

# Electric-Drive Vehicles : History & Characteristics

## History:

The history of electric vehicles (EVs) is longer than that of internal combustion vehicles.

- 1937 - The first electric car was built in Scotland by Robert Davidson.
- 1892 - First production electric car created a sensation when exhibited in Chicago.
- 1899 - Belgian-built electric racing car "La Jamais Contente" set a world land speed record of 68 mph.
- 1910s - Electric vehicle's first heyday. Twenty companies were producing 6,000 EVs per year. They were a favorite of the women, because they were easy to start, clean, and quiet.
- 1928 - The introduction of the electric starter, started the decline of EV production in the U.S.
- 1973 - Oil Embargo and a resurgence of interest in electric vehicles.
- 1976 - Congress passed the Electric and Hybrid Vehicle Research and Development Act over protests from Detroit, and the veto of then President Gerald Ford.
- 1977 - Japan had 13,000 EV's in operation, Great Britain had 70,000 and the United States had 3,000 with projections of 25 million by the year 2000. Gas prices then lowered and the electric car declined.
- The 1980's saw the emergence of EV races. The Tour de Sol started in Switzerland in 1985. The World Solar Challenge started in Australia in 1987, the NESEA American Tour de Sol started in 1989.
- 1990's - Mandates to manufacture EVs so that states can meet clean air requirements

## EV Characteristics:

- Travel at normal road speeds.
- Acceleration comparable to gasoline cars.
- Range: 60-140 miles on a single battery charge. This characteristic makes them an excellent choice for "neighborhood vehicles," fork lifts, airport shuttle vehicles etc.
- Batteries are like the fuel tank. They store energy. There are many kinds of batteries with various characteristics and prices. Battery chemistries likely available in the next 10 years are advanced lead acid, nickel metal hydride, nickel iron, nickel cadmium. Battery that might store more energy per pound, but are not yet commercially viable include lithium ion, lithium polymer, zinc bromine, and Zinc-air.
- Other energy storage devices include the fuel cells and flywheels, which many claim have the capability of increasing electric vehicle range to over 300 miles.
- Environmental benefits: No emissions at the car itself
- Cost: EVs cost \$15,000 and up. Costs are projected to come down as sales volume increases
- Availability: Currently electric vehicles are well established in niche markets such as people movers in airports, ice smoothing machines, wheel chairs and fork lifts. Please see the annual NESEA Tour program for an up-to-date listing, or check out our web site: [www.nesea.org](http://www.nesea.org).

## Hybrid Electric Vehicle (HEV) Characteristics:

- Range: If they run on gasoline or other readily available fuels, they have the same range as a conventional vehicle
- Fuel Economy: Use less fuel than conventional vehicles

## HOW IT WORKS: Electric Vehicle (EV) with Solar Charging Station

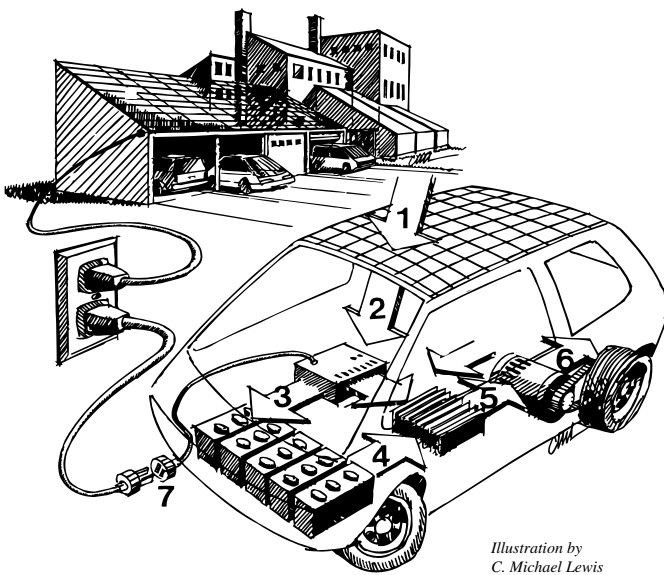


Illustration by  
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1. **Solar Panels** (photovoltaic cells) convert sunlight to electricity
2. **Computer** decided whether to store the electricity in the storage system in the car, or to send extra power to the "grid."
3. **Energy Storage System** may include batteries, supercapacitors, and/or a flywheel.
4. **Motor Controller** - A computer that sends electricity to the motor as you step on the accelerator. It will also enable the car to recapture energy during braking if a regenerative braking system is installed.
5. **Motor** - converts electrical energy to mechanical energy to power the wheels or vice versa, during regenerative braking. It may weigh as little as 10 pounds and be over 90% efficient.
6. **Drive Train** - transfers mechanical energy to the wheels through a differential, and sometimes a transmission.
7. **Charger** - enables the energy-storage system to be charged by plugging into the wall, or by home-mounted solar collectors. A charger may be integrated into the vehicle or separate.

**HYBRID VEHICLES (HEV)** are vehicles that have both an electric motor and a fossil fuel-powered internal combustion engine on-board. The engine, which can use gasoline, ethanol, biodiesel, diesel, compressed natural gas, or LP gas can generate electricity, or power the wheels directly. Most hybrid vehicles have regenerative braking, so they can recapture energy like an electric vehicle.