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## China's EV Bridge Too Far

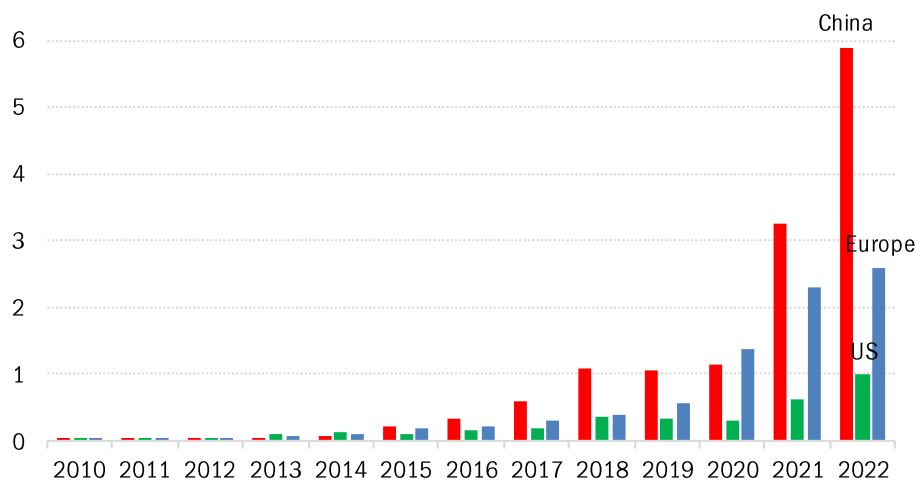
Monday, July 31, 2023

Michael Warren

China leads EV sales, but after billions in subsidies, they're still only 4% of the fleet.

China has made a great leap forward in the domestic sales of electric vehicles (EVs). Beijing financed the industry to develop the entire supply chain – [except in advanced microchips](#). They are clearly the world leader in sales (please see the chart below) and will not be overtaken anytime soon by the West. But that only makes China the tallest pygmy. Over the last decade China's journey with EVs has revealed insurmountable problems.

BEV and PHEV sales (millions)



Source: IEA, TrendMacro calculations

China has reached only one-and-a-half of its three strategic goals for its EV industry.

- Mission accomplished: *China is the world leader in EV sales*. That said, the 12 million EVs on the road are only 4% of the 306 million total light-duty vehicles.
- Mission not accomplished: The transportation sector accounts for about 50% of China's [16 million barrels per day of apparent oil demand](#), or about 8 million. [Diesel consumption is 24% and gasoline 23%](#). *Energy security has not been achieved*. With much of China's EV growth likely to come from hybrids with gasoline-

### Update to strategic view

#### OIL, ASIA MACRO:

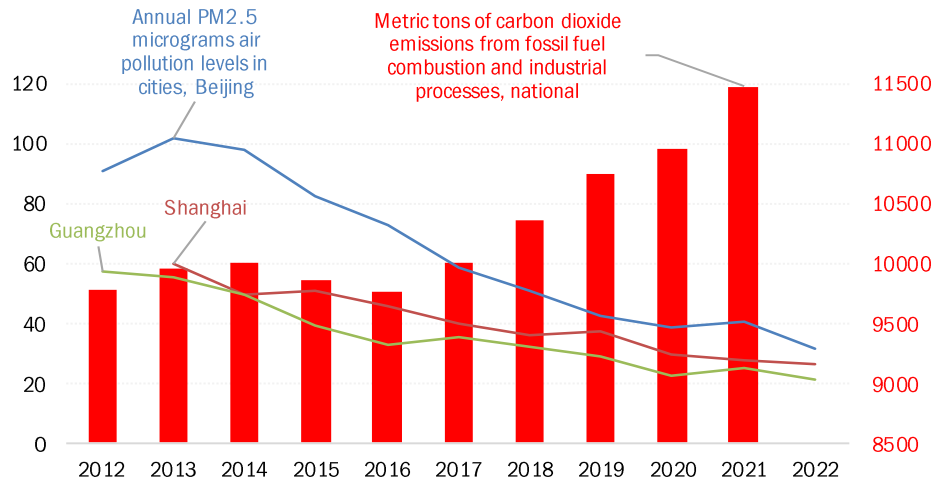
China, the country that has done the most for the longest time to subsidize electric vehicles, leads the world in unit sales but has barely scratched the surface of converting its fleet. Indeed authorities have learned that pure EVs are a non-starter, and the future lies with hybrids where an internal combustion engine acts as a generator for the electric powertrain. New sport utility vehicles in China built on this paradigm are pointing the way. Pollution has been reduced in large cities, perhaps because of more EVs on the streets. But carbon emissions nationwide have grown sharply, highlighting the reality that electric vehicles still require energy to manufacture and to power. China's strategic objective of energy independence remains elusive.

[\[Strategy dashboard\]](#)

powered engines on board, and with a growing petrochemical industry, security can't possibly be achieved until the middle of the next decade, at best.

- Mission half-accomplished: Selling more advanced technology vehicles in large cities has possibly contributed to lower PM2.5 air pollutants (please see the chart below). But this pollution goal is separate from the carbon emissions goal that has become increasingly elusive, possibly due in part to the emission-intensity of manufacturing and producing electricity for the operation of EVs (again, please see the chart below).

#### China pollution and carbon emissions



Source: Statista, US State Department, TrendMacro calculations

- If a command-and-control economy like China's cannot meet its EV goals, it's hard to see how relatively open economies like that of the US, Europe or Japan could ever do so.

China's policies have had to be changed over the years as authorities realized the bridge to a true all-electric future was too far. They have had to come to accept the reality that fossil fuels will be needed indefinitely, even in the context of a broadly electrified vehicle fleet (see "[The Electric Future is Driven by Oil](#)" February 19, 2021). These realizations didn't happen overnight and policy changes were slow to materialize, but as the lessons were learned, the authorities reacted.

- Lesson one: You need lots of money to even attempt the transition on the supply side. Tax breaks (both federal, provincial and local) and subsidies for Chinese manufacturers have been more than \$100 billion since 2014 (835 billion yuan). European and American carmakers are aggressively funding their own new state-led industrial policies geared to electrified personal transportation, but even if the West throws the kitchen sink at its perceived carbon problem its current goals will not be met, and policy adjustments will be required.

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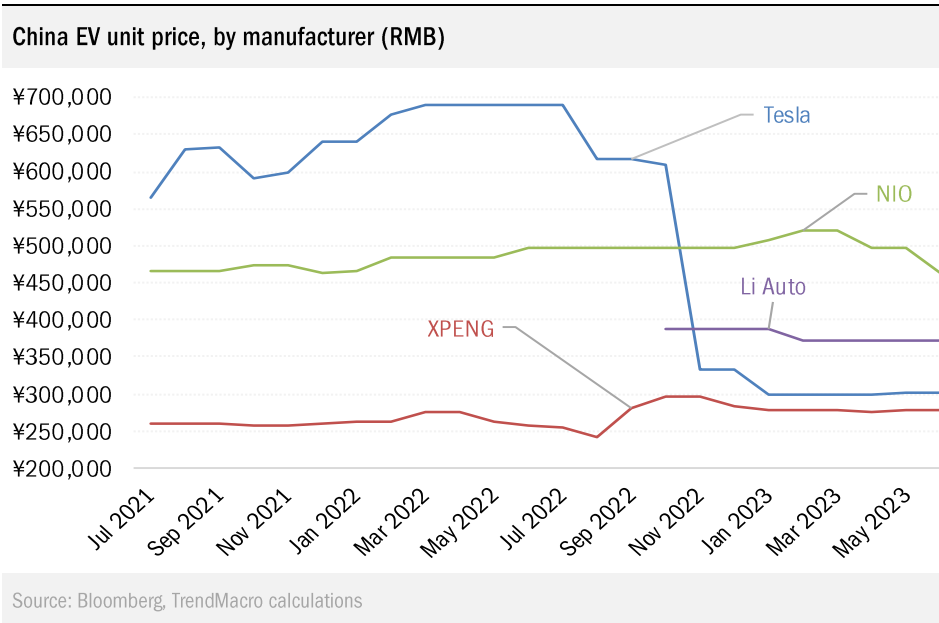
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- Lesson two: new products need massive and continuous subsidies to be adopted by consumers. Since 2014, Beijing has subsidized EV sales directly up to \$8,435 per vehicle. Direct subsidies have been extended well beyond 2020 when the authorities originally had planned to end them. Both the US and European authorities currently don't think that subsidies will need to last beyond planned bans of gasoline powered vehicle sales as soon as 2030 for some countries.

Originally, Chinese consumers didn't accept an unproven and untried product from a local industry that historically played second fiddle to traditional vehicle manufacturers in the West and Asia. Beijing announced a critical policy change in 2018 to help jump-start the industry: foreign competitors were allowed to set up shop, which helped the struggling industry in a big way.

- Tesla built and sold domestically manufactured EVs independently (without the authorities forcing it into a joint-venture), which gave consumers a standard to compare their domestic industry to.
- Before Tesla began production, no Chinese EV manufacturer had achieved economies of scale on a single platform. A dedicated EV platform needs 50,000 units sold annually over five years to make necessary economies of scale.
- With Tesla present, local EV-only manufacturers finally had an example to follow, helping them to break through and scale up production. It's no coincidence that EV-only brands like NIO, Xpeng, and Li Auto, to name a few, started to increase production and release products during and coming out of the pandemic with Tesla as their model. And all three have achieved economies of scale as of today.
- More traditional companies like BYD, Great Wall, Chery, and Geely – that had produced and sold over 300 million gasoline-powered engines – started aggressively pursuing EVs. BYD gained economies of scale soon after Tesla opened its Shanghai Gigafactory in 2019 with the 3.0 platform and surpassed Tesla as the top EV sales leader in 2022.
- Domestic large-scale production of Tesla bolstered the scope of the industry, helping China expand its market in both production and sales. Some foreign manufacturers who had been forced into joint venture agreements with state-owned enterprises for decades started to plan for EV production in the country by going it alone, as Tesla has done.
- Yet, despite the fact that 2022 was a great year for the EV industry, and domestic manufacturers in particular, China still extended subsidies and tax breaks to 2027. Beijing announced \$72 billion more in direct subsidies after EV sales growth was negative in January on a year-over-year basis (see “Russia's Oil Miracle” June 12, 2023) and domestic EV makers' sales in first half 2023 were woefully behind targets. Beijing extended subsidies by more than \$4,000 per EV for 2024 and 2025 and half that amount for 2026 and 2027. China has now pushed direct sales subsidies out seven years beyond its original timeline for a total of 17 years.

- What's more, Beijing extended these subsidies after Tesla halved prices late last year in response to the current EV sales leader BYD (please see the chart below). Competition also came from Li Auto with its rollout of an EV-subsidized large sports utility vehicle that debuted below where Tesla priced its EV-subsidized cars, which usually cost considerably less than SUVs in global markets.



The low-priced large SUVs from Li Auto are currently leading sales in that segment. We think they represent the prototype for ideal electric vehicles going forward – hybrids that use a gasoline tank as a battery and an internal combustion engine as a generator, to power an electric drivetrain (again, see [“The Electric Future is Driven by Oil”](#)).

- These SUVs are extended-range electric vehicles (E-REV) that have an on-board generator powered by a turbocharged gasoline engine (with a 17-gallon gasoline tank) that recharges the two large battery packs directly propelling the vehicle. [The Li Auto SUV is, basically, a hybrid](#) (HEV) because the majority of its driving range comes from a gasoline-powered engine (albeit through its batteries). E-REVs are gaining popularity where long-distance travel is required in areas with uncertain power grids.
- E-REVs, which get the EV subsidy, are a technology that existed when the global automotive industry was in its infancy. Such vehicles offer an electric powertrain without the usual battery charging limitations with a range of up to 700 miles (after going the first 100 on battery). This is an upgrade to a typical BEV SUV that has a range of 300 miles, or a PHEV SUV with about 400 miles.
- There are other Chinese companies that are using this technology now to power SUVs: the Aito M5 and Voyah Free with ranges that exceed 500 miles. BYD is offering a variant of this powertrain in a few of its large passenger cars, cross-over utility vehicles (CUV) and multi-purpose vehicles (MPV) with ranges over 700 miles. And Geely, who bought Volvo over a decade ago, has been rumored to

release a vehicle ([Xingyue](#)) that can toggle from battery-only, to a combination of battery and gasoline power to gasoline-only. This technology has probably been around for decades at Geely, but they are launching it now due to changes in regulations.

After a decade of shoving all-electric vehicles down consumer throats, how have policies changed to acknowledge their shortcomings and adjust the outlook for gasoline-powered engines?

- Although China never banned gasoline-powered vehicles, its [Energy-Saving and New Energy Vehicle Technology Roadmap 2.0](#) of 2020 aimed to ensure that hybrid technology (gasoline and batteries) would constitute half of the new vehicle sales market by 2035 (again, see [“The Electric Future is Driven by Oil”](#)). China’s [Corporate Average Fuel Consumption](#) (CAFC) policy was tweaked after Roadmap 2.0 to provide partial credits for hybrid vehicles that use battery and gasoline power, based on their reduction of emissions. Non-plugin hybrid vehicles are not considered New Energy Vehicles (NEVs), but they never qualified for the subsidy. Automakers receive some emission credits when they are sold so it helps them meet CAFC levels. And consumers are accepting this technology because they are weary of the costs and the unreliability of the grid. New hybrid models are being launched and older ones refreshed. By the end of this year, there will be 1 million non-plugin hybrids in operation – about one-quarter million less than plug-in hybrids and E-REVs. This, unfortunately, is another lesson not being learned by the West, which is fixated on battery-only vehicles and announcing bans on gasoline powered engines.

Why did it take Chinese authorities so long to tweak their EV policies?

- Beijing could have reviewed the EV policy during the pandemic, and accept they were wasting enormous resources aiming for perfection (battery-only vehicles) when they could more easily attain something that was at least progress (hybrid vehicles) – and still meet or exceed most of their strategic goals on emissions.
- The authorities probably looked at their massive 40-year sunk investment in state-owned joint ventures that build over 300 million light-duty vehicles powered by gasoline, and decided to keep a piece of the pie for their traditional manufacturers instead of decimating the industry (which will still supply nearly all new car sales in emerging markets that constitute most first-time buyers).
- Also, domestic and global automotive segmentation had been moving quickly toward larger vehicles (and still is). So, Beijing concluded battery-only vehicles would never reach cost-parity with hybrids, especially in large SUVs.
- And finally, the real kicker: [Most thoughtful analysts](#) who seriously write about the EV industry have come to the conclusion that demand inflation will drive up raw material costs and prohibit battery packs from being priced competitively to gasoline engines if China, the US, and the EU all aggressively adopt the technology. Moreover, those EV raw materials are controlled more by China

than oil is controlled by OPEC. The emissions created by all the mineral extraction – and the coal burned to create and power the EV industry and EV mobility require – are probably greater than those that would be released by gasoline-powered engines that EVs were meant to displace.

- Again, a significant automotive trend in which China has been following the West is segmentation. Their market has been moving from smaller to larger vehicles over the past two decades. From 2003 to 2022, SUV sales grew from about 5% of a 4 million total market to 47% of a 23.5 million total market. In 2023, SUV sales are about 50% of the market. The cumulative impact of SUV sales on the country's 306 million light-duty vehicles in operation has been enormous: it has risen from under 3 million units after the Great Recession in 2009 to 90 million in 2022 – or about 30% of the total.

While E-REV SUVs are a game-changing and newly subsidized EV segment, battery-only powertrains haven't had a big impact within the overall SUV market in China.

- From 2014-2018 the [EV market segmentation consisted almost entirely of small passenger vehicles](#) sold to federal and local governments, state-owned and private businesses (like Didi ride-sharing) as well as consumers to get the industry off the ground. By 2017-2018, the domestic EV industry started to produce larger passenger cars, CUVs and MPVs, but only a few SUV models.
- While China is leading the world in EV sales, the total number of 100% battery-powered SUVs on its roads is about 4 million units – compared to 83 million gas-only SUVs. 2023 battery-electric SUV sales will be around 2 million out of a total SUV market of probably 12 million units. Sales of SUVs powered solely by battery power experienced exponential growth from 2020 to 2022, rising from less than a quarter million to nearly 2 million units. But this year with the introduction of E-REVs, SUV sales powered solely by battery packs (without an internal combustion engine) have risen by just 5% year-to-date and there are more E-REV models coming – so we don't think the future is bright for battery-only SUVs.
- Gasoline-only passenger cars and their variants (CUVs and MPVs) make up two-thirds of the vehicles on Chinese roads and of this total, battery-only vehicles only constitute 10 million. For 2023 sales, we estimate that there will be 11 million passenger cars and their variants and three million will be battery-only.
- China has a relatively low scrappage rate (percentage of the units in operation deemed obsolete and not allowed renewed registration) of about 3.5%. Given our sales mix forecast, the units in operation for gasoline-only cars and their variants should peak in 2026 at about 203 million. For SUVs, their gasoline-only engines in operation should peak at 114 million units by 2030. Units in operation for EREVs and HEV should continue to grow so that by 2028 their sales could overtake those of battery-electric vehicles and the units in operation will surpass that of battery-only vehicles no sooner than 2033.

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## Bottom line

China, the country that has done the most for the longest time to subsidize electric vehicles, leads the world in unit sales but has barely scratched the surface of converting its fleet. Indeed authorities have learned that pure EVs are a non-starter, and the future lies with hybrids where an internal combustion engine acts as a generator for the electric powertrain. New sport utility vehicles in China built on this paradigm are pointing the way. Pollution has been reduced in large cities, perhaps because of more EVs on the streets. But carbon emissions nationwide have grown sharply, highlighting the reality that electric vehicles still require energy to manufacture and to power. China's strategic objective of energy independence remains elusive. ▶