



FACT SHEET

Plug-In Electric Vehicles

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Did you know?

- Using electricity to power a motor vehicle would cost **the equivalent of paying less than two dollars a gallon of gasoline** at current electric prices. In some states, the equivalent cost would be under one dollar per gallon.
- A typical mid-size sedan, powered by electricity from the current U.S. grid, would have **the same carbon footprint as a car that gets 50 miles per gallon** of gasoline.
- Plug-in electric vehicles could be **on the market very soon**.

What is a plug-in electric vehicle?

“Plug-in” electric vehicles are cars or trucks that use electricity to move the vehicle’s wheels. Some or all of that electricity comes from the power grid -- from “plugging in.”

There are several types of plug-in electric vehicles. *Battery electric vehicles* do not use any gasoline or other liquid fuel; *all* electric power is supplied from the grid. Hybrid vehicles with plug-in capability (so-called *plug-in hybrids*) use a combination of grid electricity, regenerative energy from braking, and another onboard power source (an internal combustion engine is currently most typical, but a fuel cell or other power unit could also be used).

Plug-in hybrids can be engineered to use electric power in different ways. Some vehicles run on electricity alone at certain times, such as starting and maintaining a constant speed, and engage the engine when additional power is needed, such as accelerating or climbing.

Other plug-in hybrids use a blended system where the battery and the conventional engine operate together. An extended-range plug-in electric vehicle uses an internal combustion engine or fuel cell only to recharge the battery, but not to drive the vehicle’s wheels.

Plug-in electric vehicles are being developed and used in diverse applications – including commuter buses and utility trucks, passenger cars, and high-performance vehicles.

What are the advantages of plug-in electric vehicles?

Plug-in electric vehicles all share the ability to use electricity from the power grid to displace the petroleum used for transportation. Currently, 96 percent of the energy used for transportation in the United States comes from oil. Close to 70 percent of that oil is imported from foreign sources. This overdependence on oil poses a threat to U.S. energy security and economic competitiveness. The transportation sector also contributes more than one quarter of U.S. greenhouse gas emissions.

Expansion of plug-in vehicles into the consumer market would significantly reduce oil imports and substitute electric energy produced from domestic sources. At present, the U.S. electric grid is powered predominantly by coal, nuclear, natural gas, hydroelectric sources; renewable energy sources, however, are increasing rapidly as a share of the U.S. electricity sector. Even, with the current energy mix of the U.S. grid, electrification of the transportation sector would reduce overall greenhouse gas emissions as well as energy costs.

Electric motors are considerably more efficient than internal combustion engines, which lose much of the energy in gasoline through waste heat. Because of this superior mechanical efficiency, a typical mid-size sedan electric vehicle would have the same carbon footprint of a car that gets 50 miles per gallon and would cost the equivalent of paying less than two dollars a gallon (assuming a price of \$0.18/kwh, which is at the high end of current U.S. residential rates).

What are the challenges in bringing plug-in electric vehicles to market?

The primary challenge to expanding the market for electric drive vehicles centers on battery technology. A viable battery needs to be able to deliver sufficient power, hold a large enough charge, and be durable enough to meet the demands of consumers. Battery companies and vehicle manufacturers such as Chevrolet (Volt), Nissan, Toyota and Volkswagen are steadily making advances in battery performance and are currently testing vehicles and batteries in order to have a production vehicle in showrooms by 2010. In addition, several companies are doing conversions of existing hybrid vehicles into plug-in hybrids.

The federal government is supporting research, development and deployment. States and local government entities are also implementing programs and incentives for plug-in vehicles. Continued commitment and support from industry and government will be important to seizing the opportunity of plug-in electric vehicles and the benefits that increased electrification of the transportation sector will bring to our economy, national security, and global environment.

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