

ClearBridge

Investments

ESG Investment Program



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Key Takeaways

- ▶ Comparing electric vehicles (EVs) to conventional gas vehicles, the climatic impact over the whole life cycle of EVs is positive under all power generation scenarios.
- ▶ As total ownership costs of EVs continue to fall, commercial adoption will be a watershed moment for environmental impact and operational savings for many companies.
- ▶ We are working with portfolio companies, both makers of EVs and those in the supply chain, to promote sustainable and fair production and consumption of EVs.

Electric Vehicle Opportunities and Challenges

Carbon emissions from vehicles contribute significantly to global warming, and the transportation sector is one of the larger contributors to greenhouse gas emissions (GHG) in the U.S. As institutional investors seek to offset and mitigate the rising levels of carbon and other GHGs, electric vehicles (EVs) are an increasingly viable solution. With sales of EVs growing faster than predicted a few short years ago, the outlook for EV production and adoption is becoming increasingly robust (Exhibit 1).

We think greater consumer and commercial adoption of EVs will bring environmental benefits as well as financial opportunity for both manufacturers and users and throughout the EV supply chain. It will also involve environmental and social challenges, and we are working with the companies we own, both makers of EVs and those in the supply chain, to help make sustainable and fair production and consumption of EVs possible.

Exhibit 1: EV Sales Among Select Mid-Size Premium Sedans



As of Dec. 31, 2018. Source: ClearBridge Investments, insideevs.com and company reports. Select competitors include: Mercedes C, BMW 3, Audi A4, Lexus IS, Acura TLX, Infiniti Q50, Volvo S60 and Alfa Romeo Giulia sedans.

Commercial Adoption of EV Will Be a Watershed

Much of the focus until now has been on consumer adoption of EVs. Consumers have several tax incentives to buy EVs, for example, but as EV technology improves and EVs become cheaper, tax incentives will be less important. Cost parity exists today between EVs and internal combustion engine (ICE) vehicles in terms of total cost of ownership in the luxury and premium segments, and mass market segments should approach parity as well.

But there is reason to shift focus to commercial adoption, because as total cost of ownership for an EV falls, EVs are becoming more feasible for commercial use. Shareholders of both fleet buyers and manufacturers are poised to benefit from greater commercial adoption. ClearBridge holding United Parcel Service, for example, is currently buying a fleet of 1,000 electric vans from Workhorse, a U.S.-based manufacturer of electric delivery and utility vehicles, part of an electrification effort that includes converting up to 1,500 delivery trucks to battery electric and initiating purchase of 125 Tesla Semi trucks and Daimler electric trucks. FedEx has also recently ordered 1,000 electric vans from California-based Chanje for use in commercial and residential pick-up and delivery in California.

Commercial adoption should help the bottom lines not just of logistics companies, but also of large consumer staples companies heavily dependent on transportation. Freight costs are one of the greatest areas of cost inflation among consumer staples companies such as ClearBridge holding Pepsico, which is ramping up its electrification efforts with 100 Tesla Semis on

Shareholders of both fleet buyers and manufacturers are poised to benefit from greater commercial EV adoption.

order. Other major consumer staples companies with Tesla Semis on order include Walmart and Sysco. As manufacturers continue to consolidate production in larger, more efficient plants, and retailers carry less inventory and demand delivery within ever more narrow time windows, transportation logistics become an increasingly important competitive advantage.

Commercial vehicles remain an underappreciated source of net-environmental benefit and investment opportunity. We encourage a diversified fleet and view several portfolio companies taking advantage of the increased feasibility of EVs in their operations as significant progress in moving toward sustainable transport.

Supply Chains Present Challenges

While EV adoption has clear environmental and economic benefits, there are also challenges, such as eliminating or minimizing the environmental and social impacts of sourcing critical metals used in batteries. EV batteries contain lithium and cobalt, metals whose production can present several supply chain risks, including environmental damage, forced labor and poor health conditions.

We are partnering with our portfolio companies both to establish responsible and efficient sourcing practices and to reduce reliance on rare earth minerals through innovation.

ClearBridge holding Umicore, for example, is a global materials technology and recycling company based in Belgium. During the year ClearBridge hosted several meetings with Umicore management, engaging the company on several ESG-related topics. One key area of focus in 2018 was the company's approach to sustainable procurement and ethical sourcing of raw materials. Umicore has been a worldwide leader in the recycling, transformation and marketing of cobalt since 1912 and is aware of the risks that are linked to the sourcing of cobalt.

Umicore not only manufactures cathodes for batteries, it also has a large recycling operation that provides some of the materials needed for cathodes and reduces the impact of materials sourcing by getting some materials like cobalt from internal recycling operations. Umicore is investing in battery recycling technology, which has the potential to be a large business for the company in the future. While there are not many lithium batteries in the market yet, once the fleet of EVs in use gets larger and older EVs get scrapped, Umicore wants to be ready to recycle the old batteries.

Where recycling has not been firmly established, Umicore has established top sustainable policies for ethical sourcing of cobalt. These include supply chain traceability to track the origin of cobalt raw materials at the mine level, plant visits and red flag

checks that eliminate suppliers engaged in any of several unacceptable practices, such as forced labor, child labor, hand-picking or artisanal mining, cruel or degrading treatment and corruption. Umicore is also committed to having its due diligence practices audited by independent third parties and the compliance report of the yearly audit is published as an integral part of Umicore's annual report.

Innovation also provides a path to solving EV supply chain challenges. In a ClearBridge visit with Tesla management in 2018, for example, we noted how Tesla is reducing its reliance on cobalt through the adoption of batteries from Panasonic that use more nickel in the cathode and more silicone in the anode material. We also discussed the eventual need for end-of-life battery recycling as part of the manufacturing facilities and observed Tesla Gigafactory's integrated recovery systems, which recover energy and save costs through regeneration braking in drivetrain testing and wastewater recovery.

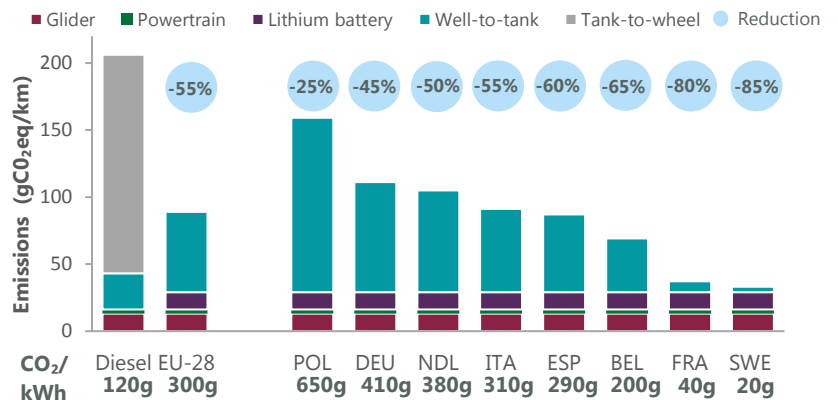
Well-to-Wheel, EV Benefits Add Up

Another challenge is the concern that the total carbon profile of EVs is potentially still significant, given the energy and resources required to build and power EVs. Often, however, these concerns are grounded on incomplete information. Examples of EV energy and resource use, for example, often focus on the energy and resources required to make batteries, but they ignore a comparison to the energy and resources required to make traditional powertrains.

A complete vehicle fuel-cycle analysis, or well-to-wheels analysis, however, shows numerous clear benefits of EVs, such as the elimination of tailpipe emissions from population centers. EVs are also simpler to manufacture and represent a resource and manufacturing savings. An EV has very few moving parts, and many manufacturers have stated that the manufacturing of EVs requires fewer assembly steps and worker hours compared to ICE cars.

EV adoption will have meaningful environmental benefits. While the life cycle impact of EVs compared to ICEs on climate should consider the nature of the electricity charging EVs (electricity may be generated by coal, for example, counteracting environmental gains of EVs), this impact is positive under any electric grid scenario. There are many academic studies comparing the EV versus ICE impact on the environment throughout the life cycle of a vehicle: from materials extraction to end-of-life recycling. One study concludes that even in the "dirtiest" grid (coal power) a fully electric fleet would result in 25% GHG emission reductions versus a diesel fleet (Exhibit 2).

Exhibit 2: EV Climate Impact Beneficial Under Any Energy Mix



As of Oct. 2017. Source: Maarten Messagie, Vrije Universiteit, Brussels.

In terms of charging, although it is still in an experimental phase, EV adoption could help balance the grid. Most EVs are charged at night, during off-peak hours, when utilization of the power grid is very low and much of the produced electricity is simply wasted as many power plants are not easy to shut down. By charging at night, EVs improve the utilization of the power fleet. Additionally, energy stored in batteries can be used to balance the grid at times of peak demand or power outages.

EVs represent a compelling business opportunity for portfolio companies that can also have significant environmental benefits, and institutional investors are playing a growing role in pushing EVs forward. ClearBridge is a long-standing member of the Investor Network on Climate Risk (INCR), which has organized biennial summits on climate change at the United Nations for institutional investors to convene on how to apply private capital solutions to global warming. Both business opportunities and environmental benefits look poised to increase as EVs are adopted for commercial use. Commercial adoption should also reinforce the need for innovation in battery technology, reducing the need for rare materials and increasing the effectiveness of battery recycling. We will continue to engage with our portfolio companies to foster greater consumer and commercial EV adoption and address the challenges that the EV supply chain presents.

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