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Electric Vehicle Technology Part I

The Promise, Pitfalls, Adoption Benefits, and Challenges

Editor's Note: This is the first in a 4-part series from McBride Consulting covering the promise, pitfalls, and adoption of Electric Vehicles. The shift from internal combustion engines to battery powered conveyance will be highly consequential for societies around the world. This shift offers many advantages, but it is not without tradeoffs for the planet and challenges for individuals and governments alike. In this series, McBride consultants examine the good, bad, and uncertain aspects of the biggest change to wheeled transportation in over 100 years and the impacts it will have on all of us.

The internal combustion engine (ICE) and automobile have a storied and entwined history, dating back to their inception by Karl Friedrich Benz and Gottlieb Daimler in 1886. In the last 137 years, that original creation born of the industrial revolution, has undergone a technological evolution. Modern automobiles are as much computer as machine and yet the principles behind their thrust have gotten more efficient but fundamentally haven't changed in over a century. That is beginning to change, however, with the widespread adoption of electric propulsion system replacing traditional ICEs in more and more automobiles each year.

The growth of the electric vehicle market, which comprised 6% of total new US auto sales in 2022¹, is driven not only by the perceived environmental benefits of the technology but by its versatility. Particularly in urban and dense population centers, the promise of electric vehicles, or EVs, truly shines. Namely, the need to never worry about stopping at a refueling station again since the average EV range in 2022 was 291 miles and that number continues to climb². For the

¹ PBS: Analysis: Boosting EV market share to 67% of new sales is a huge leap, but automakers can rise to the challenge:

<https://www.pbs.org/newshour/economy/analysis-boosting-ev-market-share-to-67-of-new-sales-is-a-huge-leap-but-automakers-can-rise-to-thechallenge#:~:text=EVs%20market%20share%20for%20light%2Dduty%20vehicles%20in%20the%20US&text=Lines%20show%20a%20quick%20>

² Bloomberg: US Electric Cars Set Record With Almost 300-Mile Average Range: <https://www.bloomberg.com/news/articles/2023-03-09/average-range-for-us-electric-cars-reached-a-record-291-miles#xj4y7vzkg>



extended excursion, charging has become easier as well with \$2.5B allocated to build 500,000 new public charging stations nationwide in the recently passed Bipartisan Infrastructure Law³.

Electric vehicle owners can also expect to save on average .04 cents per mile in maintenance costs over the life of their purchase⁴. These savings equate to about \$600 a year or \$3,000 over five years for the average 15,000 mile a year driver. Having removed most of the moving parts in an ICE, including spark plugs, valves, starters, mufflers, and belts, EV patrons can expect far fewer surprises at their scheduled automotive services. Even the ubiquitous oil change will cease to be a nuisance for EV drivers. A simple cost/benefit analysis points to a bright future for EVs and given their ecological bonafides as well, their usage is set to speed into the future.

There are many tangible benefits to automotive makers too. EV companies will be less exposed to gas price volatility and with a more secure cashflow model, EV automakers could entertain investments that were previously too risky. Even the greatest source of consumer anxiety – the electric vehicle range - could be translated to compelling business opportunities by situating charging stations in strategic areas to reinforce prospective business partnerships with non-vehicle companies. Consider a scenario, for example, where charging stations are stationed adjacent to retail shopping centers, thereby creating potential downstream revenues.

It is also critical for companies to be ahead of the times and support market demand. Electric vehicle sales have increased tenfold in less than a decade and some by some estimates EVs will represent 40% of US sales by 2030⁵, demonstrating consumers are interested in the product's cost savings. A significant element of this demand is concentrated in China which could open doors to expanding into one of the largest global economies. There are also regulatory factors at play, with governments seeking to induce organizations to go electric⁶. Rather than acting reactively to regulatory enforcements that will invariably lead to inefficiencies and higher costs, it is better to act preemptively. This too will entail tangible savings as governments use non-punitive incentives to promote EVs in the form of subsidies and rebates.

As EVs are simpler to make, with fewer moving parts and little maintenance relative to ICE alternatives, opportunities for economies of scale are real. EV companies will require fewer maintenance staff and further reduce their geographic production risk with fewer complex parts to import. This affords better chances at vertical integration, with a strong likelihood to increase cost savings. In 2014, projections indicated a potential \$9.73 trillion in net savings globally from higher usage of electric vehicles. These savings will be felt both by consumers and companies. As transport emissions are second only to electricity generation⁷, making this shift to EVs is not only beneficial to each stakeholder's bottom-line, but their responsibility to do so.

Be on the lookout for the second part of this series where McBride consultants examine the pitfalls of EVs and tradeoff costs associated with transitioning from internal combustion to electric powered vehicles.

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³ DOT: Biden-Harris Administration Opens Applications for First Round of \$2.5 Billion Program to Build EV Charging in Communities & Neighborhoods Nationwide: <https://highways.dot.gov/newsroom/biden-harris-administration-opens-applications-first-round-25-billion-program-build-ev>

⁴ Forbes: By The Numbers: What It Costs To Maintain An Electric Vehicle: <https://www.forbes.com/sites/jimgorzalany/2022/10/06/by-the-numbers-what-it-costs-to-maintain-an-electric-vehicle/?sh=72fbc11564d3>

⁵ Charging into the future: the transition to electric vehicles <https://www.bls.gov/opub/btn/volume-12/charging-into-the-future-the-transition-to-electric-vehicles.htm>

⁶ Policies to promote electric vehicle deployment <https://www.iea.org/reports/global-ev-outlook-2021/policies-to-promote-electric-vehicle-deployment>

⁷ Drawdown, 142