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China EV Charging Station and Charging Pile Market Report, 2021

Abstract

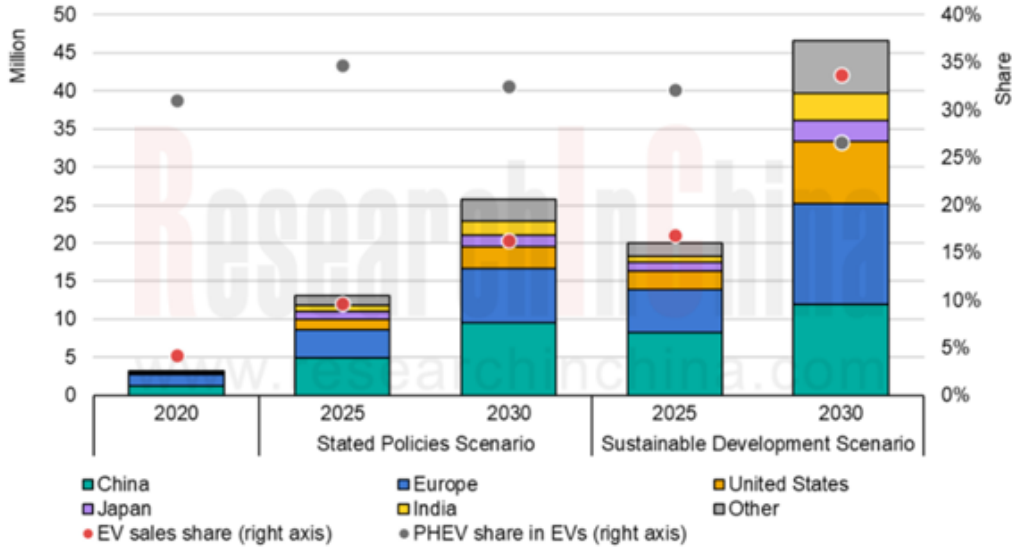
Charging Infrastructure Research: Three Modes for Self-Building and Operation of OEM's Charging Piles

Global charging pile ownership surged, while high-power fast charging network leads the growth

As of the end of 2020, there are over 11 million units of EVs on the road worldwide. Although global automotive industry suffered downturn under the impact of the COVID-19, global EV registration grew by 41% in 2000. According to IEA (International Energy Agency) data, global EV sales volume is expected to be 15 million units to 20 million units by 2025.

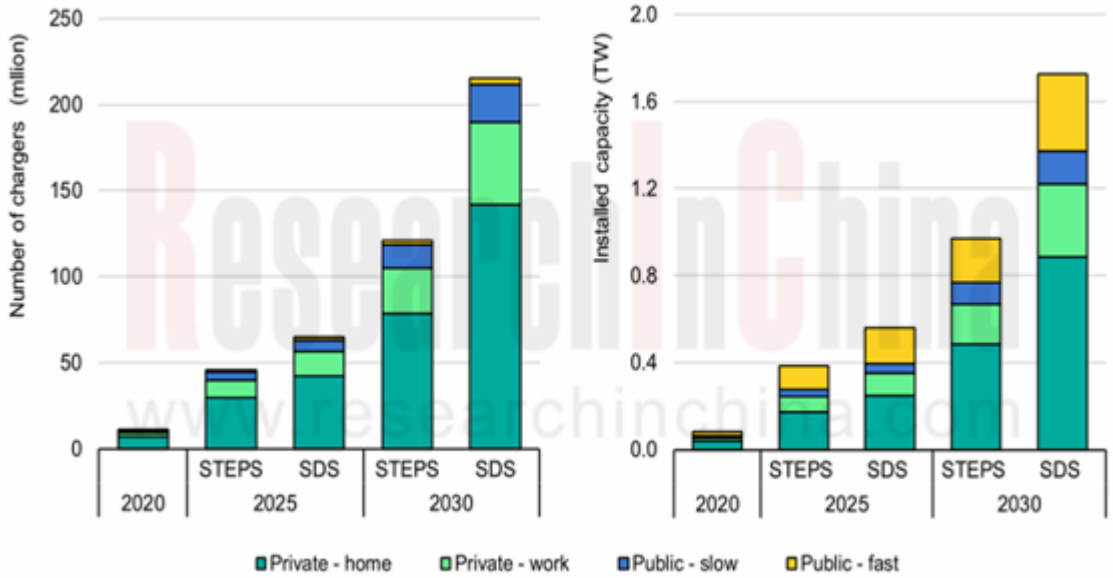
Under this background, government of each county fastens planning and construction of charging piles. Based on IEA's statistics, number of EV charging infrastructures worldwide in 2020 amounted to 9.5 million units, including 2.5 million units public ones. Conservatively forecast, global EV charging infrastructures will increase to around 50 million units, including nearly 10 million units of public one.

Forecast Global EV Sales Volume



Source: IEA

Global Charging Infrastructures Development Outlook



Source: IEA

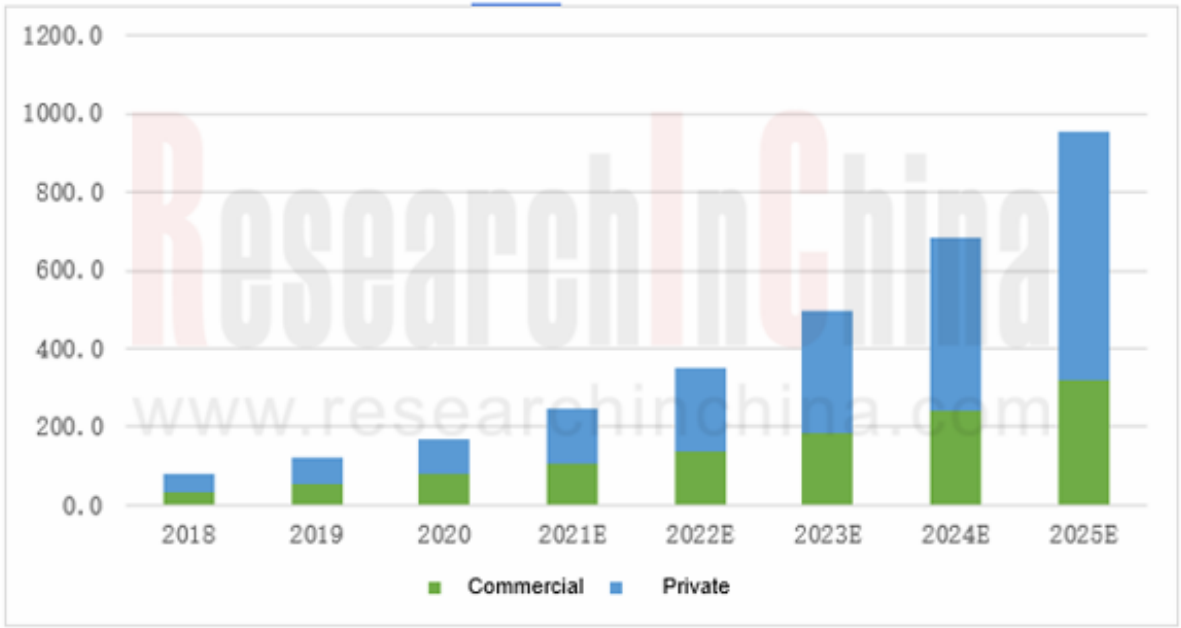
Abstract

China charging pile ownership

Currently, China's charging pile ownership ranks first in the world. As of the end of 2020, China's new energy vehicle ownership reached 4.92 million units, and number of charging piles amounted to 1.68 million units. Among them, number of private and commercial charging piles (including public and special) hit 874,700 units and 806,000 units, respectively, while car-to-pile ratio was 0.34 to 1.

It is estimated that China's new energy vehicle ownership will amount to 17.82 million units by 2025 and number of charging piles will approximate 9.39 million units. Among them, number of private and commercial charging piles (including public and special) will hit 6.18 million units and 3.21 million units, while car-to-pile ratio will be 0.53 to 1.

China's Charging Infrastructure Ownership, 2018-2025E
(Unit: 10,000 units)



Source: ResearchInChina

Abstract

China highway fast charging network

At present, China's highway fast charging network has basically taken shape, ranking first in the world. By 2020, a total of 2,251 charging stations and 9,065 charging piles have been built on 42 highways, with a service mileage of 54,000 kilometers, accounting for 35% of the total mileage of highways nationwide. According to the summary of bidding information for highway charging equipment of the State Grid over the years, highway charging piles are mainly 80 KW to 160 KW, and 240/480 KW super-power super-charging piles have been laid.

Bidding Quantity and Power Distribution of State Grid's Highway Charging Equipment, 2014-2021

AC/DC	Power	2014	2015	2016	2017	2018	2019	2020	2021	Total
AC	7kW	25				8				33
	Summary of AC	25				8				33
DC	120kW					222	192			414
	125kW		1931	496	600					3027
	160kW							191	163	354
	225kW	8								8
	24-60kW				24	12				36
	37.5kW	25								25
	450kW						2			2
	48-120kW				413	340				753
	60.2-120.4kW					27				27
	60kW				8		16			24
	80kW							24	128	152
	480kW							9	18	27
	240kW							15	16	31
	Summary of DC	33	1931	496	1045	601	210	239	325	4880
Total		58	1931	496	1045	609	210	239	325	4913

Source: State Grid Bidding; ResearchInChina

Abstract

Medium and high-end intelligent EV brands vigorously layout charging network construction

Added value of intelligent EV brands has increased significantly, bringing about consumption upgrading in the automobile industry. Apart from intelligence and quality of the vehicles, charging quality improvement is also important. An article (Can the Battery Swap Mode that NIO and BAIC BJEV Both Bet on Overturn the industrial ecology?) released by ResearchInChina in August 2018 clearly pointed out that **NIO builds a closed business scenario via battery swap mode to greatly enhance its brand value and service level, which is a very clever business strategy.**

Many OEMs have also realized the importance of closed (or semi-closed) charging network. Medium and high-end start-up brands such as Tesla, NIO, Xpeng, Lixiang and other, as well as high-end EV brands of traditional OEMs, such as Geely ZEEKR, GAC Aion, BAIC ARCFOX, SAIC R, VW ID, etc., have begun or planned to layout in super charging station sector.

China' OEMs Layout in the Self-Built and Self-Operated Charging Network

Brands	Super Charging Station
NIO	• Specifications of super charging station: up to 180KW and 250A; • As of June 2021, NIO has distributed 249 battery swap stations and 177 super-charging stations nationwide, including 1,408 super charging piles. • NIO worked with the State Grid to launch the 2rd Gen battery swap stations, planning to layout 500 units of battery swap stations nationwide by the end of 2021.
Xpeng	• Partner: TELD/self-built • Specifications of super charging station: every two charging piles share 180kW of power; rated power of a single charging pile is 90kW-120kW; • As of May 2020, Xpeng's overall charging network layout has reached 164 cities, 1,140 free charging stations and 19,019 free charging piles (some of which are self-built by Xpeng).
Tesla	• Tesla V3 super charging station supports up to 250kW of peak charging power; • Tesla has more than 25,000 super charging piles worldwide. It has opened over 800 super charging stations in China and more than 6,300 super charging piles.
VW	• By 2025, VW plans to build 18,000 new fast charging piles in Europe,17,000 fast charging piles in China and 3,500 fast charging piles in the United States; • The charging power ranges from 120kW to 300kW.
Geely	• It supports up to 360kW super-fast charging, achieving a range of 120km in as little as 5 minutes of charging; • In 2021, ZEEKR will complete the construction of 290 charging stations and 2,800 charging piles; by the end of 2023, cumulative construction number of charging stations and charging piles will reach 2,200 units and 20,000 units, respectively. • ZEEKR's charging map not only includes self-built piles, but also third-party public charging network.
GAC	• Specification of super charging pile: 600A and 1000V; • GAC Aion has developed 480kW high-power super-charging equipment, which has been tested on series produced vehicles. In the future, GAC Aion will build high-power super-charging stations; GAC plans to independently build 100 charging piles in 2021.
BAIC	• In April 2021, ARCFOX's first exclusive super-charging station was officially put into trial operation in Beijing Pomegranate Center, with a total of 12 super-charging piles and up to 180kW per pile; • In H2 2021, charging power will be increased to 360kW; flash charging of achieving a range of 400km in 10 minutes of charging will be provided; • In 2021, ARCFOX will build more exclusive super-charging stations in first-tier cities such as Beijing, Shanghai, Guangzhou and Shenzhen.
SAIC	• In Mar. 2021, the first super charging station of SAIC R was put into operation in Shanghai, with a maximum super charging power of 120kW. • Development plan: 100 new super charging stations will be built nationwide in 2021.

Source: ResearchInChina

Abstract

According to our analysis, OEMs currently mainly adopts three charging network construction and operation modes:

Mode 1: Fully self-built and self-operated "closed supercharging" system
This mode demands high costs and very high market ownership to maintain operation, represented by Tesla. In China, Tesla has laid a large number of charging piles. Although it has successively switched to the national standard interface, in fact Tesla's charging network is rarely open to the public, being a very closed charging network. Tesla has always claimed that it will allow to open super-charging piles to its peers, but we believe that the possibility of opening up in the short term is very small.

Tesla has built over 800 super charging stations and 6,300 super charging piles in China, supporting more than 710 destination charging stations, with charging network covering more than 290 cities. In 2021, its super charging pile factory in Shanghai was put into operation, with an initial planned annual production capacity of 10,000 units, mainly V3 super charging piles.

With extensive laying of Tesla's closed charging network, Tesla has actually formed a strong consumer barrier in China. Even if it faces many doubts in the short term, it will still occupy an important position in China in the long run. Its closed charging network has become one of the key factors for enterprises to achieve successful operation.

Tesla's Charging Infrastructure Distribution in China

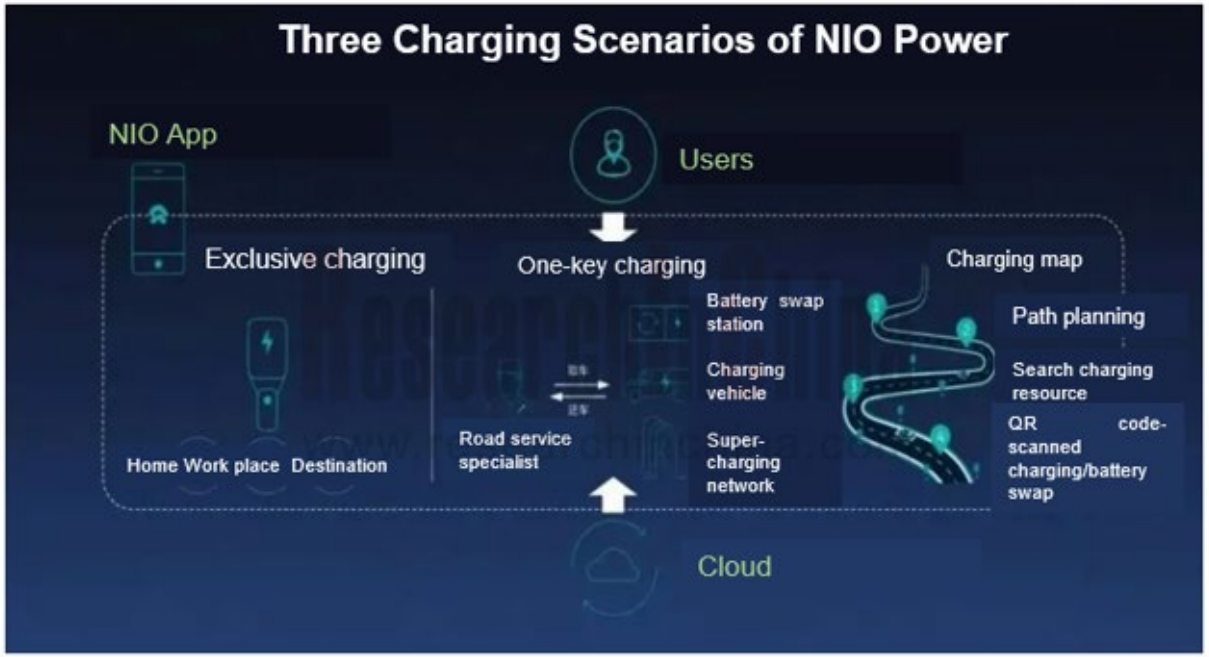
Source: Tesla

Mode 2: Fully self-built and self-operated "closed battery swap + open supercharging" system

Apart from supercharging station, battery swap station is also the main way for the charging layout of OEMs. NIO regards battery swap business as one of its core business models. It introduced car-electricity separation mode and led the establishment of Wuhan Weineng Battery Asset Co., Ltd. to be responsible for the management and operation of batteries.

In April 2021, NIO worked with State Grid to deploy the 2nd Gen of battery swap stations nationwide. Its brand-new battery swap technology supports the function of in-car one-button battery swap, eliminating the need of getting off the bus. Up to 312 battery swap services are provided every day, effectively improving battery swap efficiency.

As of June 2021, NIO has laid out 249 battery swap stations and 177 super-charging stations nationwide, including 1,408 super-charging piles. NIO partnered with State Grid to release the 2nd Gen battery swap station, planning to layout 500 units of battery swap stations nationwide. With the gradual improvement of NIO's car charging and battery swap network, we predict that NIO may properly lower the brand pricing to occupy the market of RMB 250,000 to RMB 350,000 range.



Source: NIO

Abstract

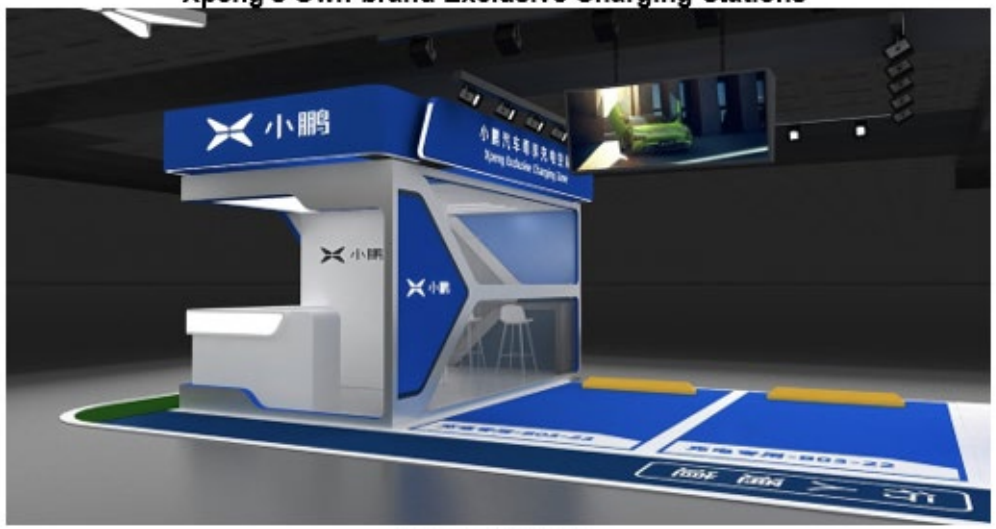
Mode 3: Cooperative "Open supercharge" system + partial self-built and self-operated "closed supercharge" system

Differed from the relatively closed charging network construction and operation modes of NIO and Tesla, Xpeng mainly cooperates with third-party operators such as TELD to build free supercharging network, greatly reducing network laying and operation costs.

In addition, Xpeng has also started the construction of its own-brand exclusive charging stations similar to those of Tesla and NIO so as to further upgrade charging brand service. By the end of 2021, Xpeng will plan to build over 500 units of branded super-charging stations. We expect that Xpeng will raise the price of its pure electric SUV to be released, and the closed charging network will be the key breakthrough point for enhancing its brand value.

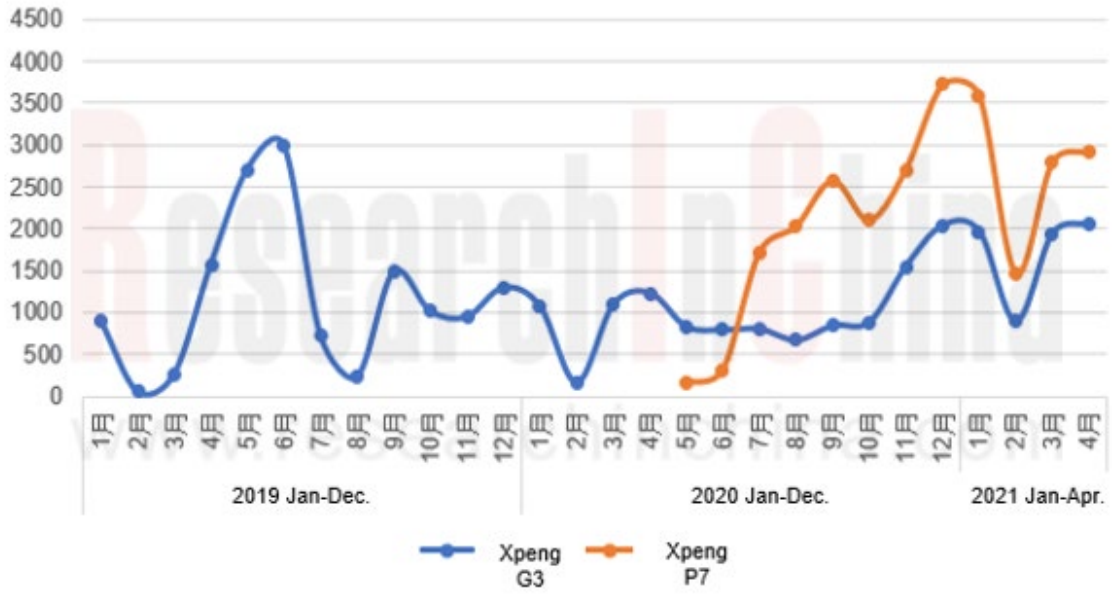
So far, Xpeng's overall charging network layout has reached 164 cities, 1140 units of free charging stations and 19,019 free charging piles (some of which are self-built by Xpeng), expected to cover over 200 major cities nationwide by the end of 2021. Xpeng sales have surged since the release of its Lifetime Free Charging Plan (3,000 KWh per year) in Sept.2020.

Xpeng's Own-brand Exclusive Charging Stations



Source: Xpeng

Monthly Insurance Number of Xpeng



Source: ResearchInChina

Abstract

OEMs

- In addition, VW (China), FAW, JAC and Wanbang New Energy jointly established CAMS Kemeth, a charging operator, which adopts an operation mode similar to that of Xpeng, namely, a combination of open + partially closed (ground lock).

- For other OEMs, we think that they are more likely to adopt mode 3. But each selects varied strategies and laying ideas. For instance, the newly released Geely ZEEKR is the first 800V platform model in China, supporting rapid charging at 360kW. It can drive 120km after just 5 minutes of charging. According to the plan, ZEEKR will complete the construction of 290 charging stations and 2,800 charging piles by 2021, and build 2,200 charging stations and 20,000 charging piles by the end of 2023. So far, ZEEKR's fast charging network has not been officially unveiled.

Prospect

In the future, with the promotion of 800V high-voltage fast charging architecture technology, it is a trend for both foreign-funded enterprises and independent brands to conduct product layout in high-voltage platform, and he self-built self-operated charging network of high-end intelligent EV brands will be accelerated.

Table of Content (1)

Table of Content (2)

Table of Content (3)

Table of Content (4)

Table of Content (5)

Table of Content (6)

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