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Electric Cars: A Disruptive Model

EVs set to upset traditional car companies in 2020

B loomberg New Energy Finance (BNEF) predicts that by 2025, electric vehicles (EVs) will be cheaper than gas powered autos (known as internal combustion engines).

The blue line in the chart below represents the average price of gas-powered cars which is predicted to slowly increase going forward.

By comparison, the average price of the least expensive EVs has been falling substantially. The largest cost for electric vehicles historically has been the price of batteries. But because manufacturers are exponentially improving price performance in battery technology both in chemistry and density storage, the price of EVs is falling. The cost of battery technology has plummeted from $1,000 kilowatts per hour in 2010 to $209 in 2017.

In 2025, BNEF predicts that battery technology will hit the critical point of $100 per kWh where EVs will become cheaper than gas cars. However, at the Tesla shareholders meeting in June 2018, Elon Musk predicted that Tesla and Panasonic would achieve $100/kWh at the battery cell level by the end of 2018 and at the battery pack level by 2020.

That means EVs would become cheaper than gas powered cars in 2020 — a full five years before BNEF projects. The implications of this are profound.

For example, look at Tesla's Model 3 sales in September 2018. The Tesla Model 3 became the fourth bestselling car in the U.S. The other top cars all saw significant declines in sales volumes. If Tesla consistently achieves its production run rate goal of 10,000 cars per week (40,000 per month) it will be the bestselling car in the U.S.

Electric vehicles are already cheaper than gas powered cars when you look at both the capital and operating costs. It's not just that electricity costs a tiny fraction of gas — it's also the savings on service. An electric vehicle has only 20 moving parts compared to the 200 in an average gas engine. So EVs don't break down as often and don't require services like oil changes. And an EV can run for one million miles.

To Wrap Up

Due to recent controversy and a U.S. Securities and Exchange Commission investigation, some analysts have questioned whether Tesla can survive.

What will happen to the auto market in 2020 when the most affordable EVs become cheaper than gas-powered cars? Traditional car companies have been furiously making announcements about EVs. Volvo announced that 50 percent of its unit sales will be EVs by 2025.
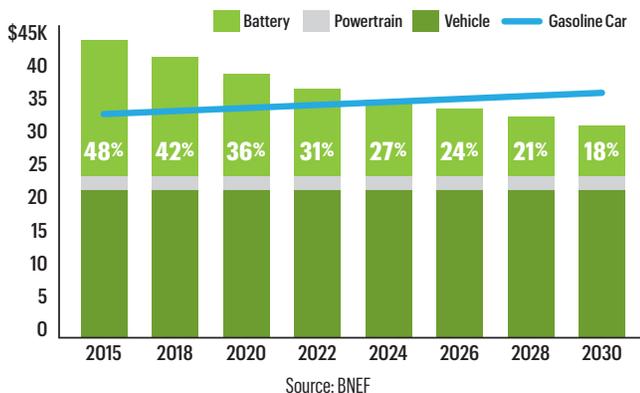
Globally, EVs only make up one percent of sales — so it's been easy for executives of traditional car companies to ignore this market. This highlights the classic challenge of disruption. Exponentially improving technologies remain below the radar for a period. But at one percent, a technology that is doubling in price performance every year — and a commensurately growing market adoption — only require seven more doublings to hit 100 percent.

By the time you can see the trend at one percent, it's too late. If car companies take eight years to develop a new model and the only cars purchased by the mass market in 2025 are EVs, traditional car companies may also produce EVs.

That said, currently federal and state fuel taxes generate $44 billion a year to pay for roads. As fossil fuel powered car sales decline, legislators will look for new ways to raise taxes — such as a tax per vehicle mile travelled. It's important to note, this will also increase the operating cost of EVs. ∎

Electric Cars Will Win on Price
Falling battery prices undercut gasoline cars by mid-2020s

Legend: Battery | Powertrain | Vehicle | Gasoline Car

Percentages by year: 2015: 48%, 2018: 42%, 2020: 36%, 2022: 31%, 2024: 27%, 2026: 24%, 2028: 21%, 2030: 18%

Source: BNEF

Trend Data for Battery Pack $/kWh
Tesla vs. Market Average (BNEF research)
Cost Axis is Log Scale, dashed lines are estimated data

Legend: BNEF Outlook $kWh | Tesla/Panasonic $kWh | Affordable EV @$90/kWh | Economy EV @$60/kWh

Battery Pack Cost $/kWh

Source: EV Obsession