

PWM Research Insights and Ideas

Electric Vehicles: Understanding the Market Opportunity and Ways to Play It

As EV investing reaches a fever pitch, we seek to help investors understand the market opportunity and differentiated ways to gain exposure to the sector.

PWM Equity & Fixed Income Research

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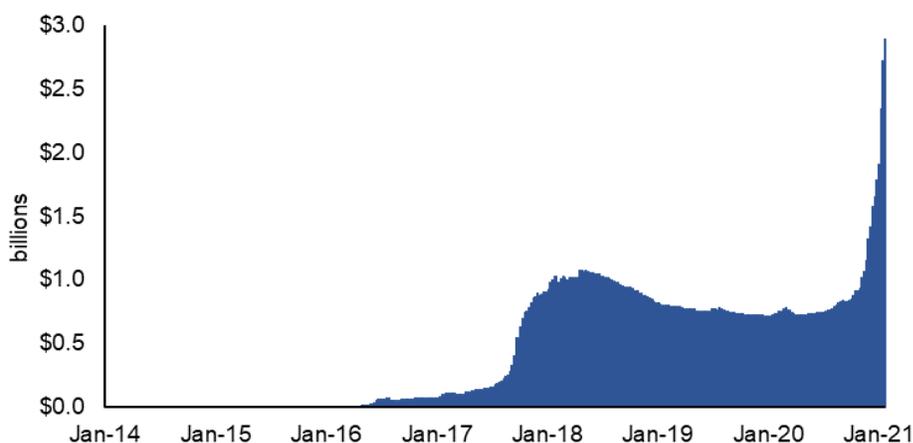
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ELECTRIC VEHICLES: A CRAZE OR IS THERE MORE TO IT?

EV continues to be one of the buzziest buzzwords in investing these days, and if you feel like you missed Tesla, don't worry—you're not alone. Although the topic of electric vehicles has been gaining prominence for a decade, 2020 was the year the space saw significant inflows.

While by no means an exhaustive measure of EV capital formation that has taken place since the end of 2019, EV-related ETFs have seen over \$2 billion in cumulative net inflows since the end of 2019 (see Figure 1). Vehicle electrification is disrupting not just the auto industry, but also much of the automotive and industrial supply chains. In this primer, we outline the underlying market opportunity for EVs and discuss ways to play the EV trade beyond just the obvious few publicly-traded EV manufacturers.

Figure 1: Cumulative EV-Related ETF Inflows



Source: Strategas

WHAT DOES “EV” REALLY MEAN?

Companies talk broadly about the EV opportunity, which generally includes both Battery Electric Vehicles (“BEVs”) and Hybrid Electric Vehicles (“HEVs”). This distinction is important given industry data sources often interchange stats on “pure” EVs (meaning BEVs) and the broader EV landscape (which includes HEVs)—and can have implications depending on where in the EV ecosystem you are investing. For the auto and industrial supply chains, BEV and HEV are somewhat interchangeable given both can be revenue accretive opportunities. However, for automakers, depending on their strategies, this distinction matters. For example, Tesla only makes BEVs, meaning its vehicles are powered by batteries and electric motors, compared to a hybrid that uses an internal combustion engine (ICE) in conjunction with batteries and electric motors. In our discussion below, when we talk about EVs, our definition will include both BEV and HEV, unless otherwise noted.

SIZING THE EV OPPORTUNITY

COVID caused the global automotive industry to contract to an estimated ~70 million vehicles in 2020 (from 87 million vehicles in 2019), the industry is likely to recover to above-2019 levels in the medium-term. While EVs represented 3% of

global light vehicle sales in 2019 and EVs grew an estimated 25% in 2020, reaching 4% of the 2020 sales mix. Forecasts suggest that EVs could ramp to more than 30% of the global sales mix by 2030.

While the transition to EV was already underway prior to 2020 given stricter carbon emission regulations in Europe and government incentives in China, 2020 EV penetration surpassed even the most optimistic forecasts—primarily due to faster adoption in Europe. Some uptick in Europe was expected from new CO₂ emissions regulations enacted in 2020 because the targeted CO₂ reduction was not achievable via ICE efficiency improvements alone; electrified vehicles (both BEV and HEV) were always going to have to be a part of the solution to reduce CO₂. However, several European governments enacted EV subsidies in 2020 that resulted in faster EV adoption.

In addition to European CO₂ regulations, COVID-19 has accelerated the pace of EV adoption. Automakers spend roughly \$100 billion annually for capital investment, much of which is allocated to vehicle platform design and engineering. However, during the early stages of COVID when automakers were shoring up capital to ensure their ability to survive the downturn, companies had to make some difficult capital allocation decisions. As a result, numerous automakers

shifted their powertrain investment strategies to either reduce—or in some cases eliminate—their future investment in ICE powertrains. The net result is a faster-than-expected ramp in EV sales, though the most meaningful acceleration will be seen later in the decade. Industry sources now forecast that as much as 45% of European light vehicle sales mix to come from EVs in 2030 (vast majority from BEV); this compares to an estimated 7% share for EVs in 2020 (see Figure 2).

However, EV penetration varies by region. China had initially been viewed as the leader in EV adoption, but the reduction of EV subsidies caused demand to contract in 2020. Still, the Chinese government is targeting 20% of auto sales in 2025 to come from EVs. China's EV penetration stood at 5% in 2019 and is expected to finish at a similar penetration rate in 2020. However, by 2030, Credit Suisse estimates EVs could comprise 43% of the total sales mix (see Figure 3).

EV adoption in the U.S. has lagged behind both Europe and China, primarily a result of regulatory differences. As it stands today, the cost of a BEV typically exceeds that of a comparable ICE vehicle given battery manufacturing is still sub-scale compared to the rest of the automotive supply chain. While key players like Tesla have worked to bring down battery costs and close the gap with ICE vehicles somewhat, it is still cheaper, all else being equal, to purchase an ICE vehicle. EV subsidies or credits can help to offset the higher vehicle cost; reinstating or extending EV subsidies appears to be a policy

Figure 2: Europe EV Penetration Forecast

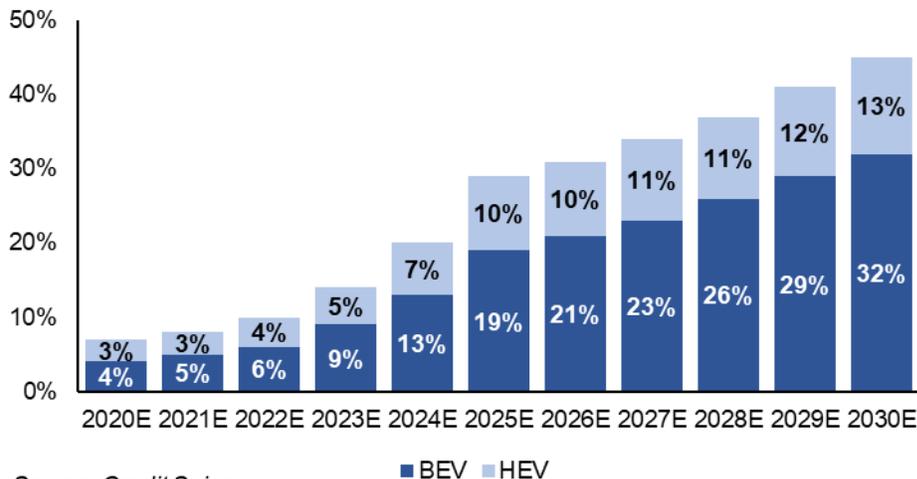
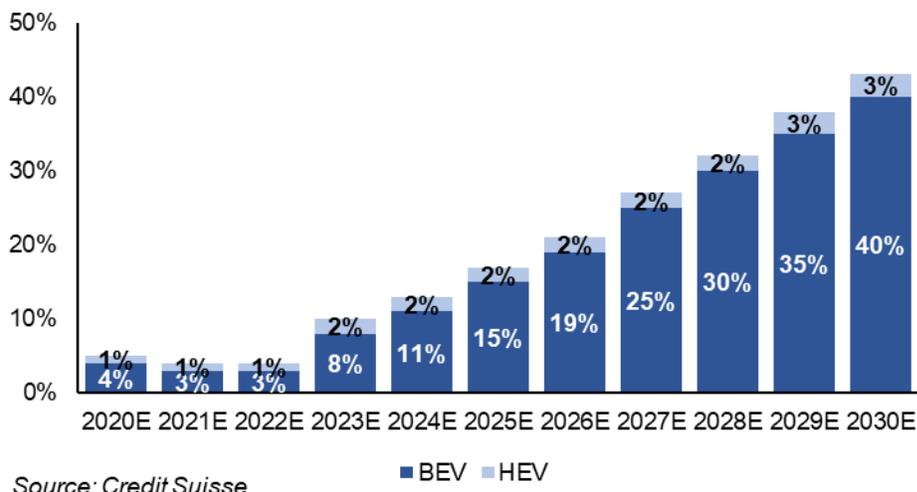


Figure 3: China EV Penetration Forecast



supported by the Biden administration. Any extension of these tax credits could facilitate faster EV adoption in the U.S., where EV penetration is expected to finish at just 2% in 2020.

RISKS TO EV PENETRATION REMAIN

In the previous sections, we discussed how a favorable regulatory backdrop in Europe drove a meaningful uptick in EV sales in 2020. As such, the regulatory backdrop remains a key consideration in the rate of EV adoption since it will determine how quickly EVs can achieve cost parity with ICE (via fines, credits/subsidies, or other measures). However, regulatory actions are not the only factors to consider when thinking about the potential ramp in EV sales. Other items to consider include: 1) battery costs, 2) lithium costs and the ability to source, 3) range, and 4) charging infrastructure.

- 1. Battery costs.** Battery costs are a key factor in determining the cost of a vehicle, as this can represent approximately one-third of total vehicle cost. Advances in the manufacturing process, economies of scale in manufacturing, and new/emerging battery technologies all represent potential ways to reduce the cost.
- 2. Lithium costs.** Today, lithium ion is the most common battery chemistry used in the production of EV batteries and is a key input in the battery manufacturing process. Lithium is extracted from brines through a process whereby the brine is pumped to the surface and slowly evaporates over a period of months. Given the intensive and specialized nature of the process, there are a limited number of lithium producers globally. However, lithium is still a commodity market; changes in the global supply and demand for lithium have an impact on battery costs.
- 3. Range.** Range anxiety is another frequently cited concern, specifically for BEVs. While range can vary by vehicle, ICE vehicles typically can travel ~350 miles on a single tank of gas. The comparable range for a fully charged BEV is often below 300 miles. Improvements in battery density, reductions in vehicle weight, and improvements in the energy consumption of the vehicle (e.g., optimizing the HVAC system) are all means to improving vehicle range, but this likely needs to improve to facilitate widespread adoption.
- 4. Charging infrastructure.** Tying into the previous point about range, the lack of EV charging infrastructure is another headwind to EV adoption, particularly in the U.S. For EV adoption to occur at a larger scale, charging infrastructure needs to be built out across the country (and across the globe) to ensure that a consumer can re-charge the EV as easily as he or she can refill an ICE vehicle with gas today. Significant infrastructure investment is needed to build out EV charging in the U.S., though we expect this to be included as a piece of any infrastructure package proposed by the Biden administration.

WAYS TO INVEST IN EV

While the four factors listed above are potential risks to EV adoption, these are also potential opportunities and areas for thematic investment. We see several different ways for investors to gain exposure to the space and its favorable secular trends, with areas of investment opportunity throughout the EV supply chain. Ultimately, the type of investment chosen will be a function of 1) the level of EV exposure desired, 2) risk tolerance, and 3) investment style decisions (e.g., high multiple growth plays vs. lower multiple value ideas). We start with the most obvious way to play the space, then work backwards in the supply chain.

Automakers. Auto OEMs (original equipment manufacturers) are the most direct way to gain exposure to the EV trend. However, we note there are few “pure plays” in the space, given EVs are a newer vehicle type. Virtually all automakers have some type of electrification strategy, with varying degrees of successful execution. Determining how much exposure to electrification a particular OEM has can be key to this investing strategy.

Automotive Suppliers. Any auto supplier that sells ICE components to an auto OEM undoubtedly has embarked on an electrification strategy. In an EV system, electric motors, gearboxes, and power electronics are the key components auto suppliers may supply to an OEM, as these components replace the internal combustion engine and the transmission. The battery is also necessary to provide stored power but is

typically supplied directly via battery manufacturers (which we will discuss separately). Electrification is only a small portion of most auto suppliers' business models today. For many auto suppliers (at least the best ones), the total revenue opportunity from EV components is greater than that of legacy ICE products; these auto suppliers are likely to see their EV mix of revenue grow over time.

Battery Manufacturers. Automakers and automotive suppliers have typically left battery manufacturing to larger conglomerates that specialize in battery cell production. We see battery manufacturing as a business that necessitates economies of scale, favoring a handful of large players. Still, as battery chemistries continue to evolve and as demand for cells increases exponentially, this is another way to gain exposure to the EV trend.

Lithium Suppliers. Today, lithium ion is the primary chemistry used in EV batteries, so naturally, lithium is a key input in the battery manufacturing process. The demand for lithium is expected to increase alongside the increase in EV demand, providing a way to play the input side of the EV equation. However, note that any breakthrough in battery technology that does not include lithium in the chemistry represents a meaningful risk to this market.

Charging Infrastructure. EV charging infrastructure is in its infancy in the U.S., though more investment has been made throughout Europe. Anyone who purchases an EV is likely to have a charging station installed at home, but publicly-available charging infrastructure is key to reducing range anxiety.

Tangential Plays. Many diversified industrial companies or technology companies have tangential exposure to the EV trend through the supply of goods or services that facilitate the manufacture, testing, or sale of EVs. For example, a diversified industrial company may supply automation equipment for EV production lines. Or a tech company may provide semiconductor testing equipment for EVs. While these typically represent low-single-digit percentages of total company revenue streams, these types of companies can provide an indirect way for investors to gain exposure to the secular trends surrounding EV without the lofty multiples currently associated with more direct EV investment.

Ultimately, there are numerous ways to gain EV exposure and there is no one-size-fits-all solution. But we think the EV transition is accelerating, with the potential to provide meaningful secular growth tailwinds for years to come.

Please reach out to your advisor to discuss in further detail. See the next page for important disclosures.

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