

CASE STUDY

The Electric Revolution

Our Emerging Markets team visited China for four months this year. In this piece, David Hao (Investment Analyst, Emerging Markets equities) shares the team’s observations on electric vehicles from their stay. Given that the adoption of electric vehicles affects many industries (such as auto dealerships, auto component suppliers, and energy production companies) that we invest in, across many geographies, David also presented these findings to the rest of our Investment Team.

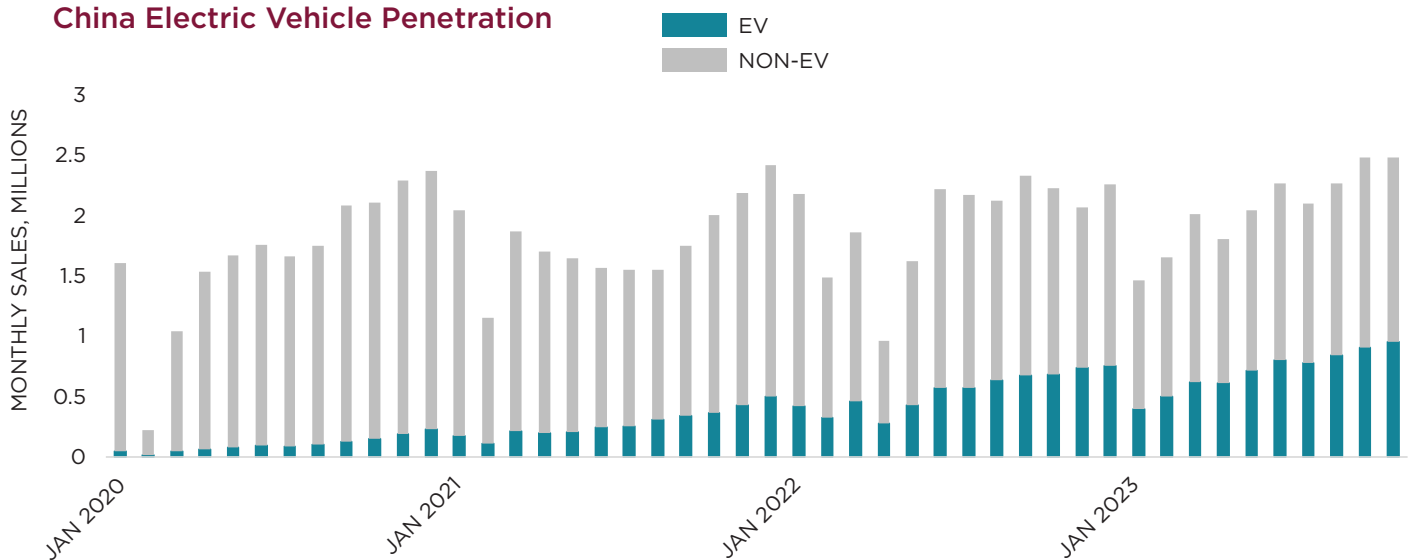
During our team’s trips to China in 2023 (March/April and October/November), our first research trips on the ground since the COVID-19 outbreak, we observed a striking number of electric vehicles (EVs) on the streets. In addition to the quantity, the quality of

these domestically made Chinese electric vehicles also surprised us. While we have followed the rapid growth of the Chinese electric vehicle market and the emergence of strong domestic brands over the last number of years on our spreadsheets and via Bilibili videos, witnessing the rapid progress firsthand was still a surprise.

China has become the single biggest electric vehicle market in the world. In 2022, over six million battery electric vehicles (BEV) and plug-in hybrid vehicles (PHEV) were sold in the country, accounting for more than half of all electric vehicles sold globally.

Looking at the data (see Figure 1), electric vehicles in China increased from just 2.5% of all passenger vehicles sold in January 2020 to 38% by October 2023. Despite

FIGURE 1
China Electric Vehicle Penetration



Source: China Association of Automotive Manufacturers.

the overall vehicle market slowly recovering from the impact of COVID lockdowns, electric vehicles have maintained strong growth.

The Growth Drivers

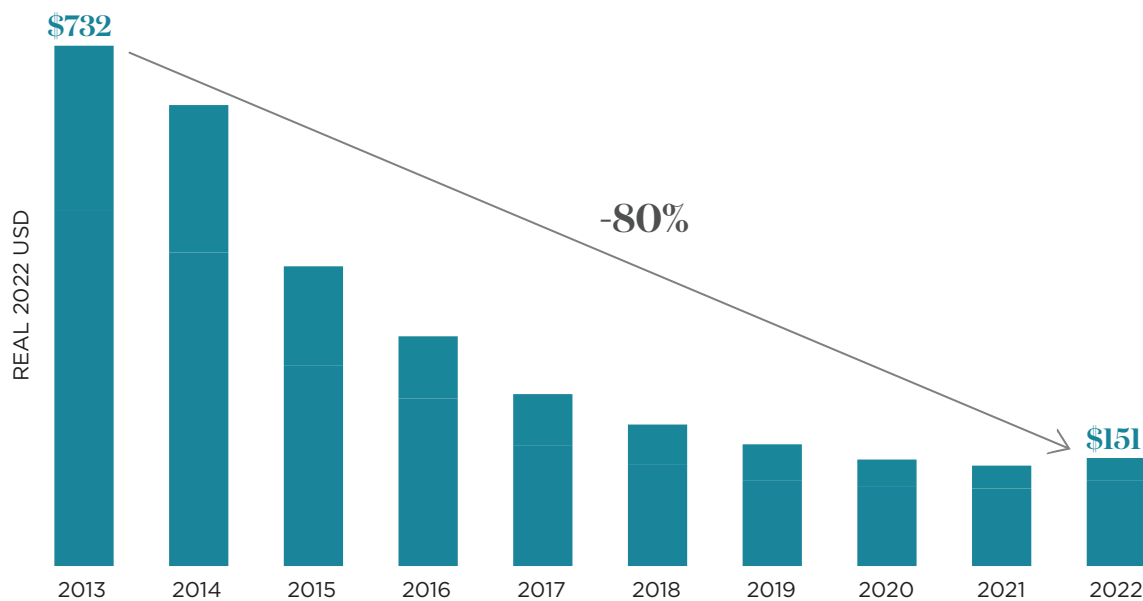
There are several key factors contributing to the rapid rise of EVs in China, including strong government support, declining battery costs, and the rapid pace of new model releases.

Starting in 2009, the Chinese government began playing a crucial role by providing significant subsidies to the industry. Recognizing the challenges of competing with the United States, Germany, and Japan in internal combustion engine innovation, the Chinese government decided to invest in cars powered by batteries. Chinese EVs also addressed issues like severe air pollution and reducing reliance on imported oil. From 2009 to 2022, the government poured over 200 billion RMB (US\$29 billion) into subsidies and tax breaks for the electric vehicles industry. While some tax breaks will continue to be in place until 2027, the subsidies have been gradually

reduced and will be phased out by the end of this year. This strong government support has accelerated consumer adoption of electric vehicles in China. We are witnessing similar government support for EVs in other countries around the world. China has also built a strong supply chain around critical electric vehicle parts, such as batteries, battery materials, electric motors, gears, and other components.

The second factor contributing to the growth of electric vehicles is the rapid decline in battery costs. Over the last decade, there has been an 80% decrease in the cost per kilowatt hour (see Figure 2). This allowed automakers to either improve the vehicle's range without increasing the cost or reduce the cost while maintaining the same range. The combination of decreased battery costs and government subsidies has had a significant impact on the cost of ownership, to the point where electric vehicles are cheaper than internal combustion engines. While the upfront cost of purchasing an EV remains higher, this difference is likely to shrink as battery efficiencies improve. This should allow automakers to price electric vehicles at a similar cost to their internal-combustion-engine counterparts (excluding subsidies) in the next few years.

FIGURE 2
Battery cost per Kilowatt Hour



Source: BloombergNEF.
Weighted average survey value includes 178 data points from passenger cars, buses, commercial vehicles and stationary storage.

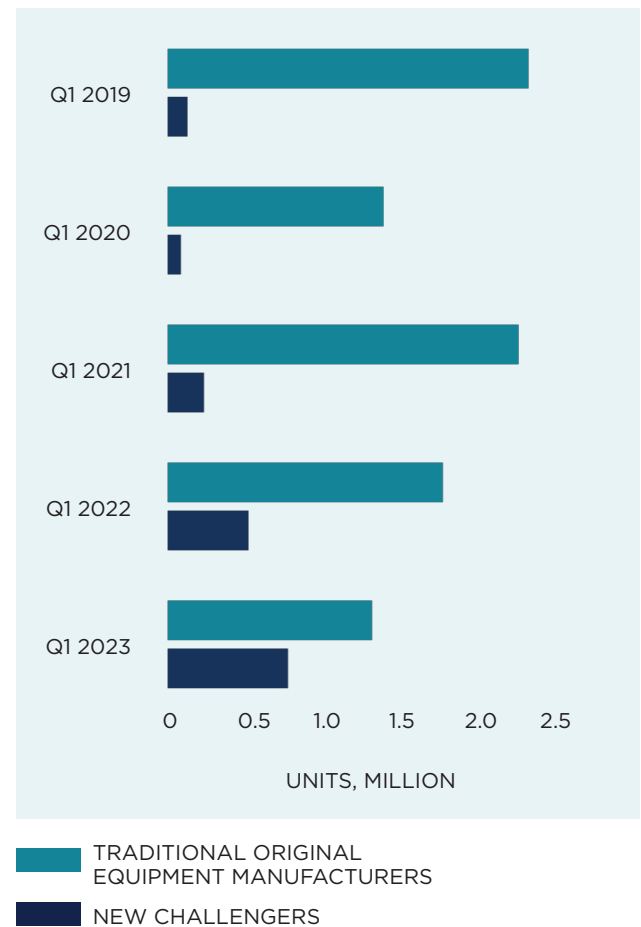
Despite an increase in battery costs per kilowatt hour in 2022 due to rising raw material prices, the subsequent decline in lithium carbonate prices in 2023 should allow the cost per kilowatt hour to resume its downward trajectory.

The third factor is the rapid pace of new model releases. Stiff competition and the emergence of new EV-focused automakers have led to the release of new models and fast iterations aimed at enhancing features and functionality. The proliferation of these new models serves multiple purposes: it is generating consumer interest, expanding consumer choice, and enabling automakers to rapidly improve the quality of their cars. In 2023 alone, EV automakers are set to release over 100 new models. Speaking with EV automakers, they highlighted that their technology is evolving much faster compared to internal combustion engines. As a result, vehicle platforms need to evolve at an accelerated pace to keep up with advancements. While this puts added pressure on automakers to innovate, it ultimately benefits consumers who gain access to a wide array of choices, feature upgrades, and competitive pricing. Concurrently, the integration of smart vehicle technology, including enhanced safety features and driver assistance features like self-driving capabilities, further increases the consumer appeal of electric vehicles.

Brand Preference: Changing of the Guard

Another important observation in the rapid rise of the EV market in China is the emergence of strong domestic brands. In 2022, Chinese brands accounted for nearly half of the entire passenger vehicle market but represented over 80% of the electric vehicle market. The rise of domestic brands like BYD, Li Auto, Nio, Aion, and others has taken significant market share from established automakers like Volkswagen, Honda, and Buick. This shift in market share is creating new winners and losers in the China auto market (see Figure 3). Almost all the top-selling electric vehicle models

FIGURE 3
Challengers Gaining Share



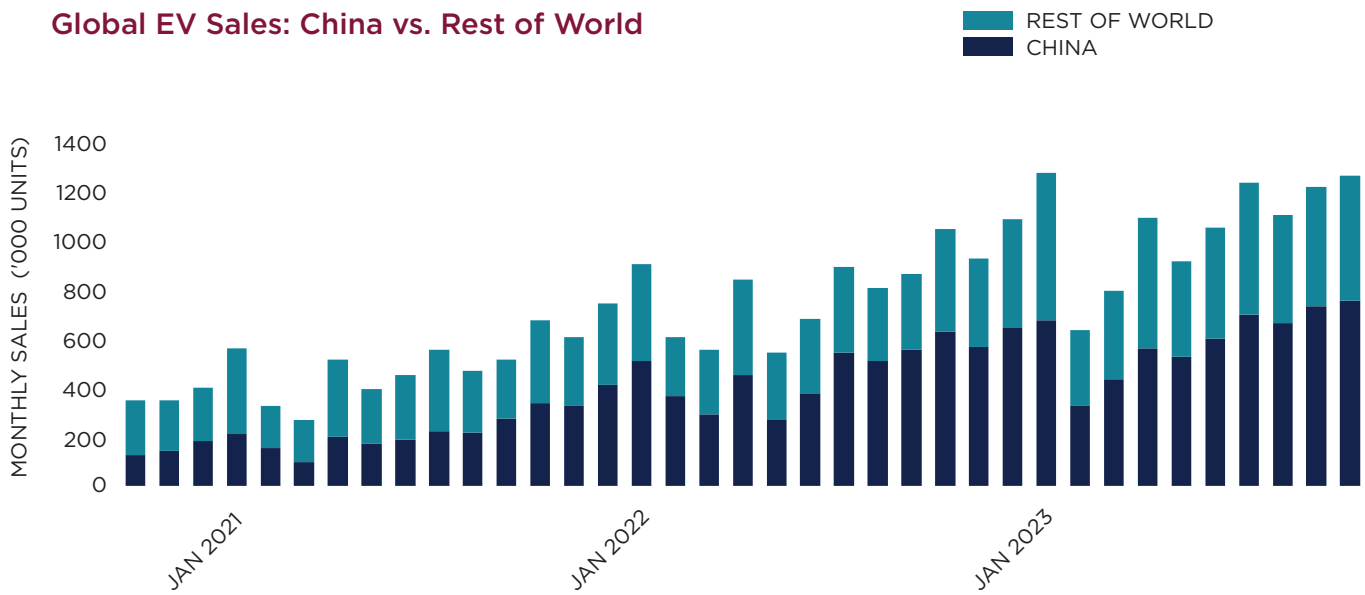
in China are made by domestic Chinese brands, with Tesla being the exception. While Chinese brands were technology laggards in internal combustion engines, there is no technology gap when it comes to electric vehicles. As a result, they are far more competitive.

A Window to the Future?

As mentioned earlier (and seen in Figure 4, next page), Chinese EV sales represented over half of total global EV sales. While that sleek BYD Yangwang U8 may not be available in many countries yet, we believe that the development of the industry in China has investment implications abroad.

Source: China Association of Automotive Manufacturers. As defined by Burgundy, "Traditional OEMs" includes Volkswagen, Toyota, Honda, Nissan, Buick, Hyundai, Kia, Chevrolet, and Ford. "New Challengers," includes BYD, Tesla, Aion, NETA, NIO, Li Auto, and Xpeng.

FIGURE 4

Global EV Sales: China vs. Rest of World

Increasingly competitive, domestic Chinese brands are now seeking opportunities abroad. As a result, China has become a formidable force in the global auto industry, solidifying its position as an auto-export powerhouse. Specifically, the iterative pace of Chinese automakers has sped up the development cycles of cars and incumbent original equipment manufacturers (OEMs) will need to keep up with the staggering pace of iterative innovation. In 2023, we have seen Volkswagen and Stellantis partner with (and invest in) Xpeng and Leapmotor, respectively, to benefit from the know-how of domestic Chinese OEMs.

Projections indicate that China is expected to reach a staggering 4.5 million exports in 2023 alone, showcasing the country's growing influence in the global automotive sector by becoming the world's biggest auto exporter (by volume). Going forward, Chinese brands are poised to be formidable competitors in many areas, such as in Southeast Asia, the Middle East, and Latin America, where domestic Chinese brands already have strong footholds. We are seeing further evidence of this internationalization with the recent announcement that BYD will build its first


overseas factories in Thailand and Brazil. As Chinese automakers continue to win share from established Western manufacturers, there will be implications across the global auto supply chain.

Opportunities for Investors

The rapid growth of EVs presents both risks and opportunities for investors as supply chains experience a significant shift. Previously, internal combustion drivetrains (which are made up of the engine and the gearbox) were mainly manufactured in-house, but now, with the shift to electric drivetrains (which are made up of a battery pack and electric motors), most of the components are outsourced to large battery makers like China-based CATL and Korea-based LG Energy Solutions. With lower barriers to entry resulting from this change, a rush of new entrants joined the industry. Over time, intense competition will likely lead to a market shake-out, weaker players will exit, and the industry will eventually consolidate.

FIGURE 5

"Pick & Shovel" Investment Opportunities

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- 1 Semiconductors** are a crucial component of vehicle production and used to control everything from driver assistance systems to emissions systems. The average EV has upwards of 3,000 chips.
 - 2** Electric door locks use **actuators**, which are the machinery that change the energy and signals entering the system into motion.
 - 3 Lithium-ion batteries** power the electric motors in electric vehicles. This “battery pack” is typically the most expensive component in EVs.
 - 4** Every EV needs **thermal management** to ensure the battery and power electronics are working at their best. Range and charging times can be increased with careful management.
 - 5 Transmission** is the mechanism by which power is transmitted from an “engine” to the wheels of a vehicle. EVs do have transmissions, but they work differently than gas-powered vehicles.

At Burgundy, we have more conviction in our understanding of the components of the EVs, such as batteries, thermal management systems, electronics, and parts (see Figure 5). We believe that among these “pick and shovel” companies, we will have opportunities to find compelling investment opportunities.

For instance, we recently added a leading battery equipment manufacturer to the Emerging Markets portfolio. This company produces the key equipment used to make batteries, with significant scale and technological advantages versus its peers. Since the battery manufacturing lines are co-developed between the battery maker and the equipment manufacturer, switching to another equipment vendor comes at a high cost. Although a leader in China, this company is increasingly expanding abroad into Europe and North America, where we believe its advantages are even stronger. With its attractive valuation and competitive advantages, we believe this investment represents an attractive way to take part in the growth of electric vehicles.

Looking Ahead

As technology continues to advance and global demand for EVs increases with a strong push towards decarbonization, the automotive market is expected to undergo significant changes. At Burgundy, we are committed to closely monitoring this evolution, staying on top of the latest developments, and actively participating in areas where we have strong conviction, particularly in the supply chain components for EVs, as highlighted above.

We recognize that due to the rapid evolution of electric vehicles, finding well-positioned companies with sustainable competitive advantages is not an easy task. However, we aim to identify and invest in the companies that possess these characteristics in order to capitalize on the potential growth opportunities that electrification of vehicles bring. While we embrace the exciting prospects in the automotive market, we also remain prudent in our approach, always mindful of the price we pay and that we are balancing both quality and value in the portfolio. **B**

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