

CHINA'S NEW ENERGY VEHICLE MANDATE POLICY (FINAL RULE)

ICCT **POLICY UPDATES**
SUMMARIZE
REGULATORY
AND OTHER
DEVELOPMENTS
RELATED TO CLEAN
TRANSPORTATION
WORLDWIDE.

China's Ministry of Industry and Information Technology (MIIT) finalized the New Energy Vehicle¹ (NEV) mandate policy² on September 27, 2017. The NEV mandate in China is a modified version of California's Zero Emission Vehicle (ZEV) mandate,³ with goals of promoting new energy vehicles and providing additional compliance flexibility to the existing fuel consumption regulation. This policy applies only to passenger cars and will formally take effect April 1, 2018.

The rule specifies NEV credit targets for two years: 10% of the conventional passenger vehicle market in 2019 and 12% in 2020. Similar to California's ZEV mandate, these annual percentage targets are not for NEV sales, but for NEV credits. Each NEV is assigned a specific number of credits depending on metrics including electric range, energy efficiency, and rated power of fuel cell systems. Higher performance vehicles get more credits, capped at six credits per vehicle. These NEV credit targets thus may result in NEV market share falling into a range of values based on fleet mix. Assuming that all manufacturers produce vehicles with a per-vehicle NEV credit of three in 2020, for example, the market share of NEVs in China based on number of vehicles sold would be around 4% in 2020 while still meeting the 12% target based on NEV credits.

In the final rule, MIIT made several major changes from the interim proposal:

- » One-year delay in mandatory NEV credit requirements, from 2018 to 2019
- » Tightened exemption criteria for small-volume manufacturers
- » Stricter technical thresholds on speed and e-range for NEV credit qualification
- » Variable per-vehicle credit for battery electric vehicles (BEVs) based on e-range

1 In China, new energy vehicles (NEVs) refer to those vehicles with new-type power systems, completely or mainly driven by new energy sources. These include plug-in hybrid electric vehicles (PHEVs, extended-range electric vehicles included), battery electric vehicles (BEVs), and fuel cell electric vehicles (FCVs). About two-thirds of China's NEV sales are passenger cars and one third are commercial vehicles. This policy applies only to passenger vehicles.

2 MIIT. (2017). Parallel Management regulation for corporate average fuel consumption and new energy vehicle credits for passenger cars. Retrieved from <http://www.miit.gov.cn/n1146295/n1146557/n1146624/c5824932/content.html> (in Chinese)

3 For a detailed description of California's ZEV mandate program, see <https://www.arb.ca.gov/msprog/zevprog/zevprog.htm>

- » Higher per-BEV credit based on energy efficiency
- » Variable per-vehicle credit for fuel cell electric vehicles (FCVs)

In this update, section 1 provides a general introduction to how this NEV mandate policy will work; section 2 summarizes the major differences between the final rule and the interim proposal; section 3 evaluates the potential impacts of this policy; and section 4 indicates the next steps.

1. HOW THE NEV MANDATE POLICY WORKS

This section provides a general introduction to how the NEV mandate policy will work according to the final rule. The provisions are largely unchanged from the interim proposal released by MIIT on September 22, 2016.⁴ The ICCT's Policy Update of October 2016 summarized the proposed NEV mandate policy in detail.⁵

Figure 1 outlines the way the NEV mandate policy works. In simple terms, it adopts a California-style ZEV mandate program and adds that to the existing fuel consumption regulation for passenger cars. Annual mandatory requirements are set for auto manufacturers on NEV credits, which need to be achieved by producing or importing enough new energy passenger cars. At the same time, it allows manufacturers to use surplus NEV credits to offset corporate average fuel consumption (CAFC) credit deficits, adding compliance flexibility to the existing fuel efficiency regulation for passenger cars. That is why this NEV mandate policy is also widely known as dual credit policy in China.

Specifically, auto companies with annual production or import volume of at least 30,000 conventional passenger cars need to hit targets for both CAFC and NEV credits. Small-volume manufacturers need only to meet CAFC targets. If a company's actual CAFC is lower than its CAFC target for a given year, the company will generate surplus CAFC credits. On the contrary, a company will face a CAFC credit deficit if its actual CAFC is higher than its target. Similarly, a company generates surplus NEV credits if its actual NEV credits are greater than its target for NEV credits. It will face an NEV credit deficit if its actual NEV credits fall short of its target.

The policy also creates a market for credits:

- » Surplus NEV credits can be sold to other companies.
- » Surplus CAFC credits can be banked and carried forward to help with CAFC compliance in future years or transferred to affiliated companies to help offset a CAFC credit deficit.
- » To offset an NEV credit deficit, an automaker needs to purchase NEV credits from other companies.

4 MIIT. (2016). Temporary management regulation for corporate average fuel consumption and new energy vehicle credits for passenger vehicles (Proposal for public comments). Retrieved from <http://www.miit.gov.cn/n1146295/n1652858/n1653100/n3767755/c5261365/part/5261369.pdf> (in Chinese)

5 Hongyang, C. & Hui, H. (2016, October 6). Proposed temporary management regulation for corporate average fuel consumption and new-energy vehicle credits for new passenger cars in China. The International Council on Clean Transportation. Retrieved from <http://www.theicct.org/publications/proposed-temporary-management-regulation-corporate-average-fuel-consumption-and-new>

- » To offset a CAFC credit deficit, more options are provided, including using banked CAFC credits, transferring CAFC credits from affiliated companies, using self-generated NEV credits, and purchasing NEV credits from other companies.

Failure to meet CAFC or NEV credit targets after adopting all possible compliance pathways will lead to MIIT denial of type approval for new models that cannot meet their specific fuel consumption standards until those deficits are fully offset.

MIIT together with other relevant regulatory agencies⁶ will adopt a number of measures to supervise the NEV mandate system. These include checking and verifying the CAFC and NEV data submitted by auto companies, developing a management system so that multiple regulatory agencies can track credit information by vehicle maker, and establishing a public complaint system. Auto companies failing to properly disclose the relevant CAFC and NEV data will face warnings from MIIT and recalculation of their CAFC or NEV credits based on MIIT's investigative findings. Severe violators will be treated as "deceitful companies." MIIT and other relevant agencies will blacklist deceitful companies in the enterprise credit information management system and will inform the public.

⁶ Other relevant regulatory agencies include the Ministry of Commerce, the General Administration of Customs, and the Administration of Quality Supervision, Inspection, and Quarantine.

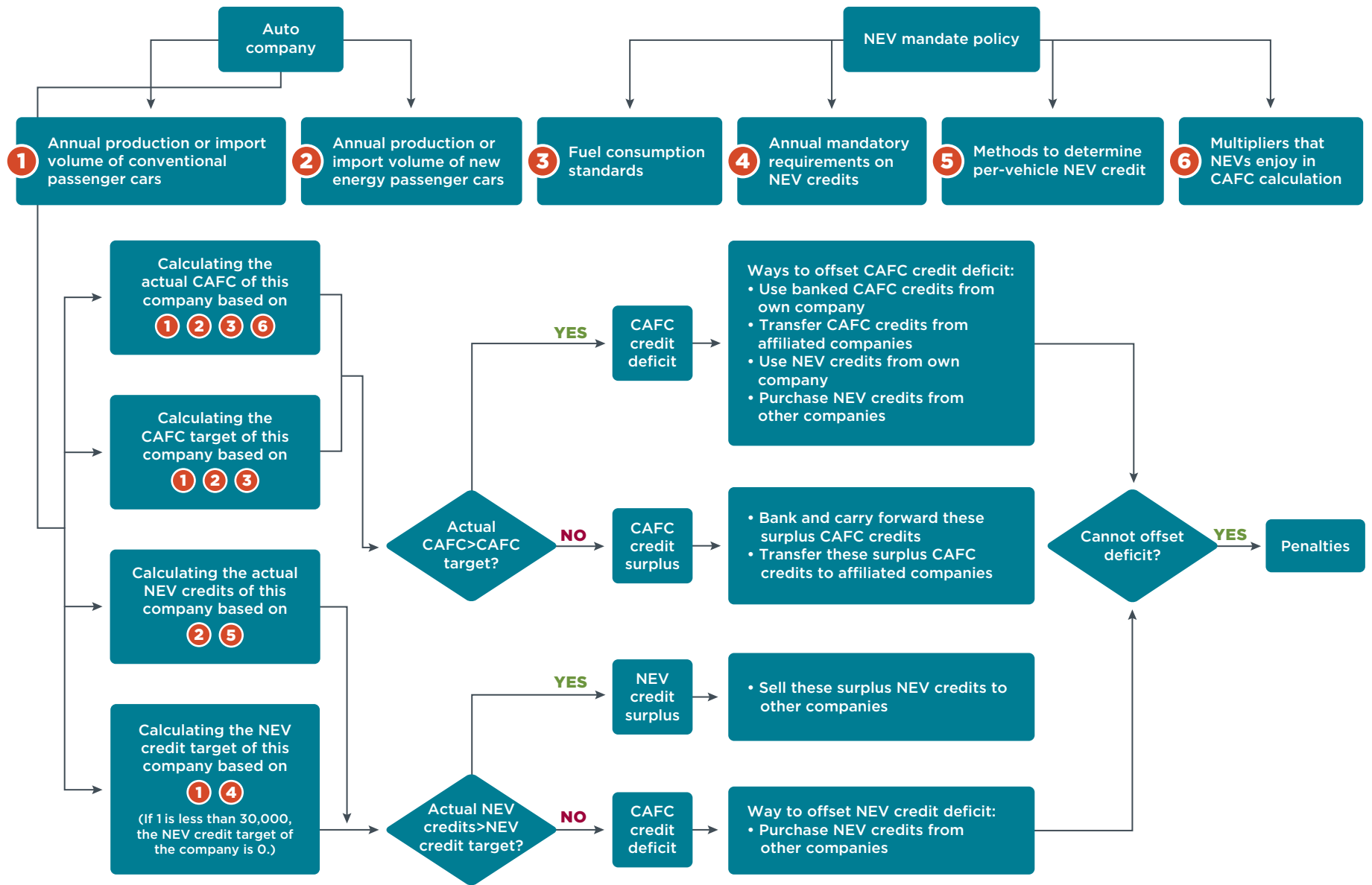


Figure 1. Concept map of how the dual credit policy works

2. MAJOR CHANGES IN THE FINAL RULE

The final rule made changes big and small to the interim proposal released last September. Table 1 summarizes the major differences between the interim proposal and the final rule. According to the final rule, this policy will be adjusted based on China's national conditions and the needs for auto industry development in the future.

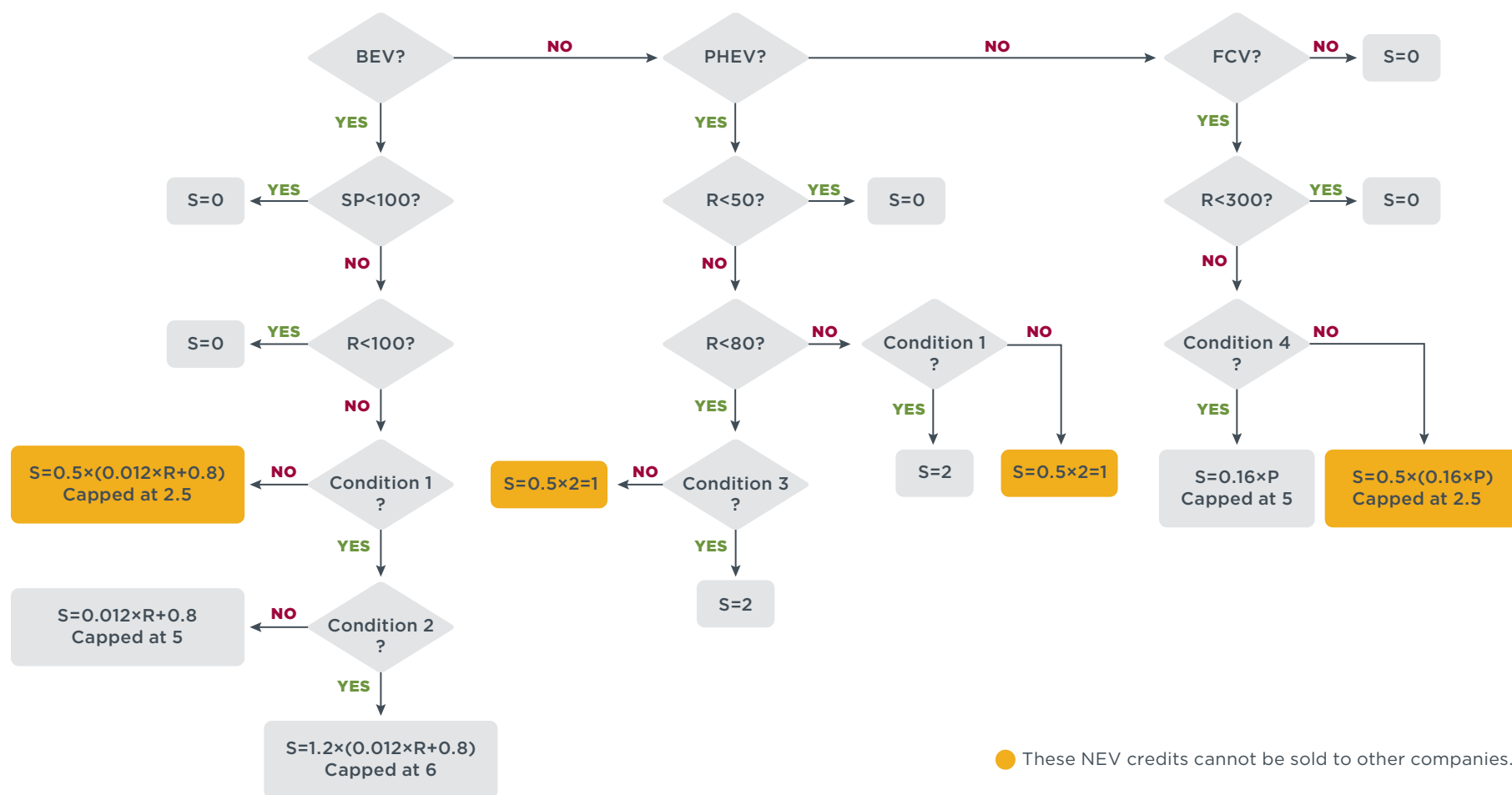
Table 1. Major differences between interim proposal and final rule

Item	Interim Proposal	Final Rule
Annual mandatory requirements on NEV credits	2018: 8%	2018: No requirement
	<ul style="list-style-type: none"> • 2019: 10% • 2020: 12% • 2021 and beyond: To be determined later 	
Definition of small-volume manufacturer⁷	Annual production/import volume of conventional passenger cars < 50,000	Annual production/import volume of conventional passenger cars < 30,000
Technical thresholds for NEV credit qualification	BEV: Electric range ≥ 80km	Electric range ≥ 100km Maximum vehicle speed ≥ 100km/h
	PHEV: Electric range ≥ 50km	
	FCV: Electric range ≥ 250km	Electric range ≥ 300km
Per-vehicle credit for BEV	Electric range (km)	Per-vehicle credit
	80-150	2
	150-250	3
	250-350	4
	≥ 350	5
	(0.012 × electric range + 0.8) × adjustment factor,* capped at 6	
Per-vehicle credit for PHEV	2	2 × adjustment factor*
Per-vehicle credit for FCV	Electric range (km)	Per-vehicle credit
	250-350	4
	≥ 350	5
		(0.16 × fuel cell system rated power) × adjustment factor,* capped at 5
NEV credits carry-forward policy	NEV credits cannot be banked or carried forward	
		Exception: 2019->2020
NEV credits carry-back policy	NEV credits cannot be carried back	
		Exception: 2020->2019

* See Figure 3 for BEV factors, Figure 4 for PHEV factors, and Figure 5 for FCV factors.

In the final rule, the per-vehicle NEV credit is designed carefully to incentivize advanced technology vehicles. Figure 2 shows in detail the methods for determining the per-vehicle NEV credits for models with different technology performance.

⁷ Small-volume manufacturers need only to fulfill the CAFC targets. They are not subject to any NEV credit requirements.



BEV = battery electric passenger vehicle
 PHEV = plug-in hybrid electric passenger vehicle
 FCV = fuel cell passenger vehicle
 SP = maximum vehicle speed (km/h)
 R = electric range (km)
 S = per-vehicle NEV credit
 Y = energy consumption (kWh/100km)
 m = vehicle curb weight (kg)
 P = rated power of fuel cell system (kW)

Condition 1: When tested under the electric mode, $Y \leq 0.014 \times m + 0.5$ ($m \leq 1000$);
 $Y \leq 0.012 \times m + 2.5$ ($1000 < m \leq 1600$); $Y \leq 0.005 \times m + 13.7$ ($m > 1600$).
Condition 2: When tested under the electric mode, $Y \leq 0.0098 \times m + 0.35$ ($m \leq 1000$);
 $Y \leq 0.0084 \times m + 1.75$ ($1000 < m \leq 1600$); $Y \leq 0.0035 \times m + 9.59$ ($m > 1600$).
Condition 3: When tested under the non-electric mode, fuel consumption (L/100km) is lower than 70% of the current (Phase IV) fuel consumption limits.
Condition 4: The rated power of fuel cell system is no lower than 30% of the rated power of the driving motor or 10kW, whichever is larger.

Figure 2. Methods for determining the per-vehicle NEV credits for NEV models with different technical performance

To be specific, for BEVs, the base per-vehicle NEV credit is calculated using a linear equation ($0.012 \times \text{electric range} + 0.8$), capped at five. Then an adjustment factor will be applied to the base per-vehicle NEV credit to get the final per-vehicle NEV credit of as much as six. As shown in Figure 3, the adjustment factor is determined by energy consumption (EC) and curb mass (CM). Different adjustment factors apply in different EC/CM zones. For a given vehicle weight, less energy-consuming vehicles will get more per-vehicle NEV credits.

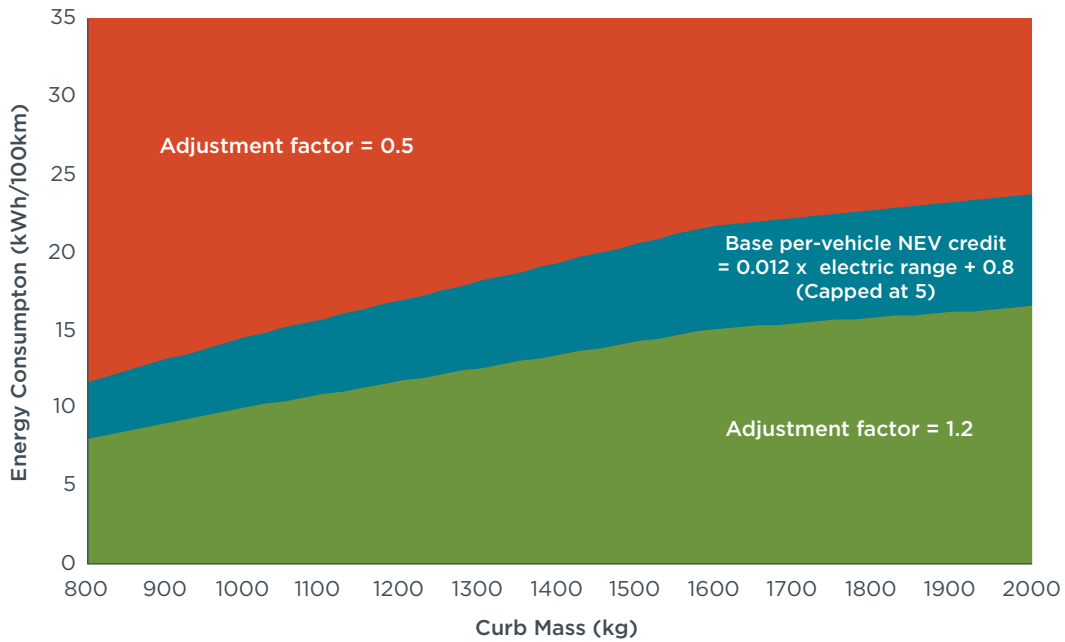


Figure 3. Per-vehicle NEV credits for BEVs⁸

⁸ This figure was updated as of 3/16/2018 to correctly reflect how the curb weight and energy consumption of a BEV impact its per-vehicle NEV credit.

For PHEVs, the base per-vehicle NEV credit is two. Then an adjustment factor will be applied to get the final per-vehicle NEV credit. As shown in Figure 4, for PHEVs with an electric range less than 80 km, the adjustment factor is determined by fuel consumption under non-electric mode. For models with longer electric range, the adjustment factor is determined by electricity consumption under electric mode. More energy-consuming PHEVs will get only half the base per-vehicle NEV credit.

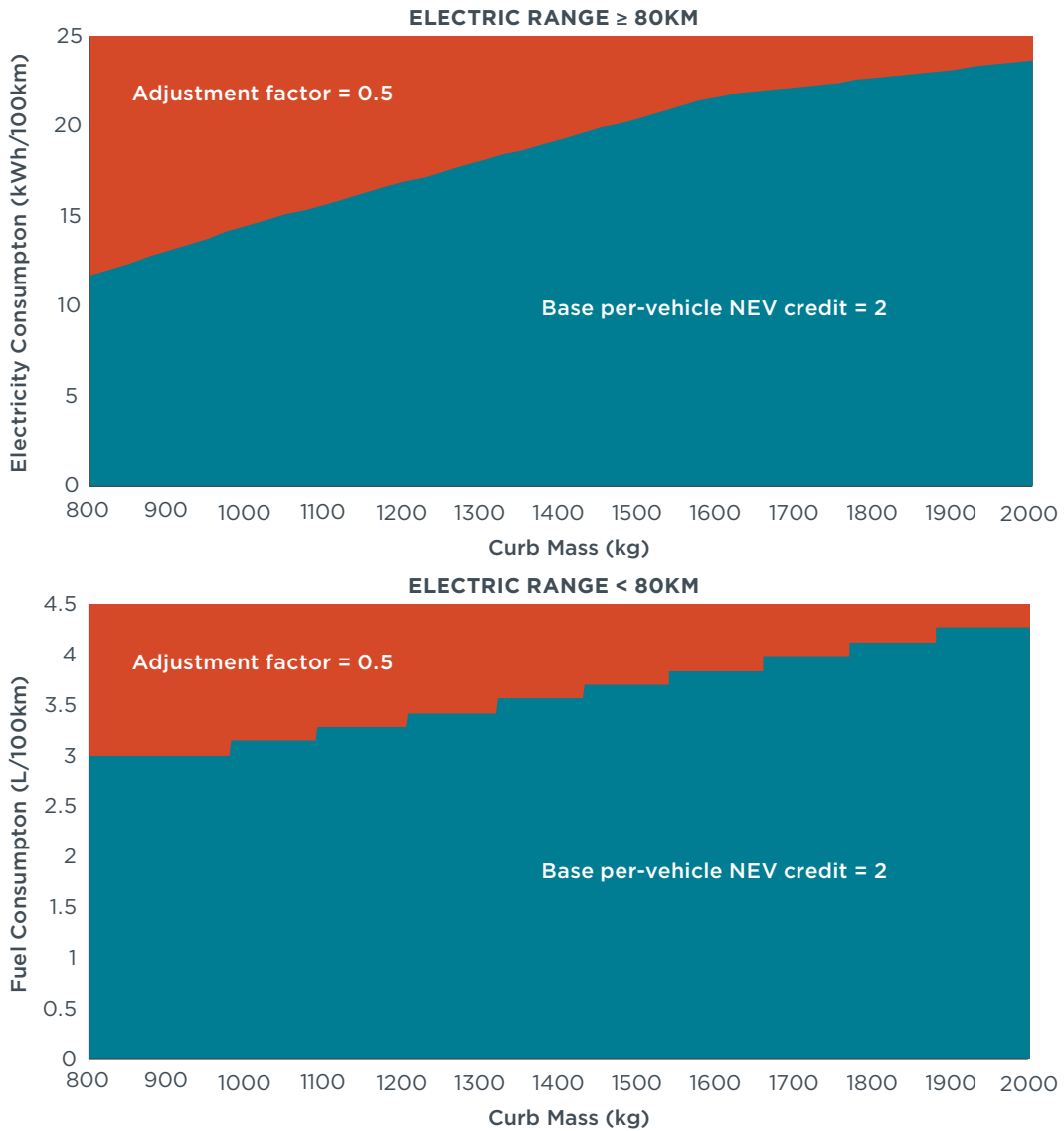


Figure 4. Per-vehicle NEV credits for PHEVs

For FCVs, the base per-vehicle NEV credit is calculated by a linear equation ($0.16 \times$ fuel cell system rated power), capped at 5. As is shown in figure 5, vehicles whose fuel cell system rated power is lower than 10kW or 30% of the rated power of the driving motor will get only half the base per-vehicle NEV credit.

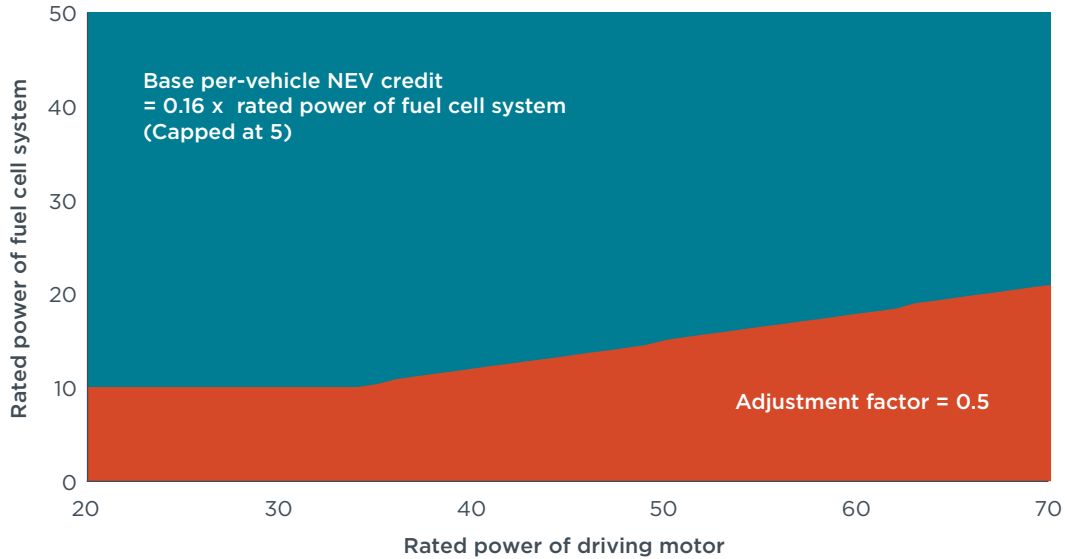


Figure 5. Per-vehicle NEV credits for FCVs

We chose two top-selling NEV models in the United States, the Chevrolet Volt and Bolt, and two top-selling NEVs in China, the BYD Qin 100 and BAIC EV200, as examples to calculate the per-vehicle NEV credits under the methods outlined in the regulation. As shown in Figure 6, both PHEV models can earn two NEV credits per vehicle because of their good performance in energy consumption. The Chevrolet Bolt EV, with an electric range of more than 380 km, can obtain a per-vehicle NEV credit of five, the highest among the four models.

	United States		China	
	Volt	Bolt	Qin 100	EV200
Vehicle type	PHEV	BEV	PHEV	BEV
Electric Range (km)	85	383	100	200
Energy consumption (kWh/100km)	19.3	17.6	18.6	14.5
Curb mass (kg)	1721	1616	1785	1295
Fuel Consumption (L/100km NEDC)	5.8	n/a	6.1	n/a
Per-vehicle NEV credit	2	5	2	3.2

Figure 6. Per-vehicle NEV credits for best-selling models in United States and China

3. POTENTIAL IMPACTS OF THIS POLICY

As the world's first ZEV mandate at the national level, China's NEV policy is expected to significantly boost China's NEV market. As shown in Figure 7, depending on the NEV technology path that manufacturers choose, the rule would require production of 2.2 million to 8.7 million new energy passenger cars in 2016-2020. Based on our best estimates of the electric range of passenger electric cars, we estimate -3 credits per vehicle. This means that China's NEV share of new passenger vehicle sales will go from about 1% in 2016 to roughly 2% in 2017, then about 3% in 2019 and 4% in 2020. Combined with NEVs in the commercial sector, the Chinese government would achieve its cumulative target of 5 million NEV sales in 2020.⁹

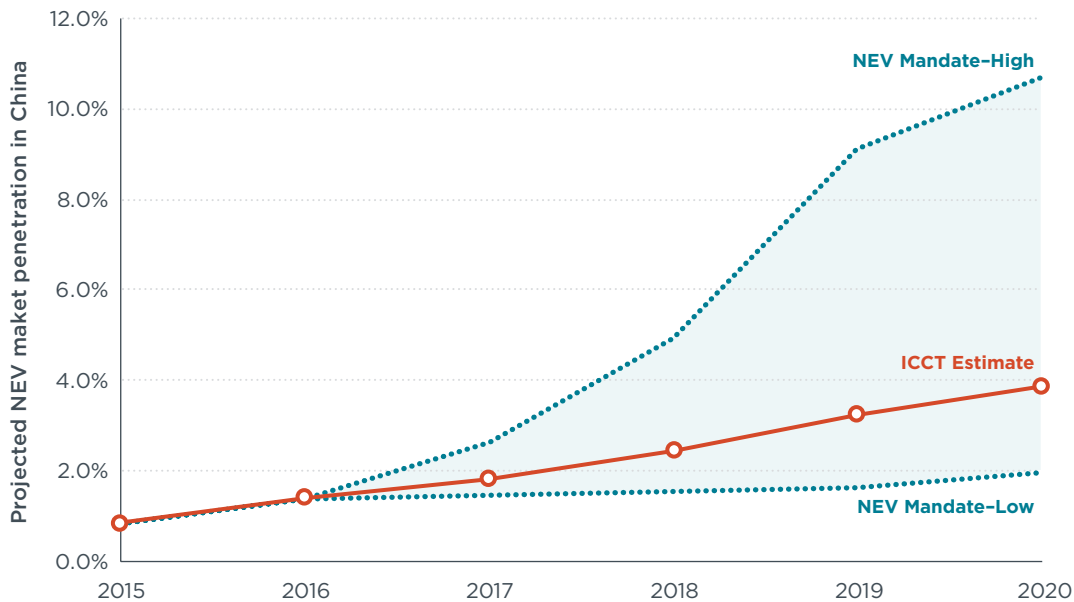


Figure 7. Projected NEV market penetration in China

However, adequate attention should still be paid to the fuel-efficiency gains of conventional cars. China's ongoing Phase IV (2016-2020) fuel-efficiency standard has deployed multipliers to NEVs to account for corporate average fuel efficiency for compliance. The NEV mandate, with ambitious NEV targets, will dramatically magnify that compliance flexibility, which may lead to a major weakening of the efficiency targets for conventional cars. This policy also allows using surplus NEV credits to offset CAFC credit deficits. By taking full advantage of this flexibility, manufacturers could further relax the requirements they face for improving fuel efficiency of conventional vehicles.

4. NEXT STEPS

This is a milestone policy for the auto industry globally. Since China is the world's largest auto market, this NEV mandate policy will undoubtedly speed up the global transition to a zero emission fleet, which will be vital for the climate and for urban air quality.

⁹ General Office of the State Council. (2012). Energy-saving and new energy vehicle industry strategic planning 2012-2020. Retrieved from http://www.gov.cn/zwqk/2012-07/09/content_2179032.htm (in Chinese)

At 340,000 autos, China's annual new energy passenger car sales¹⁰ are already the world's highest. This NEV mandate sets ambitious targets and requires annual new energy passenger car production in China to increase by as much as four times by 2020. The targets raise concern whether consumers and cities could accommodate such rapid growth because there are still many barriers to overcome, including cost barrier and technical challenges such as cold-weather battery performance and range anxiety. Having two major flexibilities for auto manufacturers to comply with CAFC targets may erode the stringency of the passenger car fuel consumption standards if there are no preventive measures and policies. Now there is a need to put resources into studying 1) how NEVs could help improve China's urban air quality, 2) how to design comprehensive incentives to encourage consumers to purchase NEVs, and 3) how to avoid the potential negative impacts of the two major flexibilities on the fuel-efficiency improvement of conventional cars.

We will continue to track the market response to this landmark policy.

¹⁰ China Association of Automobile Manufacturers. (2017). Economical operation of China's auto industry in 2016. Retrieved from <http://www.caam.org.cn/xiehuidongtai/20170112/1505203997.html> (in Chinese)