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Sector Insights

TRANSFORMATIVE INNOVATIONS AFFECTING THE INDUSTRIAL COMPLEX

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KEY POINTS

- Innovations in artificial intelligence (AI) and energy storage are upending industries traditionally viewed as immune to the rapid change and business model disruption that has characterized the technology sector.
- A confluence of machine learning and stronger computing power is creating the potential for a fully autonomous vehicle, while declining battery and electric vehicle (EV) powertrain component costs will eventually make EVs more affordable than vehicles with internal combustion engines.
- At the same time, AI will help facilitate a more reliable, flexible, and secure energy grid that will integrate renewable resources and storage at a reasonable cost.
- These trends do not happen in isolation, and our analyst teams frequently collaborate to identify which companies are poised to win or lose as these technologies reshape sectors.

Innovations in artificial intelligence (AI) and energy storage are not yet seamlessly integrated into day-to-day life, and thus the full extent of their transformative power remains underappreciated by consumers and investors alike. However, advancements in these technologies are increasing their effectiveness while lowering costs at an impressive rate. We believe that the day is approaching when these burgeoning technologies will reshape industries traditionally viewed as less susceptible to business model disruption.

AUTOMOTIVE COMPANIES WILL SOON BE FORCED OFF THE BEATEN PATH

The automotive industry faces disruption on two fronts. First, a confluence of machine learning and cheaper and stronger computing power is creating the potential for a fully autonomous vehicle. This presents several challenges for traditional automakers and original equipment manufacturers (OEMs).

For starters, machine learning and robust computing power are not these firms' core competencies, thus they are exposed to new entrants. Additionally, the business model of selling cars to individual customers—a model around which the automotive industry is structured—can be disrupted in a world where that car can drive itself.

"Autonomous vehicles should significantly push down the cost per mile for ride-hailing services, and as this happens, consumers will begin to weigh the cost of owning a car versus the cost of using a company's fleet," comments Joel Grant. "Families, for instance, could decide to own one car instead of two—if they decide to even own one at all."

This better economic model is further supported by auxiliary benefits, such as increased safety and freeing up drivers to do other things. Focusing on the passenger experience is yet another area in which automakers are not experts.

At the same time, declining battery and electric vehicle (EV) powertrain component costs are on a path toward making EVs a more affordable option than vehicles with internal combustion engines. EVs currently cost approximately USD $10,000 more to produce than a combustion engine car. In about 10 years, improved battery chemistry, specifically NMC 811 lithium battery technology, is projected to drive down EV costs to a point where a combustion engine car will cost approximately USD $5,000 more to produce. The lower upfront cost for an EV coupled with greatly diminished operating costs—no more oil changes or visits to the gas station—will become impossible to ignore for most consumers.

"Traditional automakers and OEMs have very little content on EVs. Currently, their intellectual property on a car is centered on the transmission, powertrain, and drivetrain," Joel explains. "The electrification of vehicles significantly reduces the prominence of these technologies."

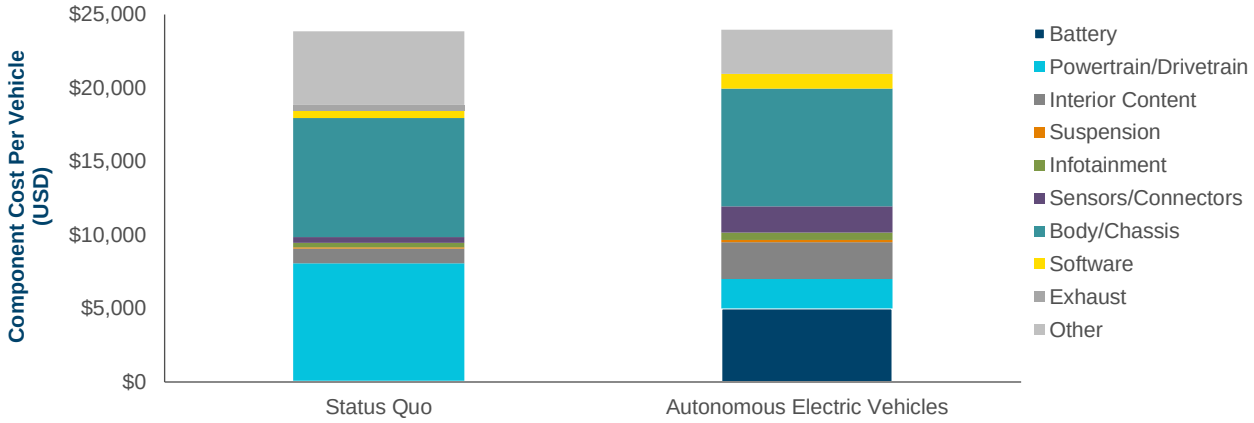
According to Joel's estimates, OEMs that do not contribute a part of the EV powertrain will see their value as a percentage of total cost of the car cut by approximately 60%, with more of the total car value contained in the battery. Such an environment could be closer than the market appreciates.

An aggregation of third-party forecasts points to EVs accounting for approximately 10%–15% of sales in 2025, but Joel thinks the reality will be the other way around—only 10%–15% of consumers will want to buy a combustion engine car at that time.

"The broad consensus is that EV adoption will be gradual, but I believe we'll witness more of a tipping point in adoption. EVs' lower relative cost and auxiliary benefits alone make them appealing. This is compounded by the increased rate at which combustible engine cars will depreciate because of the clear path for EVs to be a larger portion of the fleet."

Figure 1: Autonomous Electric Vehicles Will Transform the Automotive Supply Chain

As of March 31, 2018



Source: T. Rowe Price analysis.

The rate limiting factor, Joel argues, will be the ability to add battery capacity—not consumer demand.

“We’re still at the early stage of people appreciating the transformative nature of EV propulsion.”

WINDS OF CHANGE ALSO MOVING THROUGH NATURAL RESOURCES SECTOR

The natural resources sector is not immune to these same technologies. Here, AI is manifesting itself in smart grid technologies that enable utility companies with automation and self-healing.

“Big data will be increasingly beneficial to utilities,” explains Ryan Hedrick. “Ultimately, these companies will have more information to help manage demand more precisely, reduce peak needs, and provide the predictive analytics to determine when an outage is likely to occur. This helps improve reliability while reducing costs.”

Relatedly, AI can help utilities navigate increasing cybersecurity threats. This will likely continue to be an area of focus due to the sheer amount of critical infrastructure that runs on electricity—an amount that is expected to expand.

Improved energy storage technologies will also accommodate much more renewable energy penetration because they can significantly reduce intermittency issues, which have long plagued renewables. In doing so, electrification will be delivering energy in a way that is more reliable, safe, secure, flexible, and clean. Utilities will play an important role in enabling the widespread adoption of EVs through individual services and infrastructure upgrades.

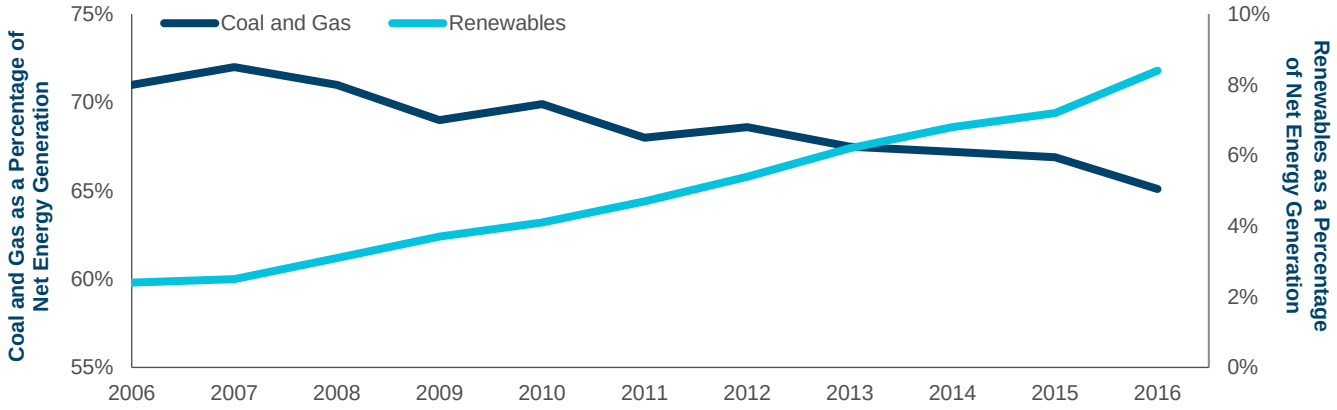
“In total, these technologies are going to help utilities have lower cost profiles, which should alleviate some of the bill pressure and enable capital investment that grows earnings,” said Ryan. “I think the transmission and distribution model in particular will be validated with electrification trends.”

Renewable energy prices are declining in the midst of these technological developments. Since 2010, renewable costs in the U.S. have fallen by 70%, and Ryan expects further cost reduction. For instance, evidence suggests that wind is among the cheapest sources of new power in the U.S. in some regions, even without subsidies. Healthy subsidies over the next several years will help accelerate wind adoption, while more advanced turbines and enhanced blade designs will lower overall cost and increase output. Solar costs, while still higher than wind, have been declining at a faster rate.

“If you have a business model today that relies on high or volatile energy prices,” Ryan notes, “it could be a more difficult environment in the future.”

Figure 2: Renewables Are Gaining Share

As of March 31, 2018



Source: Energy Information Administration.

COLLABORATION HELPS ANALYZE HORIZONTALLY ENABLING TECHNOLOGIES, LIKE AI

These trends do not happen in isolation, and our analyst teams frequently collaborate to identify which companies in a particular sector are positioned to win or lose as technologies reshape sectors. For instance, our global natural resources team incorporates Joel's bullish EV adoption models into its supply/demand commodities forecasts. More broadly, our automobiles, industrials, and natural resources analysts recognize that AI is a common denominator behind significant changes within these sectors, and they actively seek out insights from our technology portfolio managers and analysts.

"AI will become a horizontally enabling technology. As it is more and more deeply integrated into our daily lives, companies with a competitive advantage in this area stand to emerge as major beneficiaries," observes Paul Greene, "but these firms will also enable companies with AI needs but which lack AI expertise."

Paul believes that success with AI depends on four main pillars:

- Access to talent
- Access to data
- Strength of computing infrastructure
- Depth of applications to which AI can be applied

"AI has been around for a long time, but people didn't immediately recognize its potential," Paul observed. "As a result, there is a shortage of true AI experts. If you look at citations in academic research and other publications, you get an idea of who these individuals are, and you quickly observe that a sizable portion of them work at Alphabet, Google's parent company."

Paul argues that Alphabet has strengths across all four pillars. In addition to its talent, the company collects data through a range of products and services, operates on the cutting edge of computing, and benefits from seven applications with over a billion users each, including Google Search, Android, and YouTube. Not all companies will have AI as a core competency to the same extent, but Paul believes that they will still benefit from the technology.

Looking ahead, many companies will have unique applications that AI could enhance and proprietary data sets that could help inform AI. More often than not, Paul says, these companies will fall short in the strength of their computing infrastructure and their access to talent. AI-capable firms will help fill in these gaps.

We're already witnessing this within the public cloud computing industry. Leaders such as Amazon Web Services, Azure, and Google Cloud are providing access to computing power in a low-friction, highly scalable way that will be accessible to all companies. Many of these same firms are also developing tools that will enable companies to use AI without in-house experts.

"It will take time before the AI tools being developed today will reach a point when they can replace raw AI talent," Paul notes, "particularly for large-scale AI projects. For example, addressing the complexities in autonomous vehicles still requires the very best talent—and a lot of it."

CONCLUSION

T. Rowe Price's investment process, which is rooted in close collaboration between research analysts and portfolio managers, is well positioned to fully assess the sweeping impact of these powerful technologies. Much like new innovations feed on each other, our research analysts and portfolio managers actively share research, debate possible outcomes, and attend company visits together so that they can uncover valuable investment insights across industries and sectors.

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