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Electric Cars: The Shocking Truth

Introduction

Electric cars are vehicles powered by an electric motor. They usually run on batteries that can be recharged through an electrical outlet. They produce no pollutants, run virtually silently, and don't consume even a drop of gas. They are one possible solution for our petroleum chugging nation. Americans guzzle 390 million gallons of gas each day, and just one gallon emits 20 pounds of carbon dioxide into our planet's atmosphere (Fletcher). Electric cars might just be the relief America needs.

History

The first true electric car was actually built around 1842. It was a very crude version featuring non-rechargeable electric cells. By 1859, a more advanced battery was developed. It was an early version of today's common lead acid batteries, and it had the essential ability to be recharged and discharged repeatedly (Petroski). Several upgrades were made by Gaston Plante and Camille Faure in 1865 and 1881, respectively. Both increased the storage capacity and allowed for the spreading popularity of the electric car (The History of Electric Vehicles).

Americans began to focus on the electric car as a viable option around 1895. By 1897, the Electric Carriage and Wagon Company of Philadelphia had built a fleet of electric taxis for New York City. Other cars were for private use. One such example was the 1902 Wood's Phaeton, which had a range of 18 miles and a top speed of 14 miles per hour. The price tag:

$2000. In the early years of the 20th century, electric cars were favored over the internal combustion vehicles and outsold them. This occurred due to some specific advantages the electric cars had such as a lack of annoying noise, vibration, or smell. They also did not require a gear change, and did not need a manual start up via hand crank.

An early electric vehicle

By the 1920's the popularity of the electric car began to wane. The road system was vastly improved, providing routes to farther destinations. This incited a demanded for cars with a longer range. The discovery of crude oil in Texas caused prices of oil to drop to a more affordable rate. The invention of the electric starter in 1912 by Charles Kettering put an end to the quirk of manual startup. Once Henry Ford began his mass production of the internal combustion engine, his cars could be sold for as little as $500 to $1000. The internal combustion vehicle became the clear favorite. By 1912, gasoline powered vehicles numbered 900,000 in America, compared to the number of electric vehicles, which was a mere 30,000 (Petroski). Due to these shortcomings, the electric car practically fizzled out of existence for the next 40 years.

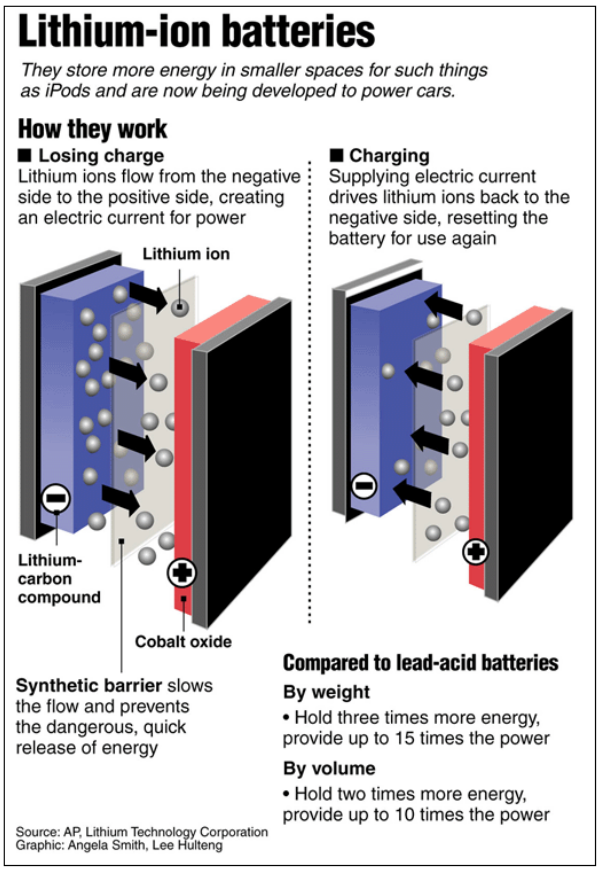
Then came the 1960's and 1970's and with them, a rebirth of the electric car. A renewed interest emerged in the later 20th century due to a need to control emissions of harmful pollutants from internal combustion cars and to reduce dependency on foreign oil. Several companies developed small electric cars in hopes of aiding this change. One was the GM EV-1. It was the first electric car produced by a major car company. The EV-1 was only available in California. It was powered by lead acid

The GM EV-1, the first electric car produced by a major automaker.

batteries, had a range of 80 miles and a top speed of 80 miles per hour. It was removed from the market in 2003, which caused a large amount of controversy, and the program was officially cancelled.

How electric cars work

Although they may sound complex, electric cars are much simpler than gasoline powered cars. Their motor has only one moving part: the rotor shaft. The rest of the motor remains stationary and runs virtually silently. The system is all electrical and requires less maintenance overall.



A diagram showing how lithium-ion batteries work

At the heart of the electric car is the battery. This is equivalent to the fuel tank of a gasoline car; it is the power source. Many different types of batteries have been used and experimented with. Earlier batteries were lead acid. Lead acid batteries were invented in 1859 by Gaston Plante (Lead-Acid Battery Resources). Unfortunately, this type of battery is very crude and inefficient (it has the second lowest energy-to-weight ratio of commonly used batteries.) More efficient batteries have been developed recently, such as the nickel metal hydride batteries. These batteries are commonly found in today's hybrid vehicles like the Toyota Prius or Honda Civic. While lead acid batteries have a power-to-weight ratio of

about 180 watts per kilogram, nickel metal hydride batteries can have a ratio between 250 to 1000 watts per kilogram, meaning they are much more efficient. But the most promising of all battery technologies seems to be the lithium-ion batteries. With a power-to-weight ratio of 1800 watts per kilogram, these are some of the most efficient batteries invented to date. Certain kinds of these batteries are being tested for use in future electric cars. They work by using positive and negative terminals. Lithium ions, which are positively charged, are sent from one terminal to the other and back. Through this process electrons are jostled free and travel out from the battery into the circuits of the car. Once the electricity is created in the battery pack, it is used to spin the motor and turn the wheels.

One unique idea being tested by GM is an "extended range electric car." The Chevrolet Volt runs on primarily battery power with a small engine onboard just to recharge the batteries. It incorporates a lithium-ion battery pack that can take it up to 40 miles (the distance travelled by the average American in a day) on pure electric energy. When the batteries are low, the engine kicks in to supply power to the batteries. This can result in a fuel economy of 100 miles per gallon or more (Fletcher).

The Chevy Volt-an "extended range electric car"

Electric vs. Gasoline and what's next?

Throughout the years, electric cars have held a few advantages over gasoline cars. They are extraordinarily efficient. The typical internal combustion, in theory, is only around 30 to 35% energy efficient. On the other hand, an electric car's motor is 90% efficient, and the

batteries are at least 85% (Moore). This means that a greater percentage of the energy taken from the batteries directly produces motion of the motor and the car.

Other advantages are that electric vehicles operate almost silently, they produce no harmful emissions, and most importantly, they don't use any fossil fuels directly. There is, however, a small amount of indirect usage if the electricity being used to charge the batteries comes from a power grid powered by fossil fuels. But by using electricity produced by renewable sources, no fossil fuels are consumed.

With growing oil prices, melting oil caps, and instability in oil producing regions, electric vehicles are looking brighter. This was also the case some twenty years ago. The last energy crisis in the early 1980's brought about a fresh interest in the clean, efficient technology of electric cars. Many experts believed that when the oil prices rose then, it would spur the production of electric cars. It almost happened until oil prices collapsed and gas was cheap and reasonable again. Once more the need and interest in electric cars vanished. Now in this new energy crisis where oil is easily above $100 a barrel, the interest is back once more, and results may be produced this time. Many companies have already created time tables and deadlines or have at least hinted at production including GM, Nissan, Toyota, Mazda, Subaru, Hyundai and several others (Fletcher). This mass movement may actually prove effective unlike the tepid attempt some twenty years ago. The future may hold the electric car in high esteem.

Conclusion

Electric vehicles are clean and efficient machines. Although the battery technology has yet to catch up to the demands of the automotive industry, electric cars could be a very important new addition to the world. According to a study by the Electric Power Research Institute and the Natural Resources Defense Council, if electric cars take hold of even a small part of the market,

carbon emissions from vehicles could be cut by 3.4 billion metric tons by 2050 (Fletcher). A comparison was made that even if an electric car gets power from a coal source, the car would only produce 0.7 pounds of CO_2 per mile driven for every pound of CO_2 emitted by a gas powered car (Fletcher). Hydrogen power technology is still decades away from being feasible and hybrid cars are a miniscule improvement over today's cars. The electric car is the most reasonable choice and could very well reduce the consumption of fossil fuels and clean our polluted atmosphere. While not prepared yet, scientists and engineers will soon devise the ideal battery technology, and the electric car shall be the quintessential tool for protecting our planet.

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