

- 2019 Electric Vehicle Roadmap recommendation: expand and improve consumer electric vehicle rebates.

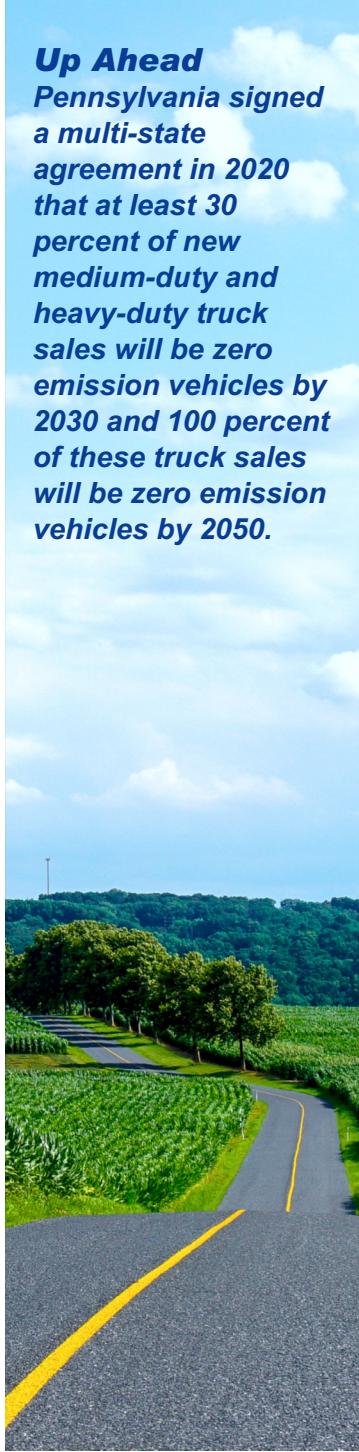
Model Availability

While there's not yet an electric vehicle model comparable to every gasoline model, the variety of electric models available continues to increase every year.



Sample of New Electric Vehicle Models Available in Pennsylvania in 2021

Vehicle Type	Battery Electric	Plug-In Hybrid
Compact and Subcompact Cars	Nissan Leaf (MSRP \$31,620; range 150 miles)	No models are currently available in Pennsylvania.
Mid-Size and Large Cars	Chevy Bolt (MSRP \$36,500; range 259 miles) Tesla Model 3 (MSRP \$37,990; range 250 miles)	Prius Prime (MSRP \$28,220; electric range 25 miles) Honda Clarity (MSRP \$33,400; electric range 48 miles)
SUV	Hyundai Kona EV (MSRP \$37,190; range 258 miles)	Mitsubishi Outlander PHEV (MSRP \$36,295; electric range 22 miles)
Van	No models are currently available.	Chrysler Pacifica PHEV (MSRP \$39,995; electric range 33 miles)
Pick-up	Several manufacturers have announced pick-up models to be released by 2022.	No models are currently available.



Up Ahead
Pennsylvania signed a multi-state agreement in 2020 that at least 30 percent of new medium-duty and heavy-duty truck sales will be zero emission vehicles by 2030 and 100 percent of these truck sales will be zero emission vehicles by 2050.

Working to Increase Medium and Heavy-Duty Electric Trucks

Electric vehicles make up only a small portion of medium and heavy-duty vehicle sales, but the industry is beginning to change, developing new models and technology advancements. The North American Council for Freight Efficiency forecasts that medium-duty electric vehicles will have a lower total cost of ownership than diesel by 2025. Heavy-duty electric vehicles are anticipated to have a lower total cost of ownership than diesel starting around 2030.



ROADMAP PROGRESS: Other states have set sales mandates or financial incentives to increase electric vehicle model availability. A bill was considered in the Pennsylvania 2019-20 legislative session that would have required electric utilities to invest in charging infrastructure and establish an electric vehicle sales goal of at least 50 percent above market forecasts. A similar bill is expected to be considered in the 2021-22 session.

- 2019 Electric Vehicle Roadmap recommendation: Executive or legislative action should establish an electric vehicle sales goal in Pennsylvania.

Charging Infrastructure

While most electric vehicle charging occurs at home, having more charging stations available in workplace and public locations will go a long way to help current electric vehicle owners maximize their vehicle's capabilities and decrease range anxiety for people considering an electric vehicle purchase.



Electric Charging Infrastructure in Pennsylvania

Charging Equipment Type	Level 2	DC Fast	Total
Public plugs: Available to all electric vehicle drivers	1,355	114	1,469
Tesla plugs: Available to Tesla drivers only	241	210	451
TOTAL	1,596	324	1,920

Source: Alternative Fuels Data Center, Electric Vehicle Charging Station Locations, 2020,
https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC



ROADMAP PROGRESS: The DEP Driving PA Forward program launched rebates to incentivize new level 2 charging infrastructure and competitive grants to support new public DC fast charging stations.

To date, they've funded over 850 level 2 charging plugs and 11 projects that will install more than 25 DC fast charging plugs. Any organization, business, or government can apply for these rebates and grants! DC fast charging station projects located in environmental justice areas receive higher consideration. For more information, see Resources.

The DEP Alternative Fuel Vehicles Incentive Grant program for business fleet fuel transitions can fund the incremental cost of electric vehicle purchases and/or charging equipment installation. Projects in environmental justice communities receive higher consideration. For more information, see Resources.

- 2019 Electric Vehicle Roadmap recommendation: Create incentives for others to invest in charging equipment.



Increasing Public Knowledge about Electric Vehicles

What's it like to drive? How does charging work? Where would I charge it? How far can it go on a charge? These are some of the questions that consumers, municipal officials, business owners, and others typically ask about electric vehicles.



ROADMAP PROGRESS: DEP and PennDOT coordinate the Drive Electric Pennsylvania Coalition, a group of leaders across the state who are working to increase public knowledge about electric vehicles through webinars, ride and drive events, flyers, and other materials. Connect with the coalition: For the website, see Resources.



Up Ahead

PennDOT and DEP are working to develop electric vehicle charging corridors on main highways around the state. The goal is to have chargers available every 50 miles, located no more than 5 miles from the highway. DEP targets funding to charging projects in these corridors.

2019

Electric Vehicle Roadmap recommendation:
Increase public education about the benefits of electric vehicles, how to operate them, and how and where to charge.



How Business Owners Can Drive Electric

Boost your bottom line and improve air quality in Pennsylvania.

- 1.** Consider how electric vehicles and charging equipment can benefit your business.
 - Providing employees with access to charging equipment at work can improve employee hiring and retention.
 - Electric fleet vehicles cost less to operate and maintain than gasoline vehicles.
 - Charging equipment can attract more customers to a business.
- 2.** Use available incentives to cost-effectively install charging equipment for your employees, fleet vehicles, and/or customers. See Resources.
- 3.** Calculate the full cost-of-ownership when making fleet vehicle purchases.
- 4.** Let your employees and community know you support electric vehicle adoption.



How Local Governments Can Drive Electric

- 1.** Learn the benefits of local electric vehicle adoption.
- 2.** Use available incentives (see Resources) to cost-effectively install charging equipment for residents and visitors in key locations, such as municipal buildings, parking garages, and parks.
- 3.** Calculate the full cost-of-ownership when making fleet vehicle purchases and, when feasible, transition your fleet to electric vehicles in phases.
- 4.** Adopt policies, parking rules, and zoning ordinances that facilitate electric vehicle growth and adoption.
- 5.** Let your community know you support electric vehicle adoption.
- 6.** Consider charging infrastructure requirements or incentives for multi-unit dwellings so everyone can enjoy the benefits of electric vehicles.
- 7.** Host an electric vehicle ride-and-drive event in your community.



Tips

For Consumers

1. Learn more about electric vehicles, charging, and rebates that are available to help with the purchase of an EV (see Resources).
2. Consider the full lifetime cost of ownership, not just the sticker price, when making a vehicle purchase, and take advantage of all rebates and tax incentives available for an electric vehicle purchase.
3. Experience an electric vehicle at a car dealership, auto show, or ride-and-drive event, or ask a friend or neighbor to show you their electric car.
4. Let others know you appreciate the benefits of electric vehicles!



Summary of Roadmap Strategies to Increase Electric Vehicle Use in Pennsylvania

What to Do	How to Do It	Who Can Help
Establish an electric vehicle sales goal	<ul style="list-style-type: none">● Pass legislation● Regularly refine the sales goal and strategies for compliance	<ul style="list-style-type: none">● Legislature● Utilities
Expand and improve consumer electric vehicle rebates	<ul style="list-style-type: none">● Increase funding for DEP Alternative Fuel Vehicle Rebates Program	<ul style="list-style-type: none">● Legislature
Conduct public outreach and education	<ul style="list-style-type: none">● Hold public events● Do statewide marketing● Train auto dealers● Educate governments and businesses	<ul style="list-style-type: none">● DEP● Drive Electric PA Coalition● Auto dealers● Local governments● Businesses
Implement electric rate structures that encourage electric vehicles	<ul style="list-style-type: none">● The PA Public Utility Commission can allow proposals for alternative electric rate structures● The legislature has the power to require implementation	<ul style="list-style-type: none">● Public Utility Commission● Utilities● Legislature
Expand public, residential, and workplace charging equipment	<ul style="list-style-type: none">● Continue investing Driving PA Forward funds in charging equipment● Create incentives for others to invest in charging equipment	<ul style="list-style-type: none">● DEP● Businesses● Government● Legislature



Learn more:

Complete 2019 *Electric Vehicle Roadmap*:

<http://files.dep.state.pa.us/Energy/OfficeofPollutionPrevention/StateEnergyProgram/PAEVRoadmap.pdf>

Drive Electric PA Coalition:

<https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/State-Energy-Plan/Pages/Drive-Electric-PA-Coalition.aspx>

Primer on electric vehicle charging from the U.S. Department of Energy:

<https://www.energy.gov/eere/electricvehicles/vehicle-charging>

Electric vehicle operating cost savings from the U.S. Department of Energy:

<https://www.energy.gov/eere/electricvehicles/saving-fuel-and-vehicle-costs>

Pennsylvania's participation in regional agreement to increase electric medium and heavy duty truck sales:

<https://www.nescaum.org/documents/medium-and-heavy-duty-zero-emission-vehicles-action-plan-development-process/>

State financial incentives for electric vehicle purchases:

DEP rebate program for individuals

<https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/Alternative-Fuel-Vehicles.aspx>

DEP Alternative Fuel Incentive Grant program for business and local government fleets transitioning to alternative fuels, including electric. For more information, please visit

<https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/default.aspx>

Federal electric vehicle purchase incentives for individuals and all organizations:

<https://www.fueleconomy.gov/feg/taxevb.shtml>

State funding support for charging station installation:

DEP Driving PA Forward Program for government, businesses, and other organizations:

<http://www.depgis.state.pa.us/drivingpaforward/>

Where to find certified public charging stations:

https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC

PennDOT and DEP project to support development of electric vehicle charging corridors in Pennsylvania:

<https://www.ahs.dep.pa.gov/NewsRoomPublic/SearchResults.aspx?id=21688&typeid=1>

Electric vehicle shopping help:

<https://plugstar.com/>

Guide on how state and local leaders can use public policy to support electric vehicle use:

<https://pluginamerica.org/policy/achieve-policy-toolkit/>

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www.dep.pa.gov