



China could benefit from the development of market-based policies for enhancing New Energy Vehicles commercialization: *The California ZEV-Credits option*

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Last year, President Xi Jinping stated that new energy vehicles are necessary for strengthening China's automotive industry. Recently, the "2025 *Made in China Plan*" anchored energy saving and new energy vehicles as one of China's 10 key sectors that should be at the forefront of development for the coming 10 years. The years 2013 and 2014 saw an increase in national and local policies that encourage the development of the NEV industry, recognizing its important role in China air quality improvement strategy.

China started its "10 cities, 1000 vehicles" program six years ago, creating pilots cities to demonstrate the potential of EVs, their market feasibility, and challenges. Although the program quickly expanded to include 39 cities, many of which laid the foundation for the initial development of the industry, only 11% of the 2015 smog reduction targets declared in early 2013 were achieved. Furthermore, because the vast majority of NEVs to date are vehicles for municipal or public use, major efforts are needed. For example, the acceleration of mass private NEVs requires new creative policies going beyond demand-subsidies, targeted open-source infrastructure available to the general public, creation of efficient private infrastructure installations processes, building consumer awareness, and acceptance of NEVs as a family's first car. It has become clear to local decision makers that subsidies are not a long-lasting solutions nor sufficient enough to create a new market. Supply-side incentives, such as the development of the market that will justify the business case for the electric car and will engage big auto manufacturers, could unlock current holdbacks. The case of California's ZEV credits, which positioned California as the world's largest EV sales and innovation hub, demonstrates a useful experience and a potential opportunity.

The California ZEV credits program

To combat vehicle emissions, California proposed the Zero Emission Vehicle (ZEV) program in 1990 and started formal implementation in 1998. The program was extended to nine more states since then and covers 23% of the US new car market. California, according to industry studies and constant engagement with EV manufacturers, is aiming at 22% of the state's total vehicle sales to be ZEVs by 2025, of which as much as 16% would be pure electric cars (PEVs) and the rest would be cars powered by alternative sources to fossil fuels which are partially zero tailpipe emissions. The annual target is gradually being increased towards the target and the PEV component of the ZEV target is increasing as well. Companies that must comply are those with most vehicle sales while small manufacturers can earn credits and sell them for supporting their growth (e.g. Tesla Motors). Car companies verify compliance with the ZEV mandate after receiving vehicle categorization approval (based on proofs such as tests

¹ The final version was shortened and published in Chinese on the *China Auto News* website:

http://www.cnautonews.com/pl/zl/201505/t20150515_408031.htm#10006-weixin-1-52626-6b3bffd01fdde4900130bc5a2751b6d1?from=message&isappinstalled=0

results) and sales volume confirmation (a vehicle is considered sold after it receives a license plate and is officially “on the road”) from the California Air Recourse Board. Excess credits can be “banked” for future years or sold to other manufacturers, while their market value is negotiated between companies behind closed doors and are assumed to be lower than the penalty value (\$5,000 per Type 0 credit, while a long-range quick-charge PEV may receive as much as 7 credits). As the mandate increases in stringency and expands geographically, its impact on innovation, commercialization, supply chain costs reduction, and sales volumes will increase.

The ZEV credits program has proven to deliver ground-breaking results: no manufacturer selling vehicles in California breached the regulation in its 7 years of implementation; nearly 2 million Californians are driving partial zero and advanced technology partial zero emission vehicles (PZEV and AT PZEV), with near-zero tailpipe emissions and some 80% cleaner exhausts than the average 2002 model year car. Various vehicles and vehicle technologies were developed in conjunction by manufacturers with the support of the ZEV-regulation (e.g. “MOA” Vehicles, FreedomCar), which also arguably triggered the development of several other successful vehicle models (e.g. Toyota Prius, Honda Insight). Innovative energy vehicle manufacturers new to the industry were able to survive their initial years arguably by the demand and external profit enabled by the regulation. This phenomenon has been extensively studied in iCET’s recent case study of Tesla Motors’. Tesla achieved revenues of about \$245M over 5.5 years (by mid-2013) thus enabling it to reach market maturity in an overwhelmingly resources-consuming new energy vehicle industry that had previously diminished PEV players elsewhere.

ZEV credits potential for China

Although China’s EV market started later than that of California, it enjoys huge market potential: national strategic plans and financial support, battery production capacity and advancements, rich lithium-ion resources and rare earth materials, fast development pace, and existing relations (JVs) with global EV manufacturers. At this stage, China’s electric vehicle policies are mainly demand-side driven (e.g. purchase subsidies and tax reliefs); however with a lack of an attractive supply side “push” and effective infrastructure plans and management, the EV market may remain a niche market. A long-term and well enforced ZEV mandate is projected to promote the manufacturing of EVs by all types of automakers, therefore providing consumers with more EV model options to meet the varying expectations and needs. Coupled with demand-side “pull” for the short term, the EV market can finally scale in volumes.

The ZEV mandate will not only engage large auto manufacturers in what is still considered a niche market and spark long-term market commitment to the development of commercial technologies, but will also enable the shifts of funds from large manufacturers to small innovative companies developing EVs and EV solutions in the short-medium terms – as was in the case of Tesla’s early year, when as much as 25% of its revenues originated in the sales of ZEV credits. The case of California demonstrated that demand-side policies alone do not have the strength to force innovative technologies into market consensus, and that only through supply-side technology-oriented policies were economics-of-scale created.

California and other states’ ZEV credits implementation period illustrates that there are no major technological barriers for the successful design and implementation of the mandate. In the case of China, several adaptations to local market conditions and management limitations are required. The past six

years have laid the foundations for multi-government collaboration that will be sufficient for the creation of such adaptations and ensure smooth implementation. Chinese auto manufacturers have been faced with increasingly stringent standards and frequent adjustments, and are calling for long-term regulatory frameworks that will advise their corporate strategic development and at the same time include market-mechanism that enable flexible implementation. The CAFÉ trading mechanism and the ETS pilots' current expansion to include the transport sector, capping either fixed or mobile emissions, further prepare the industry for compliance. Since the Chinese auto industry is dominated by large manufacturers, they are expected to play significant role in the acceleration of the EV market.

Recommendations for a China-tailored ZEV credits mandate

A China ZEV mandate may also start off with a pilot or several pilots, with national government support, and with plans to adjust the program and scale it nationally. Very similar to the development of China's CAFÉ standards, a China ZEV program should undergo adjustments that suit local capacities, for example: considering a by-production mandate instead of a by-sales mandate (in order to overcome sales information flow hurdles), substituting financial penalties with local sales restrictions (in order to overcome local government liabilities), the inclusion of importing manufacturers (in order to promote the manufacturing of globally leading EVs and spur local competition), the inclusion of EV ecosystem players such as infrastructure, operators, and battery manufacturers (in order to speed economics of scale, promote market competitive rather than domination, and create high volumes of credits at the programs' early stages), etc. Similar to California's program, the mandate will allow for grace years and a "banking" (forwarding) mechanism. Going beyond the California mandate, a China ZEV mandate can include a dedicated management mechanism and online-platform for reflecting trading options in real time (currently CARB is publishing previous years' credits volumes). Throughout the design of the mandate, a fair representation of leading auto manufacturers as well as a coalition of EV manufacturers should be consulted with in order to ensure market concerns are addressed and that all players are engaged.