

Electric Vehicles & Charging Stations



Federal Agency Workplace Charging Workshop

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Agenda



- **EVSE & PEV Basics**
- **PEV Models**
- **AFDC Station Locator**
- **Policies & Incentives**
- **Readiness Efforts**



Types of EVs and PEVs



- Hybrid Electric
 - Battery assisted – Gasoline engine
- Plug-in Electric
 - Gasoline backup for limited electric range (53 miles)
 - 10 to 20 KW batteries
- Battery Electric
 - Pure electric, no gasoline
 - 24 to 100 KW batteries
 - 95 to 240 miles of range

2017 Toyota Prius



2017 Chevy Volt



2017 Tesla Model 3



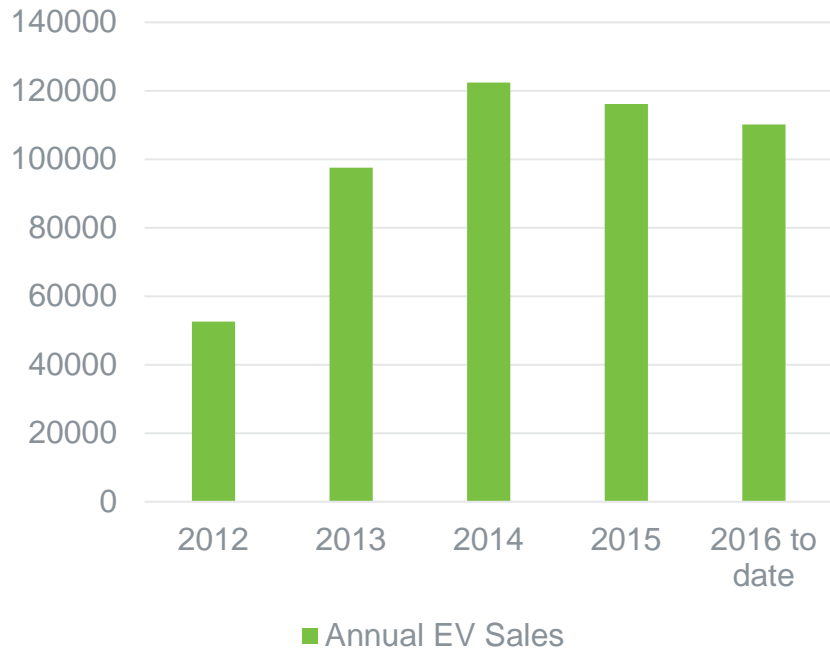
2017 Nissan LEAF



2017 Chevy Bolt

Resource: www.fueleconomy.gov

Annual EV Sales 2012-16



- In 2015:
 - 384,000 HEVs sold
 - 115,000 PEVs sold
 - 116,099 EVs sold
 - Through Oct 1 in 2016 110,171 EVs sold*
- 27 models of PEV or EV on the market today
- In 2016, there are 36,000 charging ports in the United states

*source: InsideEVs, Monthly Sales Scorecard

Infrastructure: Electric Vehicle Supply Equipment (EVSE)



	Current Type	Voltage (V)	Charging Time	Primary Use
Level 1	Alternating Current (AC)	120V	2 to 5 miles of range per hour of charging	Residential/ Workplace
Level 2	AC	240V	10 to 20 miles of range per hour of charging	Residential/ Workplace/Fleet
DC Fast	Direct Current (DC)	208/480V	60 to 80 miles per 20 minutes of charging	Commercial/ Fleet
Wireless	AC	240V	10 to 20 miles of range per hour of charging	Residential Commercial



Charging at Home

- Most charge vehicles overnight at home
 - Level 1 outlet or installed Level 2 EVSE
 - L2 240v installation typically require permitting and licensed contractors

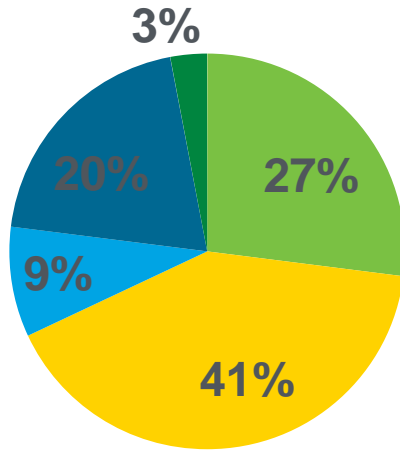


Charging in Public

- Increases vehicle range, especially for consumers who live in high-density urban areas
- Ideal public charging locations include:
 - Workplaces or office buildings
 - Shopping centers
 - City parking lots
 - Airports
 - Hotels

Sources of U.S. Electricity Generation, 2015

■ Coal ■ Natural Gas ■ Nuclear
■ Renewable ■ Petroleum



- Produced by steam turbine generators at power plants
- Electricity travels from generating facilities to distribution facilities
- With appropriate planning, plug-in electric vehicles are unlikely to strain existing electricity infrastructure in the near term

State Policies and Incentives



- **Federal**

- EV tax credit \$7500, Infrastructure Tax Credit – 30% \$30,000

- **Washington DC**

- Infrastructure tax credit 50% \$1000 and \$10,000, reduced registration fee fuel efficient vehicles

- **Virginia**

- Retail EV Charging Regulation, HOV Lane Exemption, Utility Off-Peak Charging Rate Reduction

- **Maryland**

- Plug-In Electric Vehicle (PEV) Off Peak trial
- Plug-In Electric Vehicle (PEV) Tax Credit of \$3,000
- HOV Lane Exemption
- Electric Vehicle Supply Equipment (EVSE) Rebate Program
- Alternative Fuel Infrastructure Grants



Helpful Resource:

The *Alternative Fuel Data Center Laws and Incentives Search* provides information about available state and federal incentives for EVs and EVSE.

Image: NREL Image Gallery #28005

Other Considerations: Tools



Vehicle Cost Calculator

Compare cost of ownership and emissions for most vehicle models.

mobile



AFLEET Tool

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



PEV Readiness Scorecard

Assess your community's readiness for the arrival of plug-in electric vehicles.

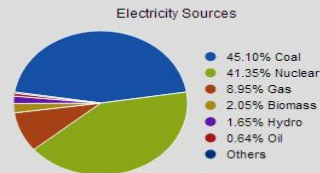
The screenshot shows the 'Alternative Fuels Data Center' website. It features a search bar for 'Alternative Fuels Data Center' and a 'Light-Duty Vehicle Search' section. The search filters include Fuel Type (Electric (EV)), Class (All), and Years (2014 (3)). A list of vehicle models is displayed below the filters, including the 2014 Nissan Leaf (EV) and the 2014 Chevrolet Volt (PHEV).

Compare Electricity Sources and Annual Vehicle Emissions

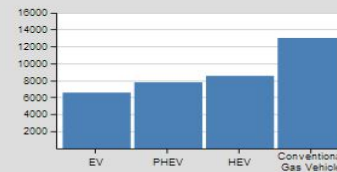
Enter a ZIP code to see a breakdown of the electricity sources used to charge EVs and PHEVs on a local grid and compare the annual emissions generated from vehicles using electricity from the grid, gasoline, or a combination of the two.

ZIP Code

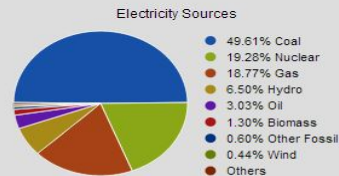
Virginia - 22031



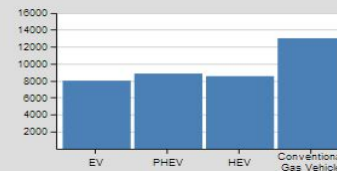
Annual Emissions per Vehicle (lb of CO₂ equivalent)



National Averages



Annual Emissions per Vehicle (lb of CO₂ equivalent)



afdc.energy.gov/tools

References and Resources



- AFDC Vehicle Cost Calculator (<http://www.afdc.energy.gov/calc/>)
- AFDC EV Emissions page (http://www.afdc.energy.gov/vehicles/electric_emissions.php)
- AFDC Light-Duty Vehicle search (<http://www.afdc.energy.gov/vehicles/search/light/>)
- AFDC Heavy-Duty Vehicle Search (<http://www.afdc.energy.gov/vehicles/search/heavy>)
- FuelEconomy.gov's Alternative Fuel Vehicles (AFV) page (<http://www.fueleconomy.gov/feg/alternatives.shtml>)
- Clean Cities Plug-In Electric Vehicle Handbook for Fleet Managers (http://www.afdc.energy.gov/pdfs/pev_handbook.pdf)
- Clean Cities Plug-In Electric Vehicle Handbook for Workplace Charging Hosts (http://www.afdc.energy.gov/uploads/publication/pev_workplace_charging_hosts.pdf)
- Clean Cities Plug-In Electric Vehicle Handbook for Public Charging Station Hosts (<http://www.afdc.energy.gov/pdfs/51227.pdf>)
- Argonne National Laboratory's (ANL) *Well-to-Wheels Energy Use and Greenhouse Gas Emissions Analysis of Plug-in Hybrid Electric Vehicles* report (<http://www.transportation.anl.gov/pdfs/TA/559.pdf>)
- Electric Drive Transportation Associations (EDTA) Electric Drive Sales (<http://electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952>)
- National Fire Protection Association EV Safety Training (www.evsafetytraining.org)
- National Alternative Fuels Training Consortium First Responder Safety Training (http://www.naftc.wvu.edu/course_workshop_information/first_responders)
- Plug-In America's Vehicle Tracker (<http://www.pluginamerica.org/vehicles>)