

Electric Vehicles

In 1891, William Morrison of Des Moines, Iowa, developed the first electric car. By the turn of the century, dedicated electric vehicles (EVs) outnumbered their gasoline-powered counterparts by two-to-one. Today, there are over 57,500 dedicated EVs in use in the United States, mostly in the West and South.

Rather than using gasoline, **electric vehicles** run solely on **electricity**. A battery stores the electrical energy that powers the motor. When a battery needs charging, EV owners can plug their cars into a charging station at home. A full charge can take four to eight hours, but there are options that allow for a faster charge, which only takes about 30 minutes. Fast charging stations will be public charging stations as they will be too expensive for home use. California currently has the most public charging stations available, but the number of public charging stations is quickly growing across the country. There are currently 9,980 electric charging units at public refueling stations.

The batteries limit the range of a dedicated EV, which is determined by the amount of energy stored in its battery pack. The more batteries a dedicated EV can carry, the more range it can attain, to a point. Too many batteries can weigh down a vehicle, reducing its load-carrying capacity and range, and causing it to use more energy. The typical dedicated EV can only travel 50 to 130 miles between charges. This driving range assumes perfect driving conditions and vehicle maintenance. Weather conditions, terrain, and some accessory use can significantly reduce the range.

Dedicated EVs, therefore, have found a niche market as neighborhood or low speed vehicles for consumers going short distances at speeds of 35 mph or less. However, this is changing. Tesla Motors has developed an electric sports car capable of accelerating 0-60 in 3.9 seconds and traveling 236 miles on one charge. The major car manufacturers have announced plans to put dedicated EVs on the market with a target range of 100 miles. By 2015, Nissan, Ford, Honda, Toyota, Chrysler, and Chevrolet all expect to have EVs available to consumers. Nissan's Leaf electric vehicle is one of the first to be mass produced and marketed in the United States.

The batteries most commonly used in new EVs are lithium-ion. Nickel-metal hydride batteries are also found in some electric vehicles. Extensive research is being conducted on advanced batteries such as lithium-polymer and lithium-air batteries. Such advanced batteries could double the current range of electric vehicles, reduce the cost of batteries, and hold promise for being longer lived.

Environmental Impacts

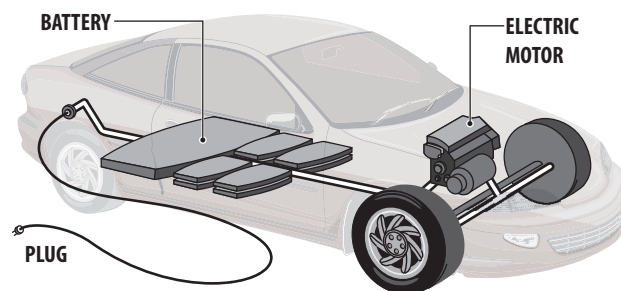
Dedicated electric vehicles produce no tailpipe emissions, but producing the electricity to charge them can produce emissions. EVs are really coal, nuclear, hydropower, oil, and natural gas cars, because these fuels produce most of the electricity in the U.S. Coal alone generates nearly half of our electricity. When fossil fuels are burned, pollutants are produced like those emitted from the tailpipe of a gasoline-powered automobile. Power plant emissions, however, are easier to control than

2011 NISSAN LEAF ELECTRIC VEHICLE



Image courtesy of Nissan

How an Electric Vehicle Works



Electric vehicles store electricity in large battery banks. They are plugged into a wall outlet (either a 240-volt or standard 120-volt) for several hours to charge. An electric motor powers the wheels, and acts as a generator when the brakes are applied, recharging the battery.

tailpipe emissions. Emissions from power plants are strictly regulated, controlled with sophisticated technology, and monitored continuously. In addition, power plants are usually located outside major centers of urban air pollution. Using electricity generated from renewable energy produces near zero emissions.

Driving EVs in more populated cities will help decrease the emissions in that city and will help reduce petroleum consumption.

Maintenance

The low maintenance of dedicated electric vehicles is appealing to many consumers. Dedicated EVs require no tune-ups, oil changes, water pumps, radiators, injectors, or tailpipes, so no more trips to the service station.