

# Alternative fuel vehicles

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# Alternative fuels landscape

The Energy Policy Act of 1992 defines an alternative fuel as:

- Biodiesel (B100)
- **Natural gas** and liquid fuels domestically produced from natural gas
- **Propane** (liquefied petroleum gas)
- **Electricity**
- **Hydrogen**
- Blends of 85% or more of methanol, denatured ethanol, and other alcohols with gasoline or other fuels
- Methanol, denatured ethanol, and other alcohols
- Coal-derived, domestically produced liquid fuels
- Fuels (other than alcohol) derived from biological materials
- P-series fuels

<https://www.afdc.energy.gov/fuels/>

# Alternative fuels landscape

“Economic factors are the primary reason consumers switch from one fuel to another”

Phil Squair, senior vice president of governmental and public affairs at the National Propane Gas Association



	Title	Type
7	Electric Vehicles Charge up at State Parks in West Virginia	Video
7	Hydrogen Powers Fuel Cell Vehicles in California	Video
Nov. 4, 2017	Smart Car Shopping	Video
Oct. 28, 2017	Natural Gas Vehicles Make a Difference in Tennessee	Video
Oct. 20, 2017	Michigan School Buses Get Rolling on Propane	Web Story
Oct. 14, 2017	Emergency Alternatives	Video
Oct. 7, 2017	North Carolina Commits to Clean Energy with EV Charging	Video
Sept. 16, 2017	National Park Saves Natural Resources with Alternative Fuels	Video
Aug. 26, 2017	Phoenix Utility Fleet Drives Smarter with Biodiesel	Video
Aug. 4, 2017	Idaho Surges Ahead with Electric Vehicle Charging	Video

Showing 1 to 10 of 292

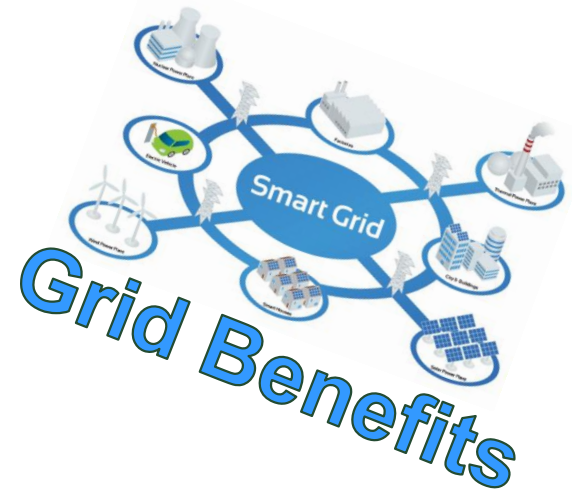
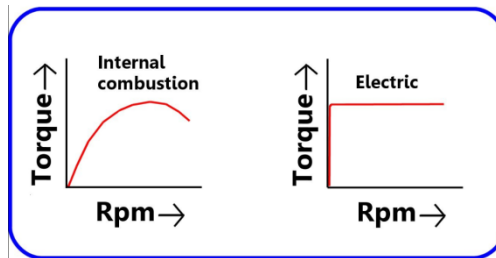
**Fuel and  
Maintenance  
Savings**



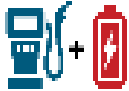
# Electric Light Duty Vehicles



**Fun to  
Drive**

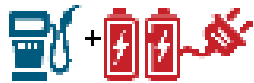


# What are the differences in electric vehicles?



## **Hybrid electric vehicle (HEV):**

Internal combustion engine (ICE) +  
Electric motor/battery  
Battery charged via regenerative braking  
and ICE



## **Plug-in hybrid electric vehicle (PHEV):**

Internal combustion engine (ICE) +  
Electric motor/battery  
Battery is charged by plugging into a source  
of power



53 mile range



## **Battery electric vehicle (BEV):**

Electric motor/battery  
Battery is charged by plugging into a source  
of power.



210-315 mile range

If it has a plug = **P**EV

# Current market landscape

- Over 40 PEV models available from more than a dozen manufacturers
  - PHEV
    - Electric range 15-55 miles
  - All electric:
    - 62-335 mile range
    - 18-100 kWh battery
    - \$23-140K Manufacturer suggested retail price (MSRP)

***36 more models expected in the next 4 years with a range of 200-400 miles***

**Even Dyson has announced an electric car that will reach the market in 2020.**

**James Dyson to invest £2.5bn on  
'radically different' electric car**

<https://www.theguardian.com/technology/2017/sep/26/james-dyson-electric-car-2020>

# Current market landscape

Governments announcing/considering plans to ban sales of gasoline and diesel-fueled vehicles:

- UK (2040)
- France (2040)
- Netherlands (by 2030)
- India (2030)
- China
- Germany (some towns/cities)
- California



Others that have set official targets for electric car sales:

Austria

Portugal

Denmark

Korea

Ireland

Spain

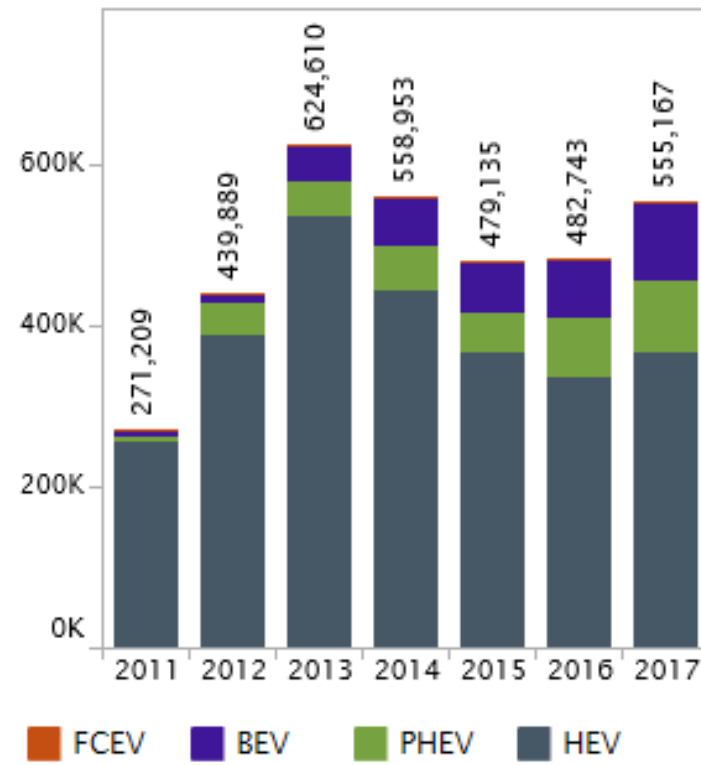
Netherlands

# Current market landscape

## U.S. sales:

Total Sales by	Category
FCEV	3,084
BEV	362,058
PHEV	356,664
HEV	2,689,900
All	3,411,706

Annual Sales by Category



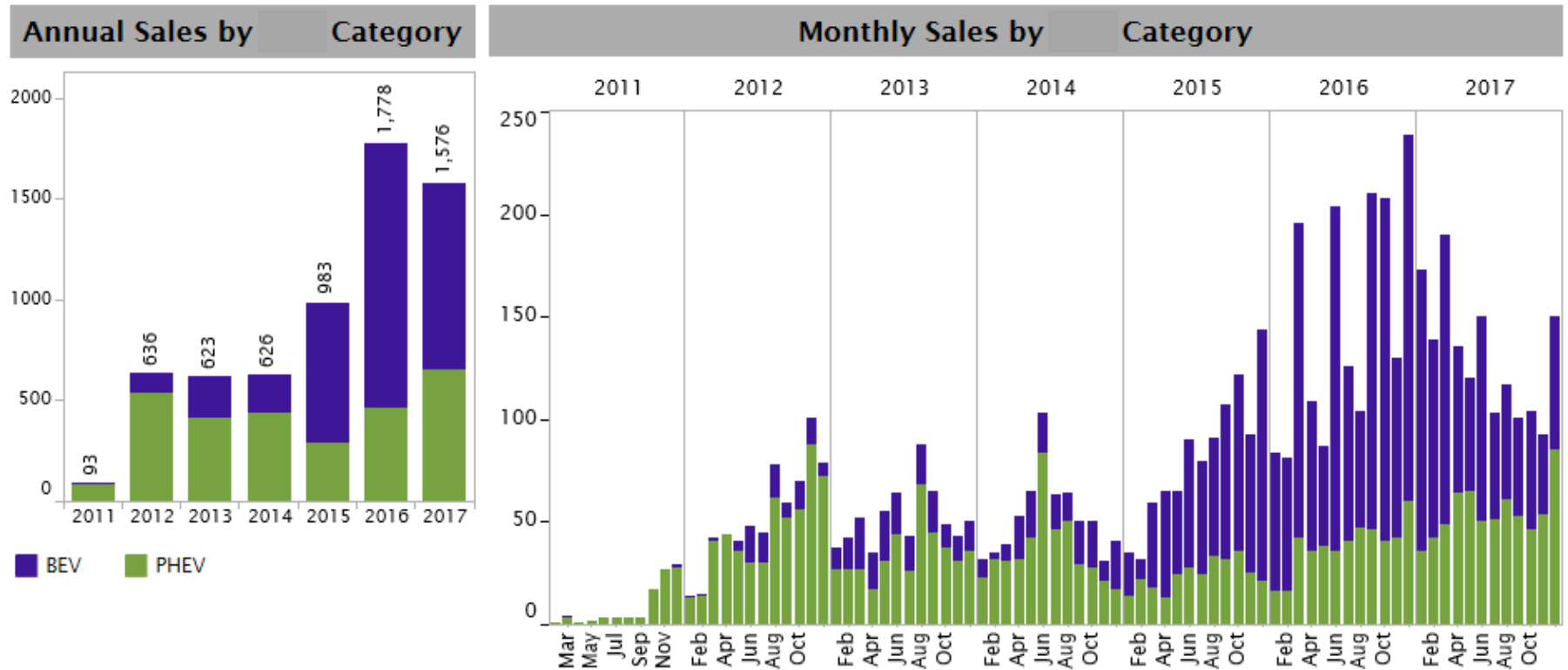
Through December 2017

Alliance of Automobile Manufacturers (2018). Advanced Technology Vehicle Sales Dashboard. Data compiled by the Alliance of Automobile Manufacturers using information provided by HIS Markit. Data last updated 2/16/2018. Retrieved 3/15/2018 from <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales-dashboard/>



# Current market landscape

**Wisconsin sales (21<sup>st</sup>): 6,315 vehicles: 3,428 BEV; 2,887 PEV**



Alliance of Automobile Manufacturers (2018). Advanced Technology Vehicle Sales Dashboard. Data compiled by the Alliance of Automobile Manufacturers using information provided by IHS Markit. Data last updated 1/2/2018. Retrieved 3/15/2018 from <https://autoalliance.org/energy-environment/advanced-technology-vehicle-sales/dashboard>

# Current market landscape

## Volvo Cars to go all electric

<https://www.media.volvocars.com/global/en-gb/media/pressreleases/210058/volvo-cars-to-go-all-electric>

ALEX DAVIES TRANSPORTATION 10.02.17 12:01 PM

## GENERAL MOTORS IS GOING ALL ELECTRIC

<https://www.wired.com/story/general-motors-electric-cars-plan-gm/>

## Renault-Nissan-Mitsubishi to launch 12 zero-emission vehicles and a robo-taxi by 2022, chief says

<https://www.cnbc.com/2017/09/15/renault-nissan-to-launch-12-zero-emission-vehicles-robo-taxi-by-2022.html>



Jaguar Land Rover to make only electric or hybrid cars from 2020

## Ford creates team to ramp up electric vehicle development

<https://www.reuters.com/article/us-ford-motor-electricvehicles/ford-creates-team-to-ramp-up-electric-vehicle-development-idUSKCN1C7224>

## Toyota announces major expansion of its electric car plans: 10 new BEVs, all models to have electric motors

<https://electrek.co/2017/12/18/toyota-electric-car-plans/>

# Current market landscape

**Volkswagen to offer electric versions of all of its vehicles by 2030**

<https://techcrunch.com/2017/09/11/volkswagen-to-offer-electric-versions-of-all-of-its-vehicles-by-2030/>

**Hyundai-Kia: eight electric cars by 2022, dedicated EV platform**

[https://www.greencarreports.com/news/1112165\\_hyundai-kia-eight-electric-cars-by-2022-dedicated-ev-platform](https://www.greencarreports.com/news/1112165_hyundai-kia-eight-electric-cars-by-2022-dedicated-ev-platform)

**Two-Thirds Of 2030 Hondas Will Be Electrified Or Zero Emission: CEO**

[https://www.greencarreports.com/news/1102507\\_two-thirds-of-2030-hondas-will-be-electrified-or-zero-emission-ceo](https://www.greencarreports.com/news/1102507_two-thirds-of-2030-hondas-will-be-electrified-or-zero-emission-ceo)

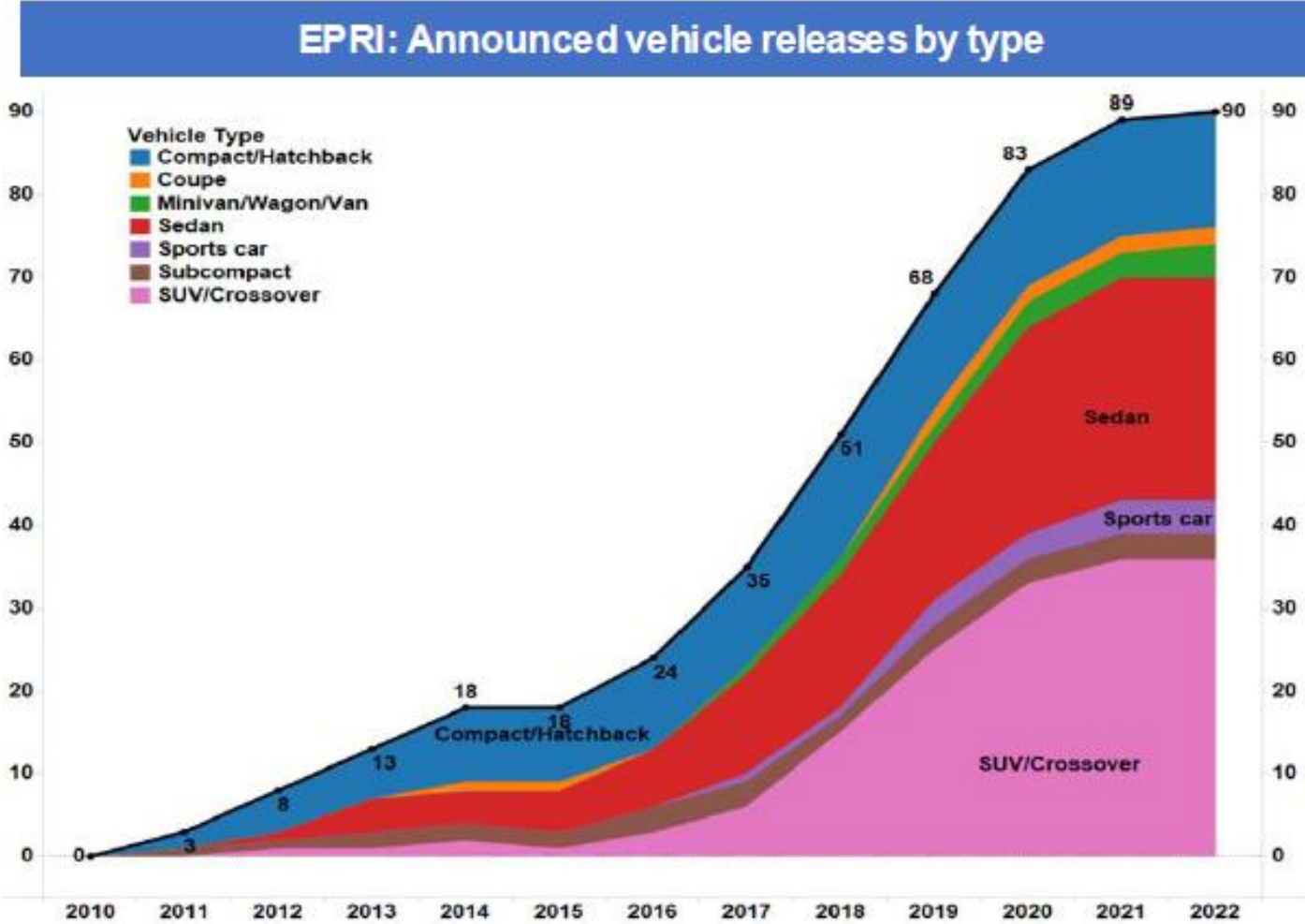
**Mercedes-Benz plans electric versions of all its models by 2022**

<https://www.engadget.com/2017/09/11/mercedes-benz-electric-versions-2022/>

**BMW readies mass production of electric cars, 12 models by 2025**

<https://www.cnbc.com/2017/09/07/bmw-readies-mass-production-of-electric-cars-12-models-by-2025.html>

# Expected Vehicle Releases



EPRI Electric Vehicles and Fast Charging Landscape report 2018.

# Incentives

- Up to \$7,500 federal tax credit for purchase of BEV or PHEV
- Credit phases out by manufacturer when 200,000 vehicles are registered

## Example

200,000th plug-in electric drive vehicle produced by the manufacturer on February 12, 2010.

Phase out starts beginning of second calendar quarter after 200,000-vehicle mark reached.

Beginning of fourth calendar quarter after 200,000-vehicle mark reached, credit decreases again.

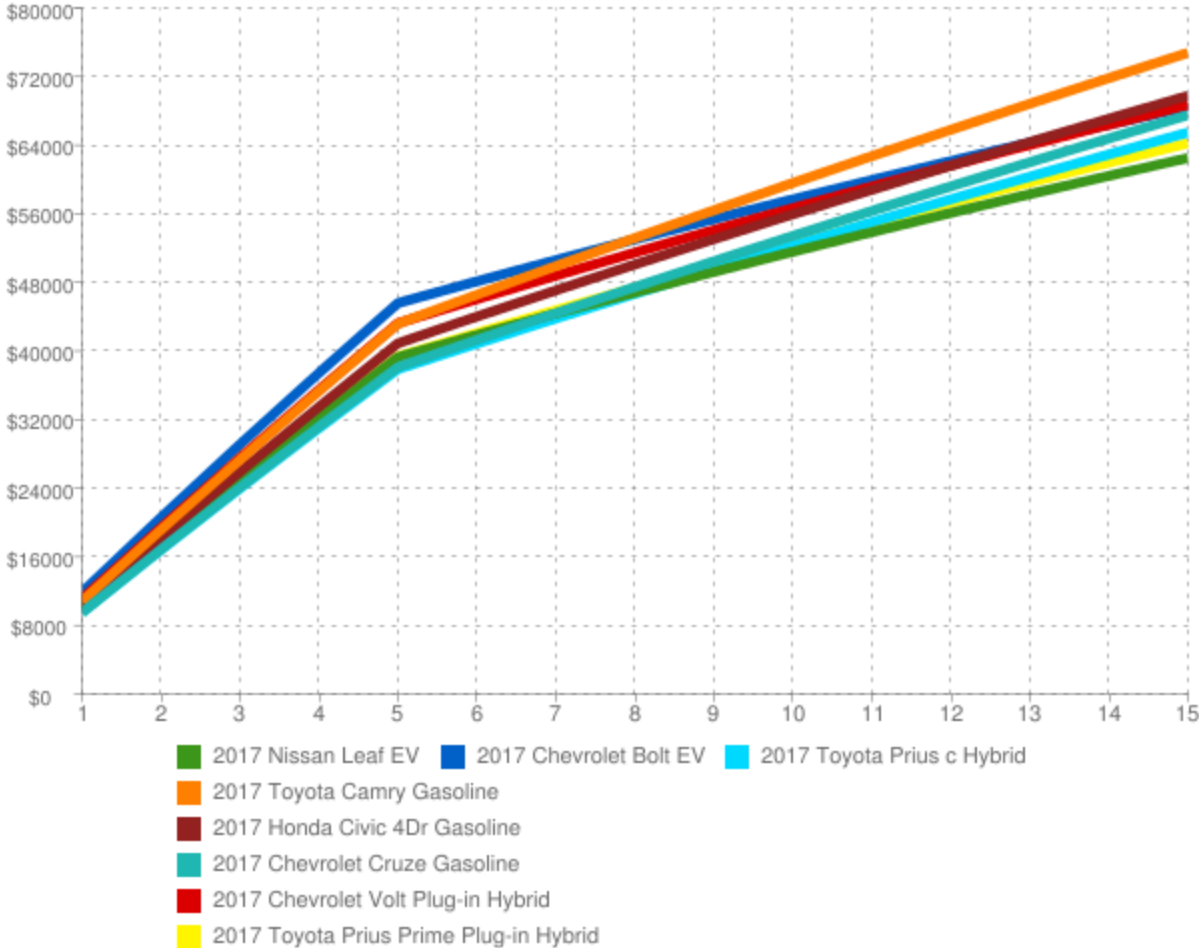
Credit ends beginning sixth calendar quarter.

Full Credit Amount			50% of Full Amount			25% of Full Amount			No Credit											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2010									2011											

- Other incentives may be available from manufacturers, local or state government and utilities.

# How much does it cost?

Cumulative Cost of Ownership by Year (Dollars)



Scenario:

- 15,000 annual miles
- Federal tax credit applied
- \$2.49/gallon

<https://www.afdc.energy.gov/calc/>

# Resources

- [www.afdc.energy.gov](http://www.afdc.energy.gov)
- [www.fueleconomy.gov](http://www.fueleconomy.gov)
- [www.plugincars.com](http://www.plugincars.com)
- [www.evtide.com](http://www.evtide.com)
- [www.autoalliance.org](http://www.autoalliance.org)
- [www.wicleancities.org](http://www.wicleancities.org)
- <http://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>
- [https://www.we-energies.com/business/energyeff/plugin\\_vehicles.htm](https://www.we-energies.com/business/energyeff/plugin_vehicles.htm)
- [https://accel.wisconsinpublicservice.com/environment/electric\\_vehicles.aspx](https://accel.wisconsinpublicservice.com/environment/electric_vehicles.aspx)

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