

POLICY UPDATE

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China's New Energy Vehicle Industrial Development Plan for 2021 to 2035

OVERVIEW

In October 2020, the State Council of the People's Republic of China released the *New Energy Vehicle Industrial Development Plan for 2021 to 2035* (hereafter "Plan 2021-2035"). This is a sequel to the *Energy-Saving and New Energy Vehicle Industry Plan for 2012 to 2020* ("Plan 2012-2020"), released in 2012.¹ By setting a target of about a 20% share for new energy vehicles (NEVs)² in new vehicle sales by 2025 and other development targets for the NEV industry, Plan 2021-2035 aims to build a green, robust, and internationally competitive auto industry in China. This policy update offers an overview of Plan 2021-2035 and compares it with its ancestral version.

BACKGROUND

By the end of 2020, China had put 4.92 million NEVs on the road, and these accounted for more than 50% of the global total.³ That number is very close to the NEV sales target set in Plan 2012-2020. Now China is due for an updated, longer-term plan that connects the pressing national challenges related to oil conservation, air pollution reduction, and climate change mitigation with the nation's ambition to build a world-class auto industry. At the same time, a new wave of technology revolution is underway in the global automotive industry. In the future, mobility will not only serve as a tool to transport people from one location to another, but will also encompass a wide range of functionalities, such as onboard digital entertainment, energy storage, and external information communication. It is expected that future demand for vehicles will trend toward autonomous, connected, electrified, and shared mobility, and meeting this demand will require innovations across industries. Plan 2021-2035 is

- 1 State Council, "Notice on printing and issuing the development plan for the new energy vehicle industry (2021-2035)" [国务院办公厅关于印发新能源汽车产业发展规划（2021-2035年）的通知] (2020), http://www.gov.cn/zhengce/content/2020-11/02/content_5556716.htm
- 2 In the Chinese context, new energy vehicles (NEVs) are battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs; extended-range electric vehicles included), and fuel cell electric vehicles (FCVs).
- 3 "By 2020, China had 372 million motor vehicles" [2020年全国机动车保有量达3.72亿辆], *Sina News*, January 7, 2021, <https://finance.sina.com.cn/tech/2021-01-07/doc-iiznctkf0700301.shtml>; and Xiaoyu Chang, "China's new energy vehicle industry leads the world in scale, with production and sales ranking first in the world for five consecutive year" [我国新能源汽车产业规模全球领先 产销量连续五年位居世界首位], *Xinhua News*, July 24, 2020, http://www.xinhuanet.com/fortune/2020-07/24/c_1126279474.htm

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formed in this context and aims at positioning the Chinese auto industry at the front of this new wave.

KEY ELEMENTS

VISION

Plan 2021–2035 includes three overarching goals.

- » Form a globally competitive auto industry with advanced NEV technologies and good brand reputation
- » Transition to an energy-efficient and low-carbon society with a convenient charging service network and pure electric vehicles (BEVs) as the mainstream in sales
- » Improve national energy security and air quality, mitigate climate change, and stimulate economic growth in the automobile, energy, transportation, and information and communications industries

TARGETS

Plan 2021–2035 sets specific targets for NEV market development, technology advancement, and the build up of supporting services in the near, mid, and longer terms, as summarized in Table 1.

Table 1. Targets in Plan 2021–2035

	Starting in 2021, near term	By 2025, mid term	By 2035, longer term
NEV market	≥ 80% NEVs in new or renewal public fleets (e.g., buses, taxis, and delivery vehicles) in pilot zones and key air pollution regions		100% electrification of the stock of public fleets
	—	~20% NEV annual sales	BEVs become the mainstream of new vehicle sales
Key technology breakthrough	—	Average electricity consumption of new passenger BEVs = 12.0 kilowatt hours (kWh)/100 kilometers (km)	NEV core technologies reach world-class levels
Autonomous driving	—	Commercialize autonomous driving in specific areas and scenarios	Scale-up the application of highly autonomous intelligent and connected vehicles
FCV	—	—	Commercialize FCVs
Charging and refueling	—	Significantly improve charging and battery swapping services	Build the foundation for a hydrogen fuel supply system
	—	—	Build efficient and convenient charging and battery swapping networks

TASKS

To fulfill its vision and meet the targets, Plan 2021–2035 sets five strategic tasks for China’s NEV industry for the next 15 years: (1) improve capacity for technology innovation; (2) build an NEV industry ecosystem; (3) advance industrial integration and development; (4) build a sound infrastructure system; and (5) increase openness and deepen international cooperation.

Task 1. Improve capacity for technology innovation

Task 1 focuses on an innovation-driven development strategy for China’s NEV industry. It requires reinforcing technology innovations in the “Three-by-Three

Research and Development”⁴ core areas with a greater focus on vehicle assembly and integration technologies and the supply system of key components. Task 1 also highlights cooperation among corporate champions, key national laboratories, and manufacturing innovation centers to enhance research and development (R&D) of key technologies, particularly those that are difficult and have the same or similar technological features as those needed by many firms in the NEV industry. It also advocates that institutes such as innovation incubation centers and industrial associations establish collaborative platforms that support technology transfer, talent cultivation, financing, international communication, and testing. Three technological innovation projects need particular action: (1) Battery technology, focused on research into electrode materials, electrolyte technology, lightweighting, safety, cost, and battery life; (2) Intelligent and connected technology, focused on environment sensing, smart decision and control, high precision mapping and positioning, vehicle to everything (V2X) communication, and wire control systems; (3) Foundational technologies in the supply chain of key components, such as automotive-grade chips, vehicle operating systems, driving motors, and powertrain control systems.

Task 2. Build an NEV industry ecosystem

In the past, China’s NEV industry was narrowly focused on the production of key components, vehicle production, and automobile marketing. Task 2 proposes employing a systematic approach to build and enhance an industrial ecosystem that includes all NEV-related firms involved in the production, marketing, and use of NEVs from upstream to downstream. The intended new ecosystem would feature synergies in the automotive, energy, transportation, and information and communication industries, and more. Two core areas of the ecosystem are to be strengthened: (1) the R&D of vehicle operating systems; and (2) the value chains of batteries. Task 2 also advocates applying a higher level of intelligent technologies in NEV design, production, and other post-sales services while ensuring technology reliability and product quality. In particular, it is encouraged to form coalitions among vehicle integration, components production, internet, and the electronic information and communication industries, to cooperate to improve the safety, reliability, and convenience of vehicle operating systems. In addition, task 2 requires establishing an efficient battery recycling system by implementing the extended producer responsibility policy, building up a battery traceability management platform, and improving technologies and industry deployment for the reuse, recycle, and disposal of spent batteries from NEVs.

Task 3. Advance industrial integration and development

To boost the formation of the aforementioned industrial ecosystem, task 3 provides detailed guidance on how to integrate the NEV industry with three vital fields: energy, transportation, and the information and communication industries. Regarding integration with the energy industry, it encourages utilizing more electricity generated from renewable energy for NEV charging. At local levels, it is encouraged to launch vehicle-to-grid pilot programs that allow interaction between NEVs and the grid for the purposes of regulating peak loads and reducing charging costs. With respect to integration with the transportation industry, task 3 proposes the establishment of an intelligent traffic control system to provide more accessible travel services, and this involves cooperation between NEV manufacturers and mobility service businesses. It also urges the application of more NEVs in public fleets, such as city buses, taxis, time-sharing leasing, non-road sectors, and in logistics services, especially for inner-city ports. Concerning integration with the information

4 The “Three-by-Three Research and Development” concept includes the three new energy vehicle technologies as pillars—BEVs, PHEVs, with extended-range electric vehicles included, and FCVs—and three component technologies, batteries and management systems, driving motors and power electronics, and intelligent and connected vehicle technologies.

and communications industries, task 3 guides the establishment of platforms for multi-level data collecting, computing, and processing based on the data of drivers, pedestrians, vehicles, roads, and cloud information to offer better mobility, traffic control, and urban management services. Meanwhile, the use of information and communication technologies is urged to assist the establishment of a secure network and to protect data in vehicles, the data that is transmitted, and the data in the cloud. To be sure, the integration of the industries mentioned will demand new and comprehensive standards. Task 3 takes this need into account and requires establishing the corresponding standard system to facilitate data sharing across sectors and improve the relevant hardware and software compatibility. Particularly, task 3 emphasizes actions to launch NEV pilot programs incorporated with elements of smart city building.

Task 4. Build a sound infrastructure system

Task 4 guides the improvement of NEV infrastructure in three aspects: scale-up charging and battery swapping networks; update urban road facilities with intelligent ones; and build hydrogen fuel refill supporting systems. In particular, task 4 promotes the construction of well-deployed, scenario-based, intelligent, and safe charging networks in both urban and rural areas. It also advocates digitizing transportation infrastructure such as traffic lights, street signs, and test equipment, the application of satellite positioning, and establishing the relevant supporting standards. As for hydrogen fuel refill supporting systems, task 4 encourages deploying facilities based on existing infrastructure used for gasoline, natural gas, or electricity and lowering the cost of hydrogen production, storage, and transport premised on secured safety. This task requires particular actions, too. Specifically, it urges the establishment of smart and comprehensive infrastructure service platforms with greater facility compatibility and application of information and communication technologies.

Task 5. Increase openness and deepen international cooperation

Plan 2021–2035 identifies increased openness and the deepening of international cooperation as vital strategies for building China’s NEV industry into a green, robust, and internationally competitive one. Thus, it encourages the expansion of China’s corporate cooperation with foreign firms, research institutes, and industry associations in relevant areas such as research, design, investment, talent cultivation, and more. Domestic firms are encouraged to make international development strategic plans, exploit overseas markets, and establish warehouses and post-sale service platforms abroad. It is also emphasized that supporting services for international cooperation such as corporate compliance and legal consulting and test and certification services are to be strengthened. Additionally, task 5 guides China to proactively participate in making the relevant international rules and standards.

COMPARISON WITH THE PREVIOUS PLAN

This section compares the key elements in Plan 2021–2035 and Plan 2012–2020 in eight dimensions, and concludes with a summary table that illustrates the major differences (see Table 2).

SCOPE

Plan 2012–2020 covered energy-efficient internal combustion engine (ICE) vehicles and NEVs, whereas Plan 2021–2035 is solely about NEVs. This signifies the increasing importance of NEV development.

NEV MARKET GOALS

Plan 2012–2020 focused on expanding the NEV market, as reflected by the targets set for the production and sale of BEVs and PHEVs. Plan 2021–2035 lifts the market goals by setting sales penetration targets for the entire NEV fleet and particular targets for public fleets.

KEY TECHNOLOGY BREAKTHROUGH TARGETS

Plan 2012–2020 mainly targeted battery and electric drive system technology breakthroughs in terms of performance and cost. Plan 2021–2035, meanwhile, targets all the NEV core technologies, and one particular indicator of the overall vehicle performance: the average electricity consumption.

INDUSTRY DEVELOPMENT FOCUS

Under the guidance of Plan 2012–2020, China boosted the NEV industry supply chain, such as key components, batteries, and vehicle production, while encouraging derivative business forms such as charging services, vehicle-to-grid (V2G), credit financing, insurance, leasing, second-hand transactions, and post-sales services. However, Plan 2021–2035 promotes all industries involved in the integration of the NEV industry within the fields of energy, transportation, and information and communications, as long as they serve the production, marketing, or use of NEVs. Additionally, Plan 2021–2035 has a clear industry development focus on the whole value chain of vehicle operating systems and batteries.

CHARGING INFRASTRUCTURE

Plan 2012–2020 offered preliminary guidance to explore foundational charging infrastructure technologies and the business models that could best meet the basic market needs. For example, it encouraged R&D into core technologies such as charging and billing, facility networking, and monitoring. It also encouraged the use of pilot programs to determine a future technology roadmap, industrial development path, and business models through lessons learned.

Plan 2021–2035 offers more precise directions for technology development and short- and longer-term planning for charging infrastructure. It identifies new focuses of R&D for charging, such as high-voltage charging, wireless charging, safety monitoring, and warning systems for charging infrastructure, and seeks to overcome bottlenecks and boost novel technologies, as well. For longer-term infrastructure construction, the plan requires incorporating charging and battery swapping infrastructure deployment into urban and rural planning, grid planning, residential property management, and urban parking management. For short-term infrastructure construction, Plan 2021–2035 promotes location-oriented facilities; this means smart, slow-charging in residential areas that is supplemented by fast-charging in case of emergencies, and fast-charging along highways in urban and rural areas that is supplemented by slow-charging. Moreover, Plan 2021–2035 guides the formation of compatible charging service platforms across charging suppliers, to allow for information sharing and a uniform method of payment.

BATTERY SWAPPING AND HYDROGEN REFUELING FACILITIES

In Plan 2012–2020, battery swapping and hydrogen refueling were novel technologies and exploration of them via pilot projects was encouraged. But Plan 2021–2035 sets requirements for building battery swapping and hydrogen refueling facilities. Plan 2021–2035 requires improving the convenience of battery swapping services significantly in the next 5 years and building the foundations for a hydrogen fuel

supply system by 2035. Still, there are no required numerical targets for these facilities in Plan 2021–2035.

REGULATIONS AND INCENTIVES

Plan 2012–2020 focused on establishing a set of core regulatory standards and test procedures for NEVs, parts, and infrastructure. These included regulations for vehicle product certification, vehicle safety, battery reuse and recycling, components maintenance and testing, and technological standards for charging, hydrogen refueling, and battery swapping facilities. In particular, Plan 2012–2020 required establishing and implementing a series of fuel consumption standards for passenger, light commercial, and heavy-duty commercial vehicles, and related fiscal policies. It also called for financial support primarily targeted toward technology innovations, pilot projects, vehicle production, and the scale-up of government procurement of energy-efficient vehicles and NEVs. At local levels, Plan 2012–2020 advocated municipal financial support for charging facilities, and battery reuse and recycling. More importantly, Plan 2012–2020 promised subsidies for pilot programs in the public fleet and vehicle purchases in the private sector, and the elimination of the business tax for qualified companies in the industry.

Plan 2021–2035 enhances the current policies to address some of the recent issues associated with NEV development (e.g., local protectionism) and expands the regulatory and technical requirements to include smart driving, shared mobility, and other emerging industries. It does this specifically by:

- » Shifting from direct subsidies for NEVs to taxation exemptions (e.g., no vehicle purchase tax and no vehicle and vessel tax), charging subsidies, and parking incentives, and incentivizing R&D investment from state-owned enterprises
- » Enhancing the NEV mandate policy and exploring its integration with the carbon trading mechanism
- » Tightening the NEV vehicle market entrance requirements, and accelerating the elimination of zombie companies that reap subsidies through forged sales documents
- » Enhancing battery reuse and recycling by establishing the power battery traceability and management platform for NEVs and accelerating legislation on spent power batteries
- » Encouraging the introduction of local policies to promote shared, intelligent, and connected mobility
- » Other measures to remove institutional and market barriers, including assuring an open and level domestic market, and enhancing local technical capacity building and attracting top talent.

IMPLEMENTING ENTITIES

There were four leading ministries for Plan 2012–2020, the Ministry of Industry and Information Technology (MIIT), the National Development and Reform Commission (NDRC), the Ministry of Science and Technology (MOST), and the Ministry of Finance (MOF). Plan 2021–2035 additionally calls for collaborative implementation from the Ministry of Public Security, Ministry of Ecology and Environment, State Taxation Administration, China Banking and Insurance Regulatory Commission, National Energy Administration, and 11 other departments. This underscores the comprehensiveness of the new plan.

Table 2. Comparison of the New Energy Vehicle Industrial Development Plan 2021–2035 and its ancestral version

Scope	Energy-Saving and New Energy Vehicle Industry Plan (2012–2020)	New Energy Vehicle Industrial Development Plan (2021–2035)
	NEVs and ICE vehicles	NEVs only
NEV market goals	<p>By 2015:</p> <ul style="list-style-type: none"> Cumulative production or sales of 500,000 BEVs and PHEVs <p>By 2020:</p> <ul style="list-style-type: none"> Cumulative production or sales of 5 million BEVs and PHEVs Annual production capacity of 2 million BEVs and PHEVs in 2020 	<p>From 2021:</p> <ul style="list-style-type: none"> ≥ 80% newly added vehicles into in public fleets in key regions must be NEVs <p>By 2025:</p> <ul style="list-style-type: none"> ~20% share for NEVs in annual new vehicle sales <p>By 2035:</p> <ul style="list-style-type: none"> 100% electrification of the stock of public fleets BEVs become the mainstream of new vehicle sales
Key technology breakthrough targets	<p>By 2015:</p> <ul style="list-style-type: none"> Maximum speed of passenger BEVs and PHEVs: > 100 km/h Battery energy density of power cells: > 150 Wh/kg Battery cost: < ¥2/Wh Battery life: 2,000 times stable charge and recharge or 10 years of service life Power density of the electric drive system: > 2.5 kW/kg Electric drive system cost: < ¥200/kW <p>By 2020:</p> <ul style="list-style-type: none"> Battery energy density of power cells: > 300 Wh/kg Battery cost: < ¥1.5/Wh 	<p>By 2025:</p> <ul style="list-style-type: none"> Average electricity consumption of new passenger BEVs: ≤ 12.0 kWh/100 km <p>By 2035:</p> <ul style="list-style-type: none"> NEV core technologies reach world-class levels
Industry development focus	Focused on the NEV supply chain and derivative business models	Focuses on the entire industrial value chain and cross-industry collaboration
Charging infrastructure	<ul style="list-style-type: none"> R&D of core technologies that meet basic needs Explored future technology roadmap, industrial development path, and business models through pilot programs 	<ul style="list-style-type: none"> R&D of novel and high-tech charging technologies to avoid bottlenecks Guides long-term planning and short-term deployment of charging facilities Requires increasing facility compatibility and information sharing
Battery swapping and hydrogen refueling facilities	<ul style="list-style-type: none"> R&D of technologies and exploration of business models 	<ul style="list-style-type: none"> Sets short- and long-term requirements for related industries
Regulations, incentives, and other policy support	<ul style="list-style-type: none"> Introduced technical standards for the NEV industry, including market entrance, vehicle safety, battery, components, charging, swapping and refueling Established fuel consumption standards for light- and heavy-duty vehicles Subsidies and tax incentives for pilot programs 	<ul style="list-style-type: none"> Shift from upfront vehicle subsidy to a range of incentives during ownership and use Enhance the NEV mandate policy and explore its integration with the carbon trading mechanism Tighten the NEV manufacturer market entrance requirement and eliminate zombie companies Enhance battery reuse and recycling Promote shared, intelligent, and connected mobility
Implementing entities	<ul style="list-style-type: none"> MIIT, NDRC, MOST, and MOF Local governments 	<ul style="list-style-type: none"> MIIT takes the lead, and another 20 departments are involved Local governments