



Recharging China's Electric Vehicle Policy

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SUMMARY

Electric vehicles offer China an opportunity to reduce its reliance on foreign oil, improve air quality by curbing emissions from the burgeoning transportation sector, and enjoy the future economic benefits of being a global pioneer in an emerging industry. While the government has prioritized the development of electric vehicles, more can be done to ensure success.

Recommendations

1. Open the domestic electric vehicle market to leading international automakers to promote technological development.
2. Prioritize promoting electric vehicle use in commercial operations that rely on large numbers of vehicles, such as car-rental and car-sharing services, business distribution networks, and taxi companies in city centers, and as official government vehicles rather than concentrating on individual consumers. Public procurement and corporate fleet orders will help establish the electric vehicle market.
3. Create an environment that encourages electric vehicle use, including building the necessary infrastructure and providing incentives to stimulate demand, instead of handing out hefty subsidies for purchasing electric vehicles. This effort should be better integrated with ongoing urbanization policies and the entire transportation system.
4. Focus on developing a self-sustaining business model for electric vehicles instead of setting specific targets for quantities sold.

It is not difficult to see why promoting electric vehicle technology is appealing to the Chinese government. There are three primary benefits to developing a strong electric vehicle industry.

First, the widespread use of electric vehicles will allow China to rely less on oil imports, improving the country's energy security. Second, it will mitigate carbon emissions from the fast-growing transportation sector, which will improve air quality. And third, China can enjoy the economic advantage of being one of the first movers in the industry and enhance its competitiveness as the market develops in the future.

In fact, China has more reasons than other countries to promote electric vehicles, and it has a better chance of being successful. Apart from having the largest auto manufacturing capacity and market in the world, China already enjoys surprising success in the electrification of transportation.

More than 120 million electric bicycles are used in Chinese cities because they cost less and cover longer distances than gas-powered scooters and because they can be easily charged at home. Although electric vehicles do not currently possess these same advantages, China believes the success of electric bicycles could be replicated with government support.

The Chinese government started its large-scale support of electric vehicle research and development with the National High-Tech Research and Development Program (or 863 Program) in 2001. It

then kicked off the Ten Cities, Thousand Vehicles Program in 2009 with large-scale pilot projects. By the end of 2010, this program had expanded from ten to 25 cities.

Six of these cities were also identified as pilots for subsidizing private purchases of new energy vehicles. And China's support grew further when the State Council, the highest government body, identified new energy vehicles as one of seven strategic new industries in 2012.

Several billion dollars have been spent on research and development programs so far, and the government also provides substantial subsidies to private purchasers of electric vehicles. In the case of Hangzhou, the most generous of the six pilot cities in terms of these subsidies, consumers can receive nearly \$20,000 from central and local governments for buying battery-powered electric vehicles or slightly less for plug-in hybrids.

And that's not all. Other incentives are provided in some pilot cities as well. They include free electricity for the first three years or 60,000 kilometers (37,000 miles); exemption from the license-registration lottery in Beijing or the registration auction in Shanghai that are used to limit the sale of private cars and cut traffic congestion; and free installation of charging poles.

By the end of 2012, the deadline of the first phase of the Ten Cities, Thousand Vehicles Program, only a few cities had reached their targets. The private market is still lagging, and technology gaps remain. Stymieing

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progress further, the slow starts and bankruptcies of electric vehicle companies in the United States have evoked pessimism about the future of electric vehicles in China and abroad.

Regardless, the Chinese government remains committed. In 2012, the State Council approved the Energy Saving and New Energy Vehicle Industry Development Plan, aiming to have sold 500,000 battery-powered electric vehicles and plug-in hybrids by 2015 and 5 million by 2020. It also pledged to invest over \$16 billion (100 billion renminbi) by 2020 to achieve these targets.

LESSONS LEARNED

The government's commitment deserves a great deal of praise, but lessons can be learned from China's ten years of experience in electric vehicle development. And there are a few things that policymakers may want to reconsider if they really want to jump-start the electric vehicle market.

First, unlike in its development of other advanced energy technologies, including wind power, high-speed rail, and third-generation nuclear power, China decided to take a more independent path on electric vehicles by mostly relying on its own innovation and indigenous vehicle manufacturers. Despite some progress, the technology gap between China and leading countries needs to be closed faster.

Second, Chinese automakers still have little incentive to focus on electric vehicles. With sales continuing to lag, manufacturers do

not have sufficient impetus to install a separate production line for electric vehicles, and companies are reluctant to spend their hard-earned profits from conventional car sales on the research and development of electric vehicles.

Third, the government is spending a lot of resources to heavily subsidize purchases of electric vehicles to bring down their prices, but the major barrier for Chinese consumers is not the cost—it is the lack of infrastructure and incentives to use electric vehicles instead of conventional ones.

Fourth, it is important for China to increase the sales of electric vehicles quickly to fulfill its 2015 and 2020 sales targets. Previous experience suggests that solely relying on indigenous automakers for innovation and obsessing over subsidies and sales numbers without establishing a sound business model and development plan will not improve the prospects for electric vehicles in the future.

POLICY RECOMMENDATIONS

China needs to do more to develop a successful electric vehicle industry and market so it can reap the benefits of the technology.

1. **China should open up its electric vehicle market to leading international automakers to promote technological development.**

The Chinese government is arguably the most ambitious in developing electric vehicles, pouring enormous resources into building up core technological capacity

among indigenous automakers. However, China is still behind when it comes to the innovation that forms the backbone of this new technology.

Chinese vehicle manufacturers trail their counterparts in core technologies, including batteries and motor control systems. Research from Japan's Ministry of Economy, Trade, and Industry shows that China holds just 1 percent of total patent registrations for lithium ion batteries—far behind Japan at 52 percent and the United States at 22 percent.

It will be difficult to catch up to the industry leaders in a short time, and more financial support alone will not push Chinese automakers ahead of their foreign competitors. This technology gap can be quickly closed only through collaborations with international companies, as proved by experience with other hi-tech energy industries. Success in wind power, high-speed rail, and third-generation nuclear power benefited from technology transfers and cooperation with international leaders during early developmental phases of these technologies.

It is time for China to replicate this success in the electric vehicle market. Chinese industries can benefit from international competition and learn about the latest technologies much more quickly than the current pace.

This should be done by opening subsidies and market access, including public procurement, to international players and setting uniform technology standards that treat all electric vehicle

companies—whether Chinese or foreign, owned by the state or by private entities—equally. This will strengthen competition, improve collaboration, and advance the adoption of the best technology. It will also provide a consistent policy framework that will allow for continuous investment in research and development.

While there is understandable reluctance to subsidize international vehicle manufacturers, China's auto market is so large and different from those in other countries that electric vehicles will need to be customized for local circumstances. This means that there will be plenty of room for Chinese automakers in the future market. Moreover, the longer China relies on conventional cars, the farther behind it could slip in mastering electric vehicle technology.

2. Rather than trying to boost sales to individual consumers, the Chinese government needs to prioritize promoting electric vehicle use in commercial operations that rely on large numbers of vehicles, such as car-rental and car-sharing services, business distribution networks, and taxi companies in city centers, and as official government vehicles. Public procurement and corporate fleet orders will help establish the electric vehicle market.

The private electric vehicle market has been the main focus of China's policy support so far. Unless electric vehicle technology overcomes existing charging and range barriers—given the current battery technology, most electric vehicles in China only have ranges of 100 to 150 kilometers (approximately 60 to 90 miles), and one full charge

takes four to eight hours—private consumers are unlikely to buy an electric vehicle as their first and only car. It is better to focus on increasing the use of electric vehicles among users with consistent operating patterns and easy access to charging locations.

Car-rental services in large urban areas like Beijing and Shanghai are good options, especially ones that offer short-term rental or car sharing. Electric vehicles used by these enterprises could be charged at fixed places when not in use. Some car-rental companies are already testing the market. The demand is very high in Hangzhou, Shanghai, and Beijing, and all cities have long waiting lists for renting electric vehicles. So far supply is mostly for long-term lease rather than short-term rental, which is not the most efficient way to nurture future consumers.

The government needs to provide financial support to these car-sharing businesses and help them gradually expand charging and parking stations. This will also offer more citizens firsthand experience of electric vehicles, helping to increase acceptance.

The distribution networks of companies and industries in urban areas provide another opportunity. Electric vehicles could replace the trucks that currently connect distribution centers and mostly run on diesel fuel. These vehicles are usually run on fixed routes and schedules, giving plenty of time to be charged at the depot. As these companies already have private, centralized places to install charging stations, the government can encourage businesses to

gradually replace fleets with electric vehicles through finance and infrastructure support.

With more Chinese companies looking to reduce their emissions, they could also be motivated through tax and fiscal incentives to build electric vehicle fleets as part of their corporate social responsibility strategies. As China is now creating emission trading schemes in pilot cities, corporate fleets could be integrated, offering even more economic incentives as the carbon savings from using electric cars could be traded to bring in additional revenue.

City taxi services offer another opening, but progress thus far has been limited. The benefits are clear. Electric vehicles enable passengers to enjoy a quieter and cheaper ride while allowing drivers to save on fuel costs. But existing charging and range barriers mean that this technology is not yet suitable for the intensive demands of driving taxis. The long charging time reduces incomes and sparks hostile attitudes from drivers, who cannot take lucrative long-distance fares because of the short ranges.

The only successful exception is in Hangzhou, where taxis adopted a battery-swap model that requires less than ten minutes of waiting.

Still, in most of the pilot cities, taxi fleets are seen as a preferred sector in which to promote electric vehicles, largely because the industry is relatively easy for the government to manage. To increase the number of electric vehicles in taxi fleets, the government needs to recognize the current

technological constraints and promote the battery-swap model for taxis running in city centers. Given the large number of taxis in most pilot cities, this could potentially open up a big market for both the automobile and battery industries, accelerating the expansion of the network of charging stations and engaging key stakeholders, including power grid companies and public building owners and managers.

Finally, the Chinese government also needs to take the lead in purchasing electric vehicles through public procurement. This will build confidence among the general public. The party secretary of Shenzhen is leading by example in using an electric vehicle as his official car. China should gradually replace most official vehicles as the bulk of their journeys are within cities and thus well suited to electric vehicle range. This will set a good example and limit public criticism of spending money on luxury cars for official use.

Emphasizing these opportunities instead of giving hefty subsidies to a few individual consumers who are unlike the majority of Chinese car users is a wiser use of resources. Incentivizing potential corporate consumers through tax and financial support will also help alleviate the financial burdens on local governments. Because these buyers are less constrained by price, governments have more options than just handing out subsidies, including business tax rebates, capital allowances, interest-free loans, and government grants.

It is important to keep in mind that the government should base its financial

support on vehicle efficiency and the amount of oil that is saved instead of backing a specific technology. This will provide more accurate incentives for innovation and avoid the risk of favoring specific technologies. The government should not pick the winners—the market should.

3. Instead of handing out hefty subsidies for purchasing electric vehicles, China needs to focus on creating an environment that encourages electric vehicle use, including building the necessary infrastructure and providing incentives to stimulate demand. This effort should be better integrated with ongoing urbanization policies and the entire transportation system.

So far there have been fewer than 1,000 electric vehicles purchased by private consumers, a small proportion even in terms of overall electric vehicle sales. Many of the consumers are relatively affluent, buying the vehicles as a second family car or for social recognition.

Despite some purchases from consumers close to the electric vehicle industry, it is unlikely that these cars will become a popular choice among Chinese families when they buy their first car that is used not just in the city. To make matters worse in Shanghai, the first 200 registered buyers of electric vehicles must be able to provide space for installing charging poles near their houses, a harsh condition for the residents, as most live in apartments without enough parking spaces.

Because affluent consumers are less sensitive to the high price of electric vehicles than expected, the necessary infrastructure and incentives will make a bigger difference in broadening the consumer base than the current policy of subsidizing purchases.

In fact, the first batch of potential users is more likely to be persuaded by incentives that make electric vehicle use more convenient than conventional car use. For example, electric vehicle users could be exempt from Beijing's policy that reduces traffic congestion, given access to priority lanes, offered exclusive parking spaces in public places with charging posts, or provided reduced annual vehicle taxes and congestion fees.

These measures would create a welcoming environment for electric vehicles in the current transportation system. They would give a needed boost to both private purchases and rentals of electric cars and in return improve acceptance of these vehicles among the general public.

Electric vehicles also need infrastructural support. Most Chinese cities, including Beijing and Shanghai, are still in the process of urbanizing, meaning that the development of electric vehicles has to be forward looking. As cities continue to develop, electric vehicles need to be well integrated into the transportation system so they complement local mobility patterns rather than forming a stand-alone system.

This has so far not always been the case. In some pilot cities, local governments have too generously leased land and

handed out financial grants to build a charging network that goes mostly unused. Higher land costs in urban areas mean that large charging stations tend to be built far away from the city center rather than based where the demand is greatest. And there is little consideration given to integrating them with other public transportation modes. Until comprehensive strategic analyses of future demand are conducted, cities should start small in building charging networks.

Focusing on priority sectors will help the government more easily identify potential consumers and hot spots for electric vehicle use. It can then expand the charging network gradually as more electric vehicles are adopted and new demand is created.

The construction of electric vehicle infrastructure also needs to be informed by the development of smart grids and the use of renewable power, especially solar generation on the roofs of public buildings. Power grid companies, estate developers, and battery and car manufacturers all need to be involved from the beginning to ensure that electric vehicles are able to use renewable power and participate in load management through smart grids to have good economic return.

This will make infrastructure a driving force behind rather than a barrier to the development of electric vehicles.

4. China should shift away from targeting sales numbers to emphasizing the development of a self-sustaining business model for electric vehicles.

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The Chinese government has set a very ambitious electric vehicle development target, and it deserves applause for its courage and commitment to fostering low-carbon transportation. However, because battery technology develops quickly, the choice in electric vehicles could be very different by the end of the decade. Focusing on achieving high sales numbers does help to reduce costs through economies of scale, but it also risks locking China in to less advanced technologies.

Without a self-sustaining business model, too much stock could damage the industry's long-term survival once subsidies are removed. This lesson was learned at a huge price in China's development of the solar-panel industry and should not be repeated for electric vehicles.

Given that the pilot cities in China's electric vehicle programs are still relying heavily on direct government support to promote purchases, they will all face a critical financial challenge when scaling up in the future. Although financial subsidies remain important, it is more critical to develop a self-sustaining business model.

It is essential to periodically review the performance of different approaches adopted by the pilot cities and reward those with better business models that need less financial support. It is also necessary for the cities and companies to analyze life-cycle costs, including maintenance and the replacement and disposal of batteries, which only last three to four years.

Policymakers need to ensure, through various incentives, that the life-cycle cost of electric vehicles is competitive with that of other vehicles so they can break into the mainstream car market and finally scale up nationally.

THE FUTURE OF ELECTRIC VEHICLES

The benefits of electric vehicles are clear, as is the Chinese government's dedication to getting its electric vehicle market off the ground. But nurturing a new, globally competitive industry requires more than just political will.

China's car market is far from saturated, so the country has certain advantages in this area. But it will need to align strategic thinking and local application to generate continuous momentum for the industry's innovation and improvement. China should learn the lessons from the past ten years and refocus its efforts away from short-term sales goals and toward measures that improve both user experiences and the business environment for electric vehicles' future success. ◀