

To fight global warming, we need to largely eliminate the internal combustion engine as a form of transportation. We need battery technology for this and to store electricity, because wind and solar power are intermittent. These technologies didn't appear out of thin air. Here's the story of their rise.

1800. Alessandro Volta invents a battery by stacking disks of copper and zinc.,

1859. Lead-acid battery invented by Gaston Planté in France.

1888. Andreas Flocken designs the Flocken Elektrowagen, with one-horsepower engine and a top speed of 9 mph. In the early 20th Century, the Model T establishes market dominance by gas cars, and they all but disappear by the Great Depression.

1950s-1960s. Researchers discover that lithium could potentially be used in batteries.

1974. Stanley Whittingham, a chemist at Exxon, patented batteries using lithium as one electrode and a titanium compound as the other. Construction of the battery posed challenges, and Exxon gave up after it caught fire.

1979. John Goodenough patents battery using lithium cobalt oxide, which doubled the energy potential of the battery. In the meantime, Armand's research group investigated the use of graphite for the other (negative) pole of the battery.

1985 Akira Yoshino of Meijo University in Nagoy, Japan, patents a battery using carbon (in the form of petroleum coke) as a pole of the battery, with cobalt oxide as the other, with lithium ions used as an ion to hold the charge.

1991. First commercial production of lithium-ion battery

1996. GM releases the EV1 which has a cult following but never takes off commercially.

1997. Toyota introduces the Prius, the first mass-market hybrid.

2003. Tesla incorporates.

2008. Musk becomes Tesla CEO after having become its biggest shareholder and pushing out its founders.

2009. Tesla receives \$465 million loan from the U.S. Department of energy.

2016. Tesla unveils its first mass market electric vehicle, the Model 3.

2019. Goodenough, Whittingham, and Yoshino receive the Nobel Prize in Chemistry for their work on batteries.

2024. there are an estimated 40 million EVs on the road globally, and over 40 Gigawatts of utility-scale electricity storage.