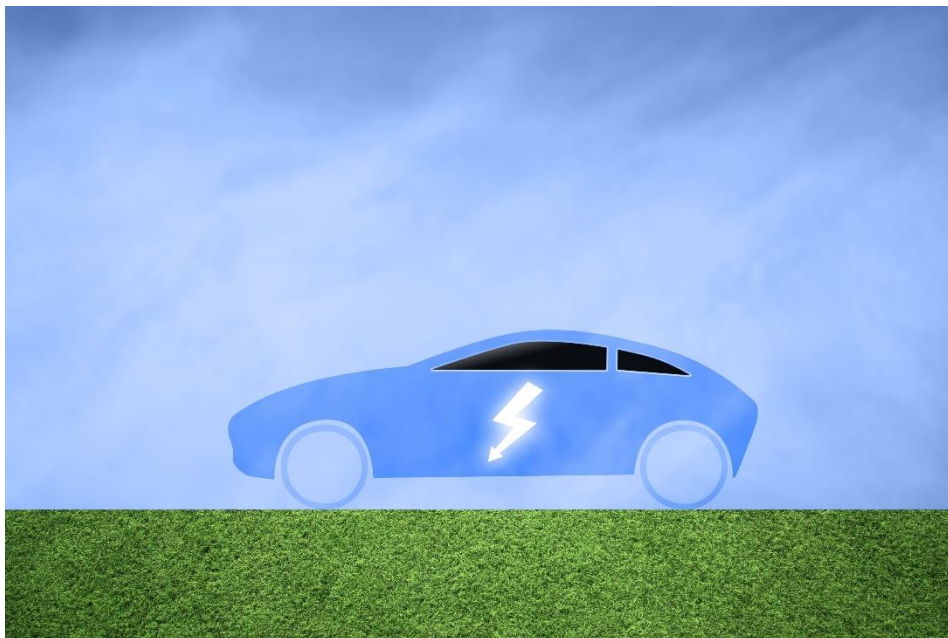


Autos

China's smart electric vehicle boom



- We believe NIO, XPeng and Li Auto (NXL) are the 'New Force' in EVs amid huge growth potential in the new energy vehicle market in China and globally.
- Administrative policies are key to a healthy new energy vehicle (NEV) market as we believe financial incentives will be eventually phased out.
- We believe NXL's smart features differentiate them from Tesla, with EV sales catalysts from localised ADAS and intelligent operation systems.
- We believe NXL's share prices will be catalysed by 1) new model rollouts, 2) software and hardware technology breakthroughs, and 3) capacity expansion.
- We initiate coverage on China's smart EV sector with an Overweight call and Add ratings for NIO, XPeng and Li Auto. XPeng is our sector pick.

Analyst

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China

Overweight *(initiating coverage)*

Highlighted Companies

Li Auto Inc

ADD, TP HK\$203.6, HK\$133.1 close

Li Auto is China's leading premium smart extended range electric vehicle (EREV) maker. The company's EV shipments continue to grow on the back of the battery EV platform and technology in its EREV models and the expansion of its product portfolio to pure battery EVs.

NIO Inc

ADD, TP HK\$257.3, HK\$156.8 close

NIO is China's market-leading premium smart EV manufacturer. The company's market share gains are underpinned by continuous rollouts of high-performance eSUV models and improvements in its battery swapping and autonomous driving technologies.

XPeng Inc

ADD, TP HK\$207.5, HK\$92.5 close

XPeng is positioning itself in the fast-growing mass market electric vehicle sector in China. The company is driving EV sales via product portfolio expansion, ADAS and operating system improvements and forays into overseas markets.

Summary Valuation Metrics

P/E (x)	Dec-22F	Dec-23F	Dec-24F
Li Auto Inc	3,945.66	190.87	72.59
NIO Inc	NA	NA	89.94
XPeng Inc	NA	NA	89.93

P/BV (x)	Dec-22F	Dec-23F	Dec-24F
Li Auto Inc	4.47	4.51	4.41
NIO Inc	8.36	7.11	6.33
XPeng Inc	4.13	5.40	6.29

Dividend Yield	Dec-22F	Dec-23F	Dec-24F
Li Auto Inc	0.00%	0.00%	0.00%
NIO Inc	0.00%	0.00%	0.00%
XPeng Inc	0.00%	0.00%	0.00%

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- We initiate coverage on China's smart EV sector with an Overweight call and Add ratings for NIO, XPeng and Li Auto. XPeng is our sector pick.

China's fast-growing NEV market is the world's largest

Global NEV sales were c.6.75m units in 2021, up 108% yoy, of which 3.3m units or half were delivered in China (source: IEA). We believe China's smart EV market will grow rapidly over the next ten years (2022F-32F) on the back of supportive government policies and nationwide EV infrastructure expansion. NIO, XPeng and Li Auto (combined into 'NXL'), which we believe represent the 'New Force' in China's smart EV market, are well positioned to gain market share on the back of 1) launches of smart EVs with rich connectivity features, 2) manufacturing capabilities for vehicle systems, and 3) improving battery technologies, which have revolutionised the mobility experience for many young people in China.

Administrative policies are the key to a healthy NEV market

We think financial incentives for consumers, such as government subsidies and purchasing tax exemptions, are short-term catalysts for China's NEV market. The policies that matter over the longer term are those on the administrative (supply) side, including those that encourage an increase in charging piles/charging station infrastructure and developments in EV batteries (new-type EV batteries) and the supply chain as well as financial support, such as Parallel Credit Administration and taxation benefits, for automakers.

NXL's smart features provide differentiation and boost EV sales

NXL have proven themselves to be leaders in the 'Smart EV' field in China with more accurate and reliable advanced driver assistance systems (ADAS) and intelligent operating systems (OS) that come with voice assistance and interactive interfaces. As sophisticated ADAS and intelligent OS are key factors when deciding which EV to purchase, we believe NXL's self-developed smart features will help boost their EV sales.

NXL's EV deliveries to remain strong

NIO/XPeng/Li Auto's FY21 EV deliveries touched a record high of 91k/98k/91k units, rising 109%/263%/177% yoy. NIO/XPeng/Li Auto's 1H22 EV deliveries increased 21%/124%/100% yoy despite the country's Covid-19 wave and a sustained chips shortage. We estimate NIO/XPeng/Li Auto will achieve robust CAGR for EV deliveries of 59%/57%/54% in FY21-24F, driven by new model launches, overseas market expansion and market share gains amid rising NEV penetration rates in China.

New models, technology and capacity are share price catalysts

NXL have been trading at premiums (no P/E valuations, 4x-8x P/BV or 3.0x-4.0x P/S ratio) over traditional automotive companies' 5x-10x P/E, 0.5x-2.0x P/BV or 1.0x-1.5x P/S ratios. Besides EV deliveries, which drove NXL's short-term share price movements, we are more focused on factors that we believe will result in sustainable earnings growth, such as consistent new model rollouts, technological breakthroughs and capacity expansion, which are potential key share price catalysts.

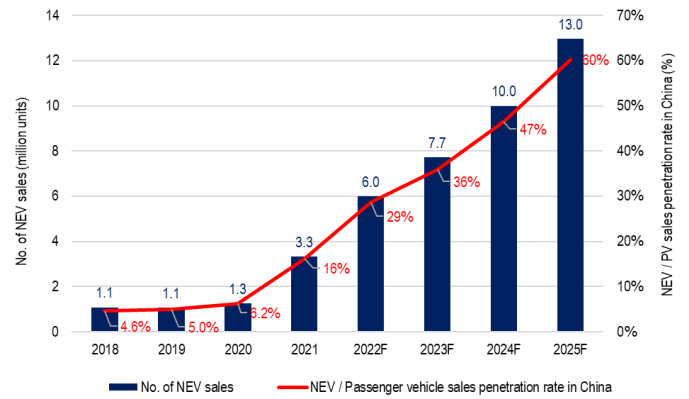
Initiate coverage on China's smart EV sector with Overweight

We initiate coverage on China's smart EV sector with Overweight and Add ratings on NIO, XPeng and Li Auto. XPeng is our top sector pick for its rapid EV sales growth, best-in-country autonomous driving technology and overseas expansion. We are positive on Li Auto for its EREV, which has attracted a lot of interest in low-tier cities in China. We recommend NIO for its renowned brand name and growing market share in China's premium EV market. Downside risks: prolonged Covid-19 outbreak in China, sustained supply chain constraints and keener competition from foreign automakers.

KEY CHARTS

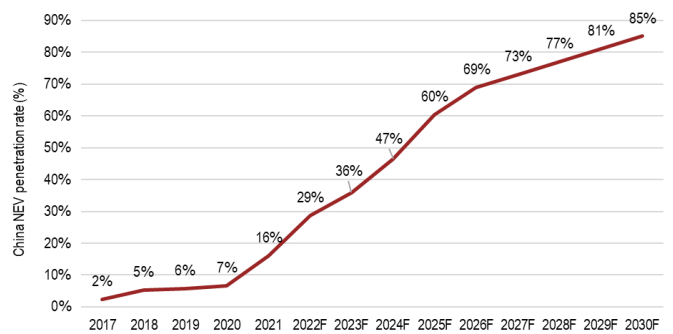
China NEV market set to boom ➤

China new energy vehicle (NEV) sales jumped 164% yoy to reach approximately 3.3m units in 2021, accounting for c.16% of total automobile sales in the year. The China Association of Automobile Manufacturers (CAAM) forecasts the country's NEV sales to reach c.13m units, 60% of China's passenger vehicle penetration rate, in 2025F, a CAGR of 40% in 2021 to 2025F.



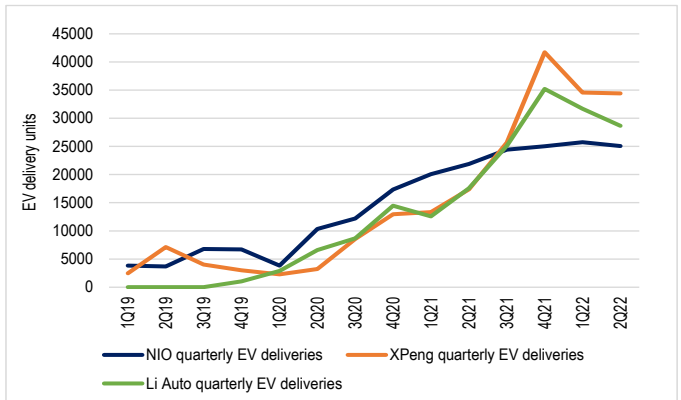
China NEV penetration rate accelerating ➤

We estimate China's NEV penetration rate to reach 60% in 2025F and 85% in 2030F, underpinned by the rising popularity of smart EVs, improvements in autonomous driving and the narrowing price gap between EVs and conventional gas-powered cars as well as infrastructure expansion.



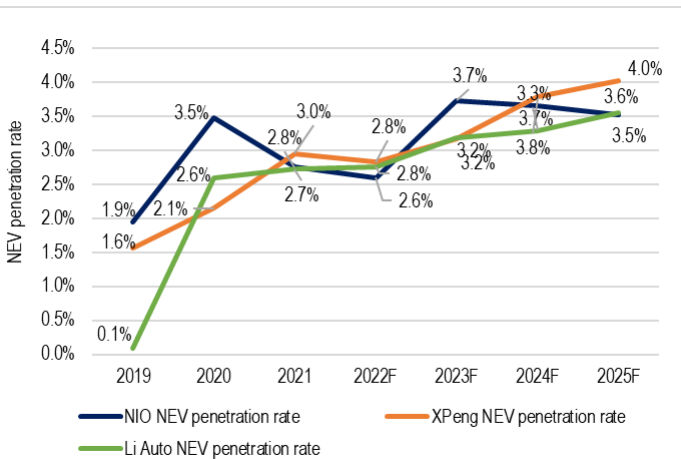
NXL's EV deliveries grew rapidly in 2019-21 ➤

NIO's FY21 EV deliveries touched a record high of 91.4k units, rising c.109% yoy, while XPeng's reached 98.2k units, surging c.263% yoy. Li Auto notched 90.5k units, up c.177% yoy. NXL's 1H22 EV deliveries fell c.10% hoh, from 200k units in 2H21 to 180k units in 1H22, principally due to the Omicron wave.



NXL set to gain more share in China's NEV market ➤

NXL will likely continue to gain market share in China's NEV industry in 2022-25F, underpinned by 1) continuous new model launches, 2) sophisticated ADAS systems, 3) intelligent cockpit and operating systems, 4) superior interior/exterior car designs and high-quality vehicle systems, 5) improved charging technologies and infrastructure, and 6) effective direct sales models and ecosystem.



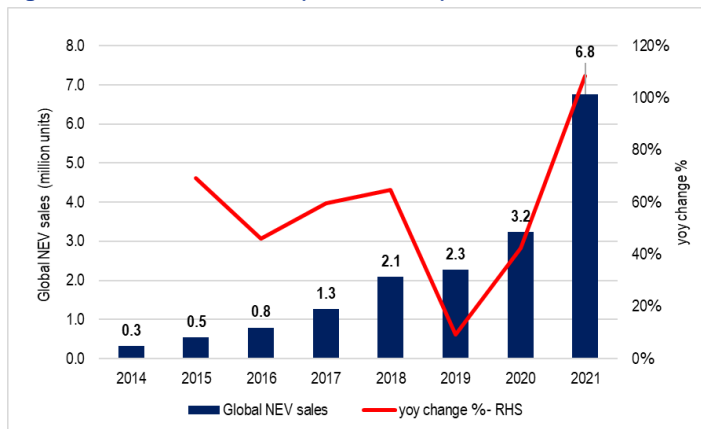
China's smart electric vehicle boom

Investment summary

China's fast-growing NEV market is the world's largest >

China accounts for half of the world's NEV market. According to International Energy Agency (IEA), global new energy vehicle (NEV) sales came to c.6.75m units, up 108% yoy, and representing 8.6% penetration of the passenger vehicle (PV) market. Out of total NEV units sold, 3.3m units were delivered (+164% yoy) in China, half of the global pie. On the back of supportive government policies, traditional automakers' proactively switching into NEV and the emergence of numerous newly-formed electric vehicle (EV) makers, China is becoming the world's largest and one of the fastest-growing NEV markets globally (Fig 1).

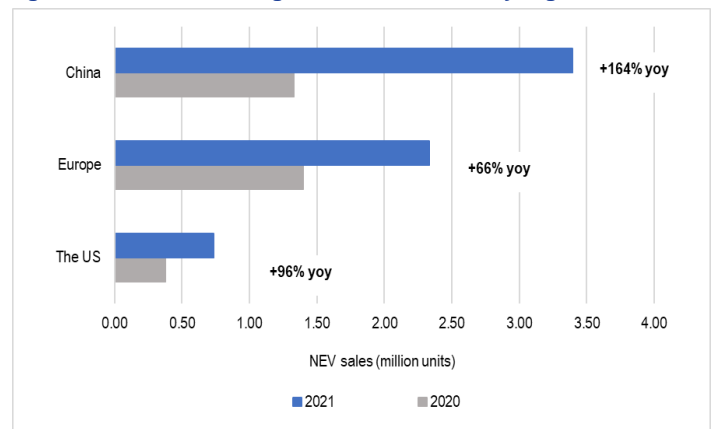
Figure 1: Global NEV sales (2014 to 2021)



New electric vehicle include pure battery electric vehicle, Plug-in hybrids electric vehicle, light electric trucks and light commercial electric vehicle

SOURCES: CGS-CIMB RESEARCH, IEA

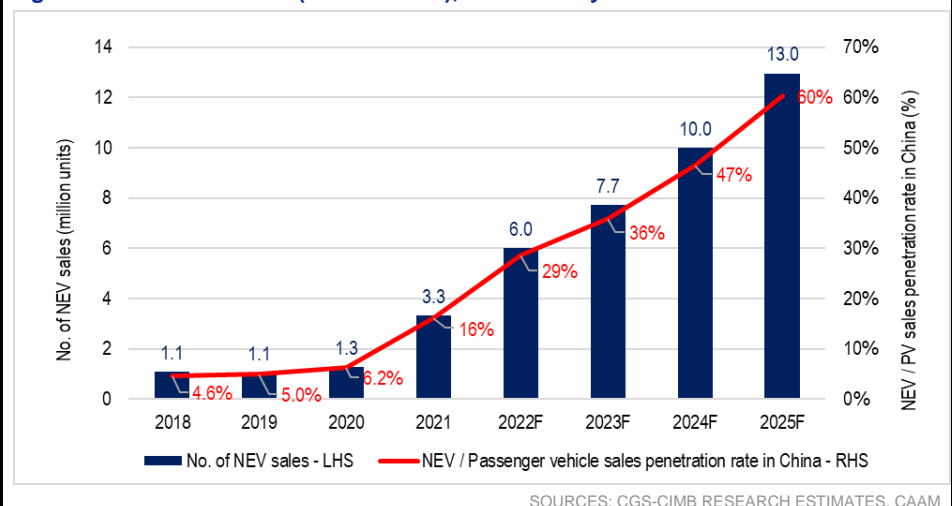
Figure 2: NEV sales and growth rate in 2021, by region



SOURCES: CGS-CIMB RESEARCH, IEA

China NEV penetration to reach 60% in 2025F. We forecast China's NEV sales to increase from 3.3m units in 2021 to c.13m units in 2025F, a CAGR of 40%, or a penetration rate of c.60% of passenger vehicle (PV) sales in China in 2025F from 16% in 2021, underpinned by the rising popularity of smart EV, improvements in autonomous driving and narrowing price gap between EVs and conventional gas-powered cars, as well as EV infrastructure expansion (Fig 2).

Figure 3: China NEV sales (2018 – 2025F), estimates by CGS-CIMB Research



SOURCES: CGS-CIMB RESEARCH ESTIMATES, CAAM

NIO, XPeng and Li Auto (NXL) set to benefit from China's smart EV boom ▶

NIO, XPeng and Li Auto (NXL) “smarten” China's NEV market. We believe that China's smart EV market will grow rapidly over the next ten years (2022F-32F) due to 1) favourable government policies supporting consumers switching to smart EVs and automakers investing in EV technology and capacity for EV manufacturing, 2) accelerating penetration rate, thanks to a narrowing price gap between EV and Internal Combustion Engine vehicles (ICEV), 3) significant electrification and autonomous driving trends, and 4) advanced charging technologies and sustained charging infrastructure expansion for EV users' convenience. Meanwhile, we believe that NIO, XPeng and Li Auto (collectively 'NXL') represent the 'New Force' in China's smart EV market and are well positioned to capture the huge growth potential of China's NEV market in the near, medium and long term on the back of their capabilities in 1) developing rich connectivity features with smart human-vehicle interaction and intelligent interfaces (smart cockpit and autonomous driving), 2) manufacturing vehicle systems (chassis, powertrain and electrical/electronic architecture), and 3) developing energy-efficient and environmentally-friendly battery technologies (long driving range and advanced charging technologies), which have revolutionised the mobility experience for many young people in China.

Administrative policies (supply side) are the key to guaranteeing healthy China NEV industry development ▶

Financial incentives (demand side) for consumers are short-term catalysts. We believe financial incentives for consumers, such as government subsidies and purchasing tax exemption for NEVs, are all short-term policies that will help modify consumption patterns and solidify consumer demand for NEV. We expect these short-term financial measures to be phased off over the next few years (Fig 4).

Administrative policies (supply side) are more effective for promoting healthy industry growth. Administrative policies, such as increasing the number of charging piles in residential areas and charging stations along highways, encourage EV technology development (such as safer and more efficient EV batteries, new-type EV batteries and the supply chain) while financial support to automakers, such as Parallel Credit Administration and local governments' taxation benefits, will be key over the longer timeframe for guaranteeing healthy NEV market development (Fig 4).

Sodium-ion battery could be more suitable for EV batteries on the back of potential government policy. In addition to the above policies, from a longer-term perspective, we expect the government to roll out more supportive measures for the development of new-type EV battery such as “Na-ion batteries (NIB)” as an alternative to lithium-ion batteries; sodium-ion batteries are safer than lithium-ion batteries despite the former's lower energy density. As sodium is much more abundant than lithium, prices could be more stable, limiting exposure to commodity price risk.

Figure 4: The major government supportive policies for consumers (demand side) and automakers (supply side)

Demand-side Policy	Description
NEV purchasing subsidy	The purchasing subsidy ranges from Rmb4,800 to Rmb12,600, depending on the types of NEV and the NEDC range, while the decreasing rate of the subsidy is set universally at -10%/-20%/-30% for 2011/2021/2022, deducted from the previous year's subsidy.
NEV purchasing tax exemption	The tax exemption first began in 2014, allowing most consumers who buy NEVs to save about Rmb10,000 relative to those who buy traditional fuel vehicles, given that the purchase tax rate for internal combustion engine vehicles was 10%. The policy has been extended to the end of 2022, and recently, the government confirmed that it would be further extended.
Supply-side Policy	
Parallel Credit Administration	The policy required automakers to meet the CAFC and NEV credit targets set by the government. The current NEV credit target is based on 14%/16%/18% of the vehicle output of the manufacturer itself in 2021/2022F/2023F. Automakers can trade their extra credits to earn income but will be penalised if they do not meet the targets.
Charging network expansion	China has the largest charging infrastructure networks for NEVs in the world, with over 1.3m public charging piles. Most of these charging piles are located in regions such as Guangdong, Shanghai and Beijing. The central government planned to expand the charging coverage for at least 60% of expressway service areas by 2025F.
Sodium-ion battery development	In the 14th Five-Year Plan (2021-2025), the central government encouraged the development of the sodium-ion battery industry to guarantee a fair EV market structure by offering different types of batteries to the market.

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

NXL sets themselves apart with smart features ▶

NXL's smart features are differentiating factor and help boost EV sales. We believe NIO, XPeng and Li Auto (NXL) are leaders in the 'Smart EV' field in China due to their localised advantage. NXL has been paying enormous attention to its products' smart technologies, such as enhancing the geographical coverage of its advanced driver assistance system (ADAS), sending upgrades via Over-the-air (OTA) and improving Human-Machine Interaction (HMI) with Augmented Reality (AR) and Virtual Reality (VR) capabilities, voice assistance (local language) and three-dimensional (3D) interactive systems. More importantly, we believe NXL's self-developed ADAS has a huge local advantage over Tesla's Autopilot (the major rival in China's smart EV market) as the former's ADAS software systems provide more accurate and reliable assistance and instructions, thanks to data collection on Chinese driving behaviours and China's road and tariff conditions.

As sophisticated ADAS and intelligent operating systems are the key deciding factors for customers' smart EV purchases, we believe NXL's self-developed ADAS and intelligent operating systems give them an edge, helping them carve out a nice slice of China's NEV market.

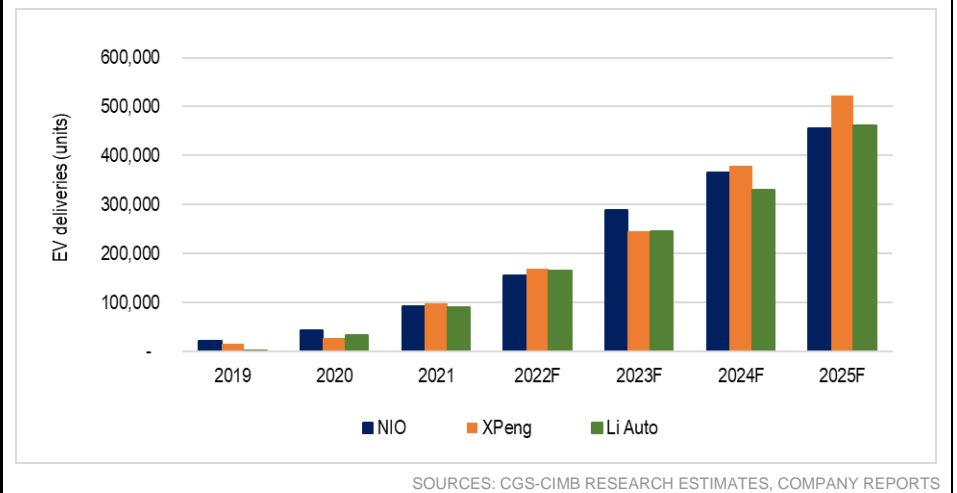
Reasons why NXL will gain market share in China EV market▶

NXL's EV deliveries to continue to grow. Government subsidies for NEV have boosted domestic demand for the vehicle type over the short term. China's NEV sales surged 164% yoy to 3.32m units in 2021 and 123% yoy to 2.47m units in the first half of 2022, driven by a rising EV penetration rate in China, reduction of the EV purchase tax by half and a myriad of new model launches.

On the other hand, NIO's FY21 EV deliveries touched a record high of 91.4k units, rising c.109% yoy, while XPeng's reached 98.2k units, surging c.264% yoy. Li Auto's notched 90.5k units, up c.178% yoy. NIO's, XPeng's and Li Auto's 1H22 EV deliveries climbed 21%, 124% and 100% yoy, respectively, despite the Covid-19 wave and a sustained chips shortage.

NXL set to gain bigger share of China's smart EV market. We believe NIO's XPeng, and Li Auto's EV sales will expand further to achieve robust EV delivery CAGR of 59%, 57% and 54% (FY21 to FY24F), respectively, fuelled by new model launches, overseas market expansion and market share gains amid rising NEV penetration rates in China (Fig 5).

Figure 5: NXL's EV deliveries (FY19 to FY25F), estimates by CGS-CIMB Research



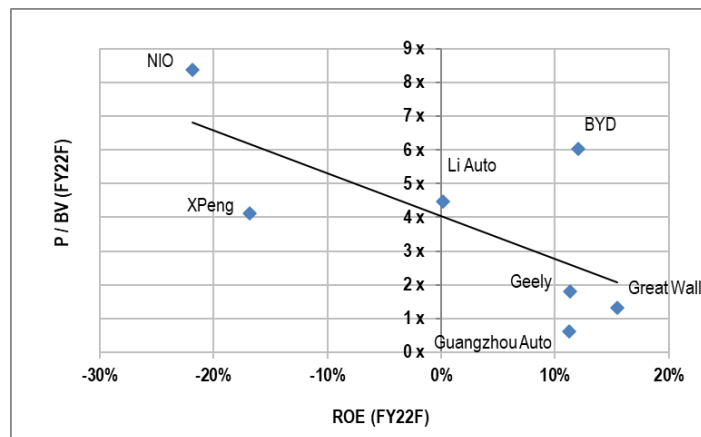
New model launches, technology breakthroughs and capacity expansion are NXL's key share price catalysts

New model launches, technology breakthroughs and capacity expansion are NXL's key share price catalysts. NXL have been trading at premiums (no P/E valuations, 4x-8x P/BV or 3.0x-4.0x P/S ratio) over traditional automotive companies, such as Guangzhou Auto (2238 HK, Not Rated), Geely Automobile (175 HK, Not Rated) and Great Wall Motor (2333 HK, Not Rated), all of which produce both ICEV and EV. These traditional automotive companies have generally been trading at single-digit 5x-10x P/E, 0.5x-2.0x P/BV, or 1.0x-1.5x P/S ratios (Fig 6 and 7).

We believe robust EV deliveries will drive short-term share price movements. However, we are more focused on factors that can help them achieve more sustainable earnings growth, such as 1) consistent new model rollouts, 2) software (ADAS and OS) and hardware (battery, powertrain and electrical/electronic architecture) technology breakthroughs, and 3) capacity expansion, which could be the key share price catalysts.

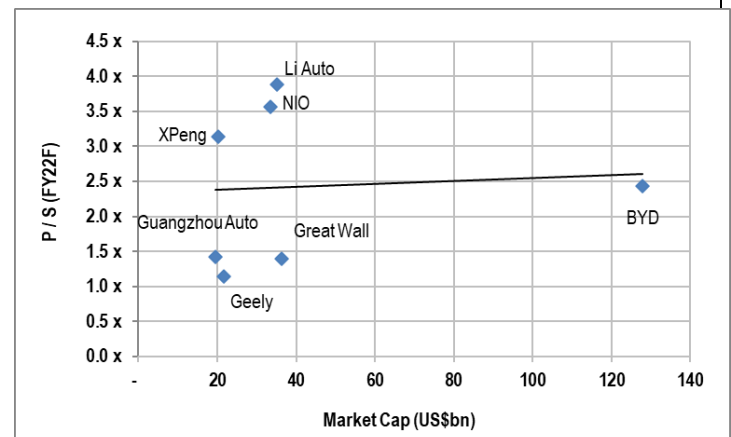
Sector re-rating catalysts: China's smart EV sector valuation re-rating catalysts include 1) robust EV deliveries from NXL, 2) accelerating ICEV to EV migration in China's PV market, 3) supportive government policies for EV technology development and infrastructure, 4) rapid decline of battery costs, and 5) easing of global chip shortages.

Figure 6: P/BV vs ROE (FY22F), based on Bloomberg consensus estimates



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 7: Market cap vs P/S (FY22F), based on Bloomberg consensus estimates



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Initiate coverage on China's smart EV sector with Overweight; XPeng is our top pick

Initiate coverage on China's smart EV sector. We initiate coverage on China's smart electric vehicle (EV) sector with Overweight and Add ratings for NIO, XPeng and Li Auto. Among the three companies, our order of preference is XPeng, Li Auto, and NIO.

XPeng is our top sector pick on the back of 1) quickest EV sales growth with wider EV model portfolio, covering the fastest growing mid- to high-end segment, 2) its best-in-country autonomous driving technology and intelligent operating systems, and 3) its overseas market expansion. We are positive on Li Auto as its extended range electric vehicle (EREV) is a hit among young parents in low-tier cities in China. We also recommend NIO for its renowned brand name and growing market share in China's premium EV market.

Key risks for China's smart EV sector: 1) Change in Chinese government policies, such as an end to government subsidies and tax exemption for NEV purchases, 2) increasing competition in China's EV market, 3) sustained supply chain constraints, which crimp EV output and increase production costs, and 4) impact of the Covid-19 pandemic in China.

Figure 8: Peers comparison

Company	Bloomberg Code	Recom.	Price (local curr)	Target price (local curr)	Upside (%)	Market Cap (US\$m)	P/E (x) CY2022F	P/E (x) CY2023F	3-year EPS CAGR %	P/BV (x) CY2022F	P/BV (x) CY2023F	ROE (%) CY2022F	ROE (%) CY2023F	EV/EBITDA (x) CY2022F	EV/EBITDA (x) CY2023F	Yield (%) CY2022F	Yield (%) CY2023F
NIO, Li Auto and Xpeng																	
NIO Inc	9866 HK	Add	156.80	257.30	64%	33,368	na	89.9	na	8.4	7.1	-21.9%	-5.6%	na	257.4	0.0%	0.0%
Li Auto	2015 HK	Add	133.10	203.56	53%	35,039	190.9	72.6	na	4.5	4.5	0.1%	2.4%	363.3	80.4	0.0%	0.0%
XPeng Inc	9868 HK	Add	92.45	207.45	124%	20,273	na	88.2	na	4.1	5.4	-16.9%	-16.7%	na	na	0.0%	0.0%
Electric vehicle manufacturers																	
BYD Co.	1211 HK	Not Rated	287.00	N/A	n.a.	127,768	55.9	39.2	65.2%	6.0	5.2	12.1%	14.9%	22.2	17.2	0.2%	0.2%
Tesla Inc	TSLA US	Not Rated	891.83	N/A	n.a.	931,508	51.8	43.2	49.3%	15.3	11.4	33.2%	27.6%	30.8	23.9	0.0%	0.0%
Average							53.8	41.2	57.2%	10.6	8.3	22.7%	21.3%	26.5	20.6	0.1%	0.1%
China Automobile manufacturers																	
Geely Automobile	175 HK	Not Rated	17.00	N/A	n.a.	21,702	15.6	12.1	21.9%	1.8	1.6	11.3%	12.9%	7.8	6.3	2.1%	2.7%
Great Wall Motor	2333 HK	Not Rated	12.70	N/A	n.a.	36,299	9.0	7.3	24.9%	1.3	1.2	15.5%	17.7%	12.7	10.2	5.1%	6.8%
Guangzhou Auto	2238 HK	Not Rated	7.45	N/A	n.a.	19,528	5.7	5.0	23.6%	0.6	0.6	11.3%	11.8%	21.7	18.4	4.7%	5.4%
Average							10.1	8.1	23.4%	1.2	1.1	12.7%	14.1%	14.1	11.6	4.0%	5.0%
Foreign automobile manufacturers																	
Kia Motor	000270 KS	Add	81,200	110,000	35%	25,240	6.0	5.6	6.3%	0.8	0.7	14.7%	13.2%	2.8	2.6	1.5%	1.5%
Hyundai Motor	005380 KS	Hold	196,500	190,000	-3%	32,195	8.0	7.6	12.9%	0.7	0.6	8.3%	8.1%	9.4	9.1	2.0%	2.0%
Toyota	7203 JP	Not Rated	2,154.50	N/A	n.a.	268,264	9.9	8.9	17.9%	1.1	1.0	11.2%	11.4%	12.5	11.4	2.9%	3.3%
BMW	BMW GR	Not Rated	79.53	N/A	n.a.	53,346	5.5	5.3	-2.4%	0.6	0.6	10.5%	10.5%	4.4	3.6	6.2%	6.5%
Mercedes-Benz Group	MBG GR	Not Rated	56.87	N/A	n.a.	62,278	5.0	4.9	-5.6%	0.7	0.7	14.2%	14.1%	0.8	1.0	8.0%	8.2%
Volkswagen	VOW GR	Not Rated	193.90	N/A	n.a.	87,768	5.7	5.1	10.2%	0.6	0.6	10.5%	10.8%	2.4	2.2	4.9%	5.4%
Ford	F US	Not Rated	15.34	N/A	n.a.	61,670	7.5	7.4	4.4%	1.2	1.1	14.1%	12.8%	3.2	2.1	3.5%	3.5%
General Motor	GM US	Not Rated	36.77	N/A	n.a.	53,612	5.7	5.6	-2.1%	0.7	0.6	12.4%	11.4%	2.7	2.3	1.3%	2.0%
Average							6.7	6.3	5.2%	0.8	0.7	12.0%	11.6%	4.8	4.3	3.8%	4.1%
Battery manufacturers																	
CATL	300750 CH	Not Rated	523.87	N/A	n.a.	189,187	35.7	26.3	51.7%	8.5	6.4	25.4%	26.2%	23.0	17.2	0.2%	0.3%
EVE Energy	300014 CH	Not Rated	99.30	N/A	n.a.	27,899	32.5	22.8	39.7%	7.0	5.4	22.8%	25.0%	26.0	18.1	0.4%	0.5%
Gotion High-Tech	002074 CH	Not Rated	38.66	N/A	n.a.	10,176	55.5	38.2	85.7%	3.2	3.1	6.4%	8.9%	24.0	18.1	0.6%	0.7%
Shenzhen Desay Battery	000049 CH	Not Rated	43.34	N/A	n.a.	1,926	13.2	10.4	16.9%	2.8	2.4	23.8%	25.9%	7.9	5.5	1.6%	2.5%
LG Energy Solution	373220 KS	Not Rated	417,000	N/A	n.a.	74,636	66.4	47.5	37.8%	4.8	4.4	7.7%	9.7%	22.0	16.8	0.0%	0.1%
SK On	096770 KS	Not Rated	180,000	N/A	n.a.	12,729	7.7	7.7	43.8%	0.7	0.6	9.9%	8.9%	5.7	5.7	2.3%	2.3%
Samsung SDI	006400 KS	Add	572,000	750,000	31%	30,161	21.2	17.9	23.3%	2.4	2.2	9.7%	10.8%	8.7	7.0	0.2%	0.2%
Average							33.2	24.4	42.7%	4.2	3.5	15.1%	16.5%	16.7	12.6	0.7%	0.9%
Electric vehicle parts manufacturers																	
LK Technology	558 HK	Not Rated	12.64	N/A	n.a.	2,216	21.6	16.2	59.9%	3.9	3.3	19.9%	21.8%	14.8	11.5	0.9%	1.1%
Times Electric	3898 HK	Not Rated	33.25	N/A	n.a.	9,525	15.1	13.2	14.5%	1.1	1.0	7.4%	8.2%	16.6	14.6	1.8%	2.1%
Ningbo Joyson Electronic	600699 CH	Not Rated	20.93	N/A	n.a.	4,237	28.2	21.9	-218.5%	2.2	2.0	8.0%	9.4%	10.0	8.5	0.4%	0.4%
Continental AG	CON GY	Not Rated	67.30	N/A	n.a.	13,778	7.2	5.7	20.0%	1.0	0.9	13.8%	15.0%	3.3	2.8	4.2%	5.4%
Valeo	FR FP	Not Rated	20.85	N/A	n.a.	5,177	9.4	6.5	69.0%	1.2	1.1	13.6%	17.3%	3.3	2.7	3.8%	4.8%
Magna International	MGA US	Not Rated	64.23	N/A	n.a.	18,572	8.9	6.8	22.9%	1.5	1.4	17.5%	20.2%	4.9	4.1	2.9%	3.2%
Average							15.1	11.7	-5.4%	1.8	1.6	13.4%	15.3%	8.8	7.4	2.3%	2.8%

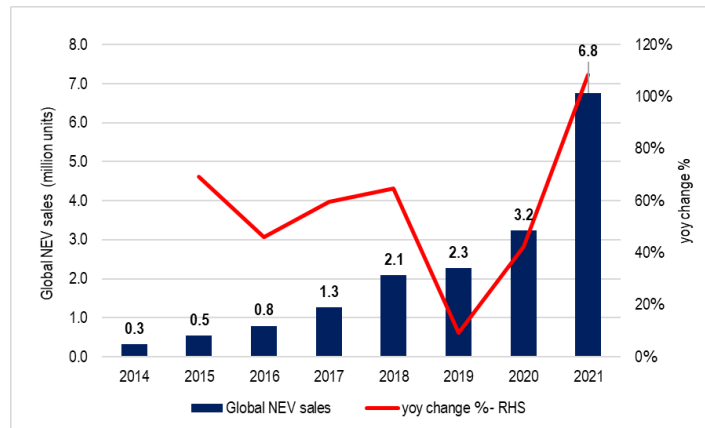
NOTE: ESTIMATES FOR NOT RATED (NR) COMPANIES ARE ALL BASED ON BLOOMBERG CONSENSUS ESTIMATES
 SOURCES: CGS-CIMB RESEARCH ESTIMATES, BLOOMBERG (PRICE AS AT 02 AUG 2022)

China – fast-growing; world’s largest NEV market

China’s fast-growing NEV market is the world’s largest ➤

According to International Energy Agency (IEA), global new energy vehicle (NEV) sales came to c.6.75m units, up 108% yoy, and representing 8.6% penetration of the passenger vehicle (PV) market. Out of total NEV units sold, 3.3m units were delivered (+164% yoy) in China, half of the global pie. On the back of supportive government policies, traditional automakers’ proactively switching into NEV and the emergence of numerous newly-formed electric vehicle (EV) makers, China is becoming the world’s largest and one of the fastest-growing NEV markets globally (Fig 9 and 10).

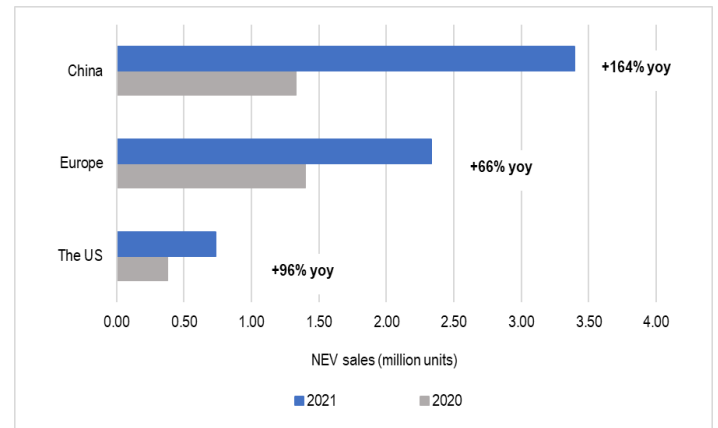
Figure 9: Global NEV sales (2014 to 2021)



New electric vehicle include pure battery electric vehicle, Plug-in hybrids electric vehicle, light electric trucks and light commercial electric vehicle

SOURCES: CGS-CIMB RESEARCH, IEA

Figure 10: NEV sales and growth rate in 2021, by regions



SOURCES: CGS-CIMB RESEARCH, IEA

China’s new energy vehicle (NEV) market set to boom ➤

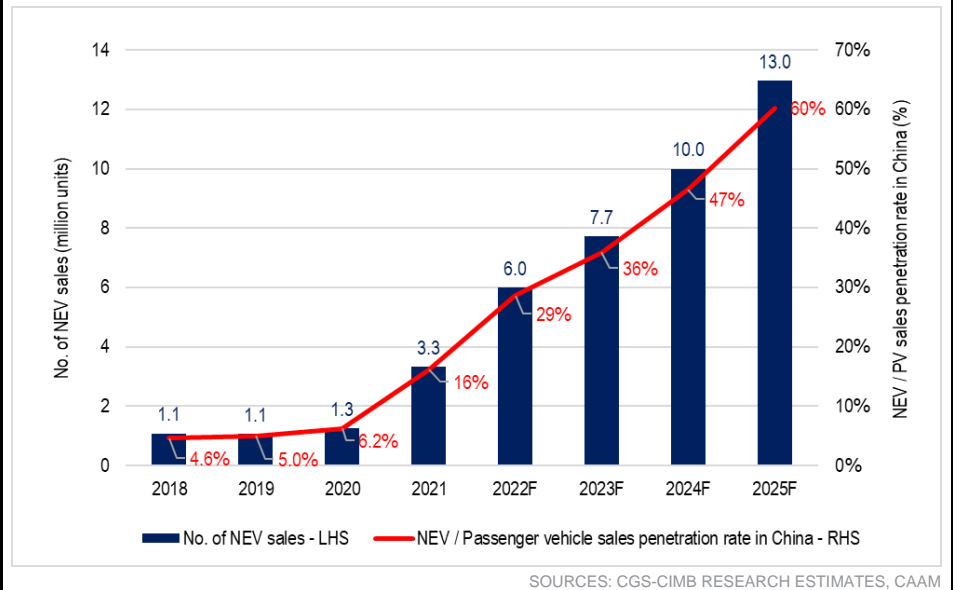
Record HIGH sales. In 2021, new energy vehicle (NEV) sales in China has reached approximately 3.3m units, surged 164% yoy and accounted for c.16% of the total passenger vehicle sales, based on the data from the China Association of Automobile Manufacturers (CAAM). The 16% nationwide penetration in 2021, which is well ahead of Chinese government’s 2025 forecast, thanks to new model launches which lured new buyers and spurred owners to switch to zero-emission electric vehicles (EVs).

We expect such high growth momentum to continue in the next 5-10 years (2021 to 2030F) with further NEV penetration growth due to continuous favourable government policies and significant electrification trend in the automobile industry. We forecast China’s NEV sales to increase from 3.3m units in 2021 to c.13m units in 2025F, a CAGR of 40% (Fig 11).

What is new energy vehicle?

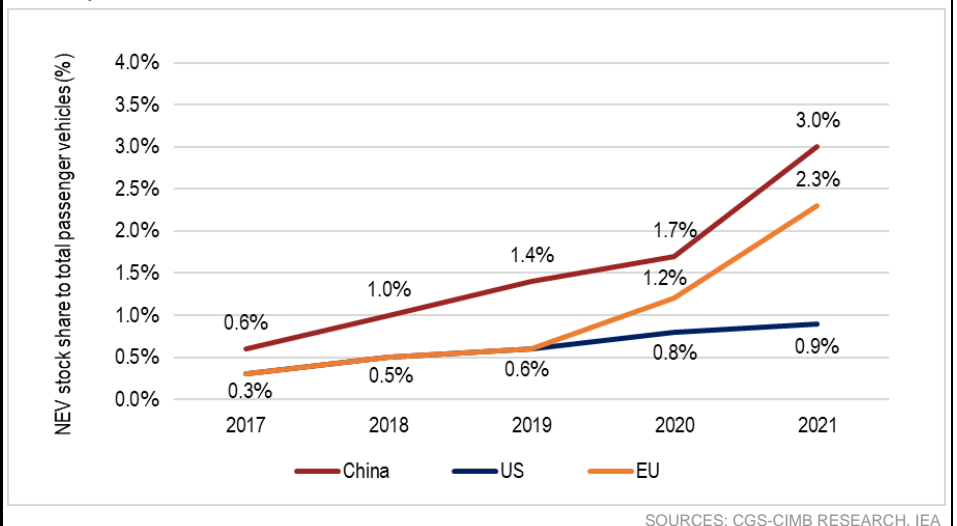
New energy vehicles (NEV) refer to cars using new power systems that are completely or partially based on non-conventional energy, such as battery-powered. China has used the term NEV to include, but not limited to, battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and fuel cell electric vehicles (FCEVs).

Figure 11: China's NEV Sales (2018 – 2025F), estimate by CGS-CIMB Research



China dominant in the world NEV market. China is the world's largest New Energy Vehicle (NEV) market, with total NEV sales over 3.3m units in 2021. According to International Energy Agency (IEA), China currently has approximately 8m NEV stock with a penetration rate of c.3.0% of total passenger vehicles (PV) in the country in 2021, compared with c.2.3% in the EU and c.0.9% in the US (Fig 12).

Figure 12: NEV stock share to total passenger vehicle in China, the US and EU (2017 to 2021)



Government's NEV penetration rate targets for 2025F and 2035F. Looking back to the past documents released by the ministries, the central government planned in 2017 to set a target of NEV sales to reach 25% in 2025F. On 27 Oct 2020, the Energy-saving and New Energy Vehicle Technology Roadmap 2.0 (hereinafter referred to as Technology Roadmap 2.0) was released in Shanghai, under the guidance of the Ministry of Industry and Information Technology (MIIT). The updated roadmap suggested that all new vehicles sold in China by 2035F must be powered by 'new energy', the Chinese authorities have said. Half of them must be electric, fuel cell, or plug-in hybrid – the remaining 50%, hybrid vehicles.

China's NEV penetration rate to accelerate in 2022F-2025F. China's NEV market is leveraging on strong NEV supply chain, including battery and car manufacturing capabilities, automotive components and chips supply, and robust

demand due to supportive government policies. We expect Chinese NEV automakers to have a competitive advantage over US and European automakers due to China’s rapidly-growing software development, strong automotive component supply chains and lower manufacturing costs (from increasing automation and highly skilled engineers).

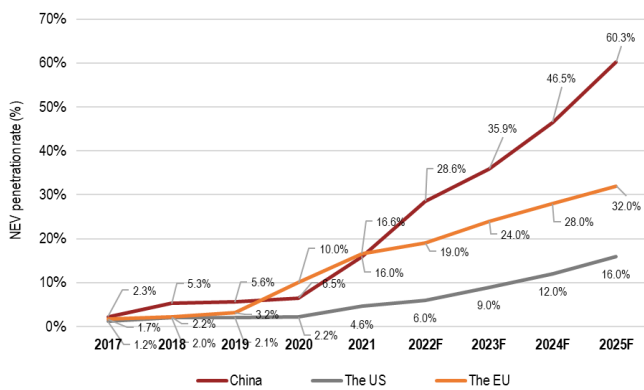
We believe China’s NEV penetration rate will accelerate over 2022F-2025F, thanks to favourable government policies. We estimate NEV sales to reach 6.0m units and penetration rate to reach 29% in 2022F, boosted by subsidies to purchase NEV and several new models launches by China EV makers, and expected to exceed the penetration target set by the government,

China’s NEV penetration rate to reach 85% by 2030F. We estimate China’s NEV penetration rate to reach 60% in 2025F and 85% in 2030F, to c.13m units (CAAM forecasts 13m units) and c.20m units (19% CAGR over 2021-2030F), respectively, underpinned by the rising popularity of smart EV, improvements in autonomous driving and narrowing price gap between EVs and conventional gas-powered cars, as well as EV infrastructure expansion (Fig 13 and 14).

“China's new energy vehicles have entered a new stage of accelerated development, and their leading role in the electrified transformation of the global automobile industry has been further strengthened ”

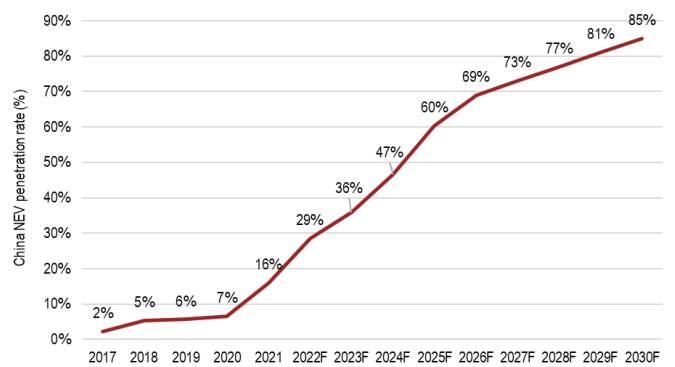
*- Guo Shougang
The Deputy director of Ministry of Industry and Information Technology (MIIT)*

Figure 13: NEV penetration rate (NEV/total passenger vehicle sales) (China vs. US vs. EU) (2017 – 2025F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, IEA

Figure 14: China NEV penetration rate (NEV/total passenger vehicle sales) (2017 – 2030F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, IEA

Why is China's NEV market expand rapidly?

The drivers: Policy, infrastructure, and technology ►

Policy, infrastructure, and technology are the key drivers. We believe that China's NEV market is likely to grow rapidly, due to three main drivers: 1) policy support, 2) expansion of EV charging infrastructure, and 3) iteration in EV battery technology.

Key policies such as the Parallel Credit Administration, government subsidies and purchase tax exemptions have made NEVs more cost-effective to produce, and offer incentives to buyers. Growing EV charging infrastructure and EV battery technology help build a solid foundation to support the robust NEV momentum in China.

1) Driver 1: Policy – Parallel Credit Administration, Subsidy and Purchasing Tax Exemptions ►

Key Policy 1: The Parallel Credit Administration. We believe the Parallel Credit Administration provides robust and continued support for the NEV industry. It rewards NEV manufacturers with subsidies, and imposes a penalty on those who do not meet targets.

On 27 Sep 2017, the official version of the “*Measure for the Parallel Administration of the Corporate Average Fuel Consumption (“CAFC”) and New Energy Vehicle Credits of Passenger Vehicle Enterprises*” (hereinafter referred to as “**Parallel Credit Administration**” (a.k.a. “**Dual Credit policy**”) were issued by the Ministry of Industry and Information and Technology (“**MIIT**”), and came into effect as of 1 Apr 2018.

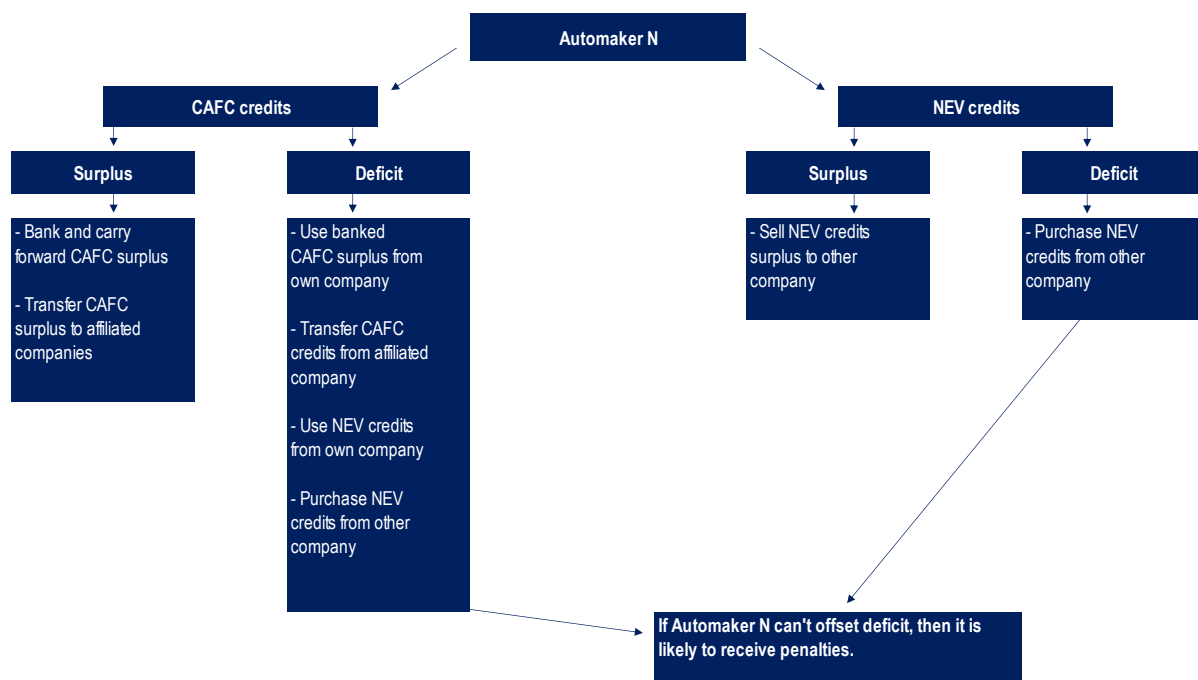
The mechanism. Under the Parallel Credit Measure, all automotive manufacturers need to produce a certain percentage of EVs to obtain CAFC and NEV credits. Currently, the NEV credit target is based on 14%/16%/18% of vehicles output in 2021, 2022F, and 2023F, respectively.

What are CAFC and NEV credits?

CAFC credit is used to measure an automaker's average fuel consumption level of its passenger vehicles, while **NEV credit** is a gauge for an automaker's ability to manufacture passenger EVs.

For example, if an automaker produces 1,000,000 units of conventional ICE vehicles in 2022F, and the target NEV credit is 16%, then 160,000 NEV credits (1,000,000×16%) would be the target for that automaker in 2022F. Any automaker that fails to meet the target value of NEV credits would be considered to be in a deficit, and would need to purchase NEV credits from other companies to offset the deficit. If not, it would be penalised by the central government and its vehicle-manufacturing business may be suspended until its negative credits are zeroed out. This is similar to CAFC credits, with the recent CAFC credits target set at 5.0L/100km of the New European Driving Cycle (“**NEDC**”) average fleet. If an automaker has a CAFC credit surplus, it can be carried over to the following years, and transferred among affiliates or traded; however, it cannot be used to offset an NEV credit deficit. In contrast, an OEM's NEV credit surplus may be used to make up for either an NEV credit deficit or CAFC credit for the same OEM, but cannot be carried over to the next year, transferred or traded other than on the MIIT official platform. Below is an example of the Parallel Credit Administration (Fig 15):

Figure 15: Summary of how the Parallel Credit Administration is applied to “Automaker N”



SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

Important implications of the Parallel Credit Administration. The mechanism implies an NEV-oriented feature of itself as it can benefit NEV manufacturers in the following ways:

1. The policy acts as a huge impetus to the electrification trend in China’s automotive sector, as automakers need to consider both CAFC and NEV credits.
2. The policy acts as a direct subsidy mechanism for automakers, especially those focus on NEV production. The credit programme provides another source of income for NEV manufacturers.

Key policy 2: Government subsidy policy for NEV. To support the promotion and application of NEVs in China, the government has launched a subsidy scheme for both NEV consumers and producers. The scheme, first put into effect in Apr 2015, allows consumers to purchase NEVs by paying the original price minus the subsidy amount, while the producers can receive the subsidy amounts after such NEVs are sold to the purchaser (Figs 16 & 17).

Subsidies Review and Update. In Dec 2020, the government announced a further adjustment to the subsidy standards. It will steadily lower direct per vehicle subsidies by 10%, 20%, and 30% each year between 2020 and 2022 respectively, and set subsidies for 2m vehicles as the upper limit of the annual subsidy scale. The aim of the reduction is to force producers to lower their cost of production, in the hope that this will improve production efficiency and spur technology innovation. Below is a recap of the government’s subsidy scheme and an overview of the subsidy amount between 2020 and 2022:

Figure 16: Government subsidies for purchase of NEVs (2015–2021)

Date	Department	Details
Dec-20	the Ministry of Finance the Ministry of Science and Technology the Ministry of Industry and Information Technology the National Development and Reform Commission	Improvement of the financial subsidy policy for the promotion and application of NEVs - To provide subsidy for NEVs priced below Rmb300k or NEVs with battery swapping services - To steadily reduce direct per vehicle subsidies by 10%, 20%, and 30% each year of between FY20 and FY22F, respectively, on previous year's subsidy basis
Dec-16	the Ministry of Finance the Ministry of Science and Technology the Ministry of Industry and Information Technology the National Development and Reform Commission	Adjusting the Subsidy Policy for the Promotion and Application of NEVs - To set the central and local governments subsidies limit, the local financial subsidies (local fiscal subsidy sum) shall not exceed 50% of the central finance for the single car - To reduce central and local subsidies for various types of NEVs by 20% based on the 2017 subsidy standards
Apr-15	the Ministry of Finance the Ministry of Science and Technology the National Development and Reform Commission	Financial Support Policies on the Promotion and Application of NEVs in 2016-2020 - To provide consumer subsidies from the PRC national government in purchasing specified types of NEVs - To receive the consumer subsidy from the PRC government after such NEV is sold to consumers - To Provide a preliminary phase-out schedule for the provision of subsidies

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

Figure 17: Government subsidies for purchase of NEVs (2015–2022)

Types of NEV	NEDC range (km)	Amount of subsidy (Rmb) (for non-public sector)				Decreasing Rate		
		2019	2020	2021	2022	2020	2021	2022
BEV	300 - 400	18,000	16,200	13,000	9,100	-10%	-20%	-30%
	400 - 500	25,000	22,500	18,000	12,600	-10%	-20%	-30%
	≥ 500	25,000	22,500	18,000	12,600	-10%	-20%	-30%
EREV	≥ 50	10,000	8,500	6,800	4,800	-15%	-20%	-29%

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

Potential extension of the subsidy programme to 2023. However, the Omicron outbreak has caused lockdowns in several cities in China. Multiple cities and industrial parks have temporarily suspended their production to follow control rules. The restrictions have led to closure of stores, supply chain disruptions, and logistic challenges, turning down the market sentiment and people's consumption ability and willingness. To ease the situation and guarantee in-line expansion of the NEV industry, we believe the governments are now considering extending incentives to EV customers to 2023.

Key policy 3: Purchasing tax exemptions for NEV. In order to promote and support the development of NEVs (include pure EV, PHEV and fuel cell vehicles), China first introduced purchase tax exemptions in 2014. The policy allows most consumers buying NEVs to save about Rmb10,000 (US\$1,540) relative to those buying traditional ICE vehicles.

The policy originally expired at the end of 2017, but was extended to the end of 2020 before it expired, and in March 2020, China extended the policy again to the end of 2022.

Purchase tax exemption for NEVs has been extended. On July 29, 2022, an executive meeting of the State Council hosted by Li Keqiang, China's Premier, has confirmed to extend the purchase tax exemption for NEVs (to be expired at the end-2022). However, the details about the extension is still in the planning stage.

Relevant policies/announcements summary for NEV Industry ➤

Policy summary. Below is a table summarizing relevant and vital government policies or announcements for the NEV industry, released by the ministries or the central government since 2019. We further classify policies into four categories: overall, infrastructure, financial, and promotion, reflecting a well-organised implementation scheme by the Chinese government. (Fig 18):

Figure 18: Relevant policies/announcements for NEV Industry (Jan 2019 to Jul 2022)

Date	Department	Policy Type	Policy Details
2022			
Jul-22	China State Council	Financial Policy	Confirmation on the extension of NEV purchase tax exemption - To confirm that the country's purchase tax exemption for NEVs will be renewed next year - To increase the number of quotas and relax restrictions on eligibility to purchase cars
Jun-22	Ministry of Finance the General Administration of Taxation	Financial Policy	Tax cut policy on low-emission passenger vehicles - To halve the car purchase tax for passenger vehicles priced at no more than RMB 300k and with 2-liter or smaller engines, which last from June 1 to the end of 2022 - To limit tax exemption on purchasing passenger cars, which no more than nine seats
Jan-22	The National Development and Reform Commission and other nine government departments	Infrastructure Policy	Guidelines for expanding electric vehicle charging infrastructure - To expand charging services for electric vehicles to meet the demand of 20m vehicles by 2025 - To have rapid charging stations for no less than 60% of expressway service areas in the the country by 2025 - To equip rapid charging stations for no less than 80% of national ecological civilisation pilot zones and key areas for air pollution prevention and control by 2025 - To strengthen maintenance and Internet services for charging facilities - To improve battery charging and swapping capabilities in urban and rural areas
2021			
Mar-21	China State Council	Overall Policy	The 14th Five-Year Plan of the People's Republic of China - To focus on higher quality and standards for NEV manufacturing - To promote the development of Na-ion battery industry - To launch or extend incentive policies for NEVs, such as tax exemptions, preferable loans, and co-financing - To encourage development of battery recycling industry and highlight the importance battery design and production, quality control, packaging and transportation, etc.
2020			
Dec-20	Ministry of Finance Ministry of Industry and Information Technology Ministry of Science and Technology National Development and Reform Commission	Financial Policy	Improvement of the financial subsidy policy for the promotion and application of NEVs - To provide subsidy for NEVs priced below Rmb300k or NEVs with battery swapping services - To steadily reduce direct per vehicle subsidies by 10%, 20%, and 30% each year of between 2020 and 2022, respectively, on previous year's subsidy basis
Oct-20	China State Council	Overall Policy	The New Energy Vehicle Industry Development Plan (2021-2035) - To increase the scale of R&D of EVs' operating system and power batteries - To strengthen the EV charging and hydrogenation infrastructure by developing a public fast-charging network, providing funds for facility construction, and encouraging the battery exchange mode - To enhance international cooperation for new energy vehicles - To issue a new policy to support the use of new energy vehicles - To reach 80% NEV penetration for the entire public sector, such as public transport, logistics, and distribution vehicles
Aug-20	Ministry of Transport	Infrastructure Policy	Guiding opinions on the construction of new infrastructure in the field of transport - To build intelligent transportation system (ITS) infrastructure - To gradually introduce intelligent trains, self-driving vehicles and intelligent ships in the transport system
Apr-20	State Taxation Administration Ministry of Industry and Information Technology	Financial Policy	Catalogue of NEVs exempted from vehicle purchase tax - To exempt NEVs from vehicle purchase tax, including EVs and PHEVs - To encourage NEV transition by consumers
2019			
Jul-19	Ministry of Industry and Information Technology	Infrastructure Policy	Phase V fuel consumption standards for passenger vehicles (GB 27999-2019) - To change the calculation method for maximum fuel consumption limits - To add referral indexes for calculating CO2 emissions for gasoline and diesel vehicles
Jun-19	12 Ministries in total, including the Ministry of Travel	Promotion Policy	Green Travel Action Plan - To promote green travel - To improve quality of public transport services - To raise people's awareness of the benefits of green travel

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

Local government EV policy overview ➤

Policy overview of local governments. In addition to the policy or announcement issued by the central government, the local governments have also implemented a broad array of EV policies to boost the NEV sales. Below is a brief summary of the EV promotion policies in China's Tier 1, New Tier 1, and 2 cities: (Fig 19):

Figure 19: EV promotion policy of major cities in China

City	Car plates restrictions and ZEV direct access	Traffic restrictions and ZEV waivers	Lower cost or free parking	Subsidies for the use of charging infrastructure	Direct ZEV purchase subsidies	Public bus fleet electrification
Tier 1 City						
Beijing	Yes	Yes				Yes (2020)
Shanghai	Yes	Yes		Yes (2020)		Yes (2025)
Guangzhou	Yes		First hour		Yes (2020/21)	Yes (2020)
Shenzhen	Yes		First two hours		Yes (2020/21)	
New Tier 1 City						
Chengdu		Yes	First two hours			Yes
Chongqing		Yes	100% off	Yes	Yes (2020)	
Hangzhou	Yes	Yes				Yes (2022)
Wuhan		Yes	First hour and then 50 % off			
Nanjing			First hour			Yes (2021)
Tianjin	Yes	Yes		Yes (2020)		Yes (2020)
Suzhou			First hour			Yes (2020)
Xi'an		Yes	First two hours			Yes (2019)
Changsha						Yes (2020)
Zhengzhou			50% off		Yes (2020)	
Dongguan						Yes (2020)
Ningbo						Yes (2022)
Tier 2 City						
Foshan						Yes (2019)
Kunming			First two hours			Yes
Jinan		Yes	First two hour and then 50 % off (BE	Yes (2020/21)		Yes
Shijiazhuang		Yes			Yes (Dec 2020)	Yes (2020)

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

2) Driver 2: Charging Infrastructure – The expansion of charging facilities ➤

Early foray into charging infrastructure. We believe another key factor that will help grow the NEV market in China is the rapid implementation of charging infrastructure. Placing charging stations in strategic locations would provide customers with a full range of services that allow them to easily recharge their NEV. Improving the convenience of using NEVs enhances user experience, thus drawing new customers and boosting sales. In fact, the Chinese government has announced plans for charging infrastructure in at least four documents in the past several years (Fig 20):

Figure 20: Four building blocks of charging infrastructure (2015-2016)

Date	Department	Details
Jul-16	National Development and Reform Commission	A Notice on Accelerating Residential EV Charging Infrastructure Construction - Setting out standards and procedures for residential charging infrastructure - Designating the Jing-Jinn-Ji, Yangtze River Delta and Pearl River Delta regions as demonstration zones for residential charging infrastructure development
Jan-16	Ministry of Finance Ministry of Science and Technology Ministry of Industry and Information Technology National Development and Reform Commission National Energy Administration	The 13th Five-year Plan for New Energy Vehicle Infrastructure Incentive Policies - Rmb90m in funding for installation of charging infrastructure - Minimum number of charging posts in each charging station - Government buildings need to install chargers - The procurement of chargers would be open to any charging manufacturer
Oct-15	National Development and Reform Commission	Guidelines for Developing Electric Vehicle Charging Infrastructure (2015–2020) - At least 120,000 EV charging stations and 4.8m EV charging posts by 2020 - Establishing a grid of EV-charging-enabled highways covering the most populous coastal provinces of East China
Sep-15	China State Council	Guidelines for Accelerating the Construction of Electric Vehicle Charging Infrastructure - All new residential constructions are required to be equipped with EV charging - 10% of parking spaces in large public buildings need to be reserved for EV charging - At least one public charging station for every 2,000 Evs - Public-private partnerships to develop charging infrastructure in places such as shopping malls, grocery stores and major parking facilities

SOURCES: CGS-CIMB RESEARCH, CHINA STATE COUNCIL

Enjoying the advantages of being the first mover. Thanks to these early insights, According to Frost & Sullivan, there were more than 1.3m public charging piles in 2021, representing 170 charging piles per 1,000 EV ownerships, 39% of which were DC fast chargers, in China, accounting for 74% of global charging

piles. With continuous policy support from the Chinese government, Frost & Sullivan forecasts the total number of public charging piles to reach 5.7m in 2025F, at a CAGR of 48%, of which 61% will be DC fast chargers, taking China's share of its charging network to 83% (Fig 21 & 22).

Figure 21: Total number of charging piles in China

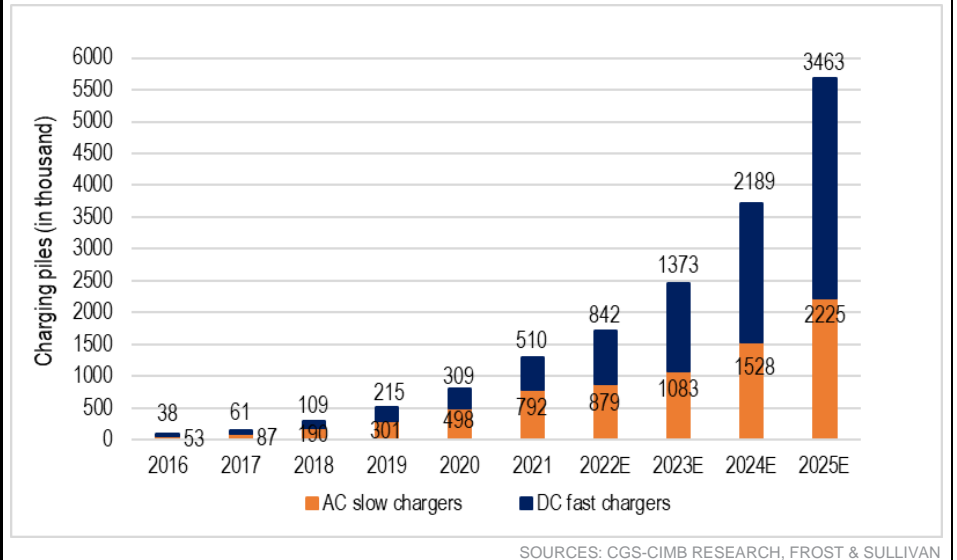
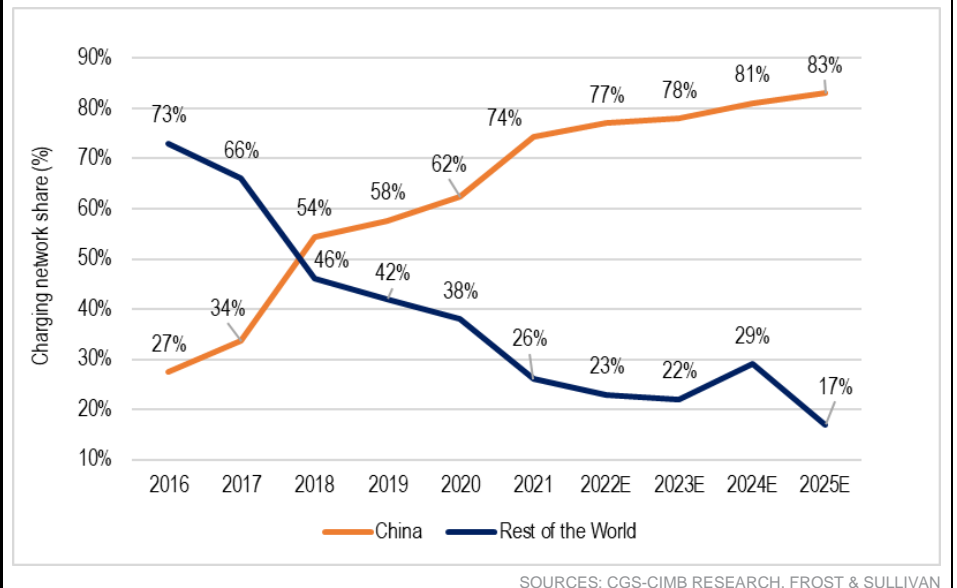


Figure 22: China's charging infrastructure network share (vs. rest of the world)



Charging network expanding to rural areas. In Jan 22, Beijing announced its latest visions and goals of a well-balanced charging infrastructure network, covering both urban and rural areas. The local government plans to provide rapid charging stations for at least 60% of expressway service areas by 2025F, and strengthen maintenance and Internet services for charging facilities to guarantee solid work in grid construction and energy supply, together with quality and safety provisions.

So far, China has the largest charging infrastructure networks for NEVs in the world, with over 1.3m public charging piles. Most of these charging piles are located in regions such as Guangdong and Shanghai. We expect a well-balanced charging network can facilitate wider BEV deployment, which will support the NEV sales target mentioned in the Plan 2021-2035 (Fig 23).

Figure 24: EV battery supply chain

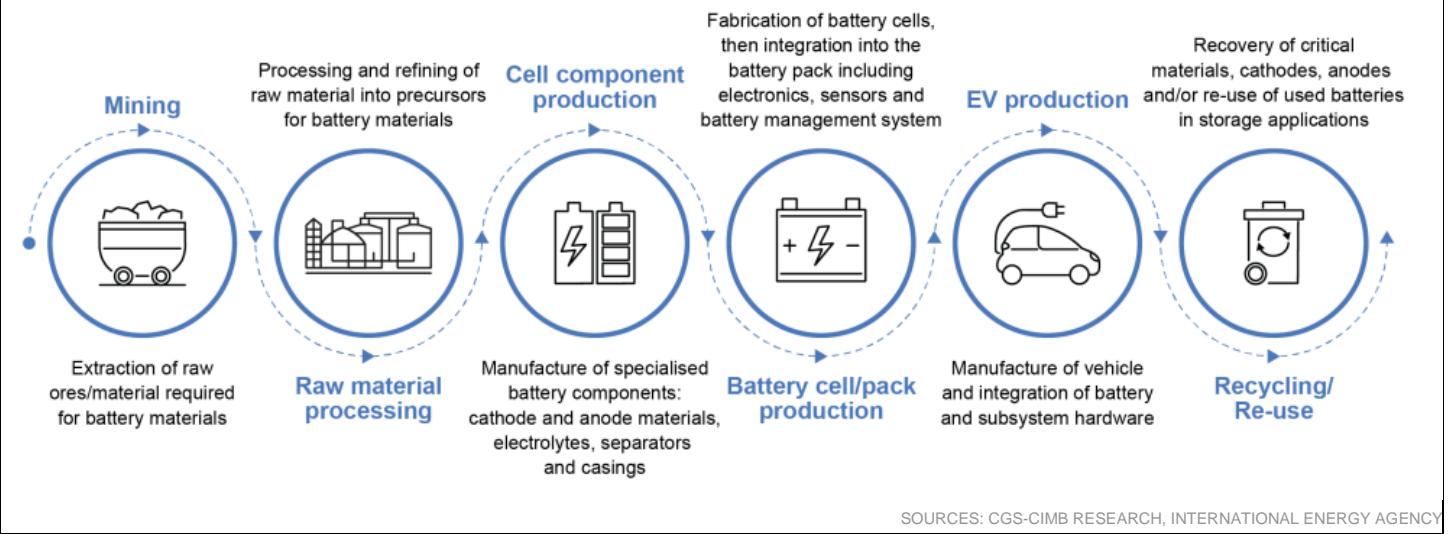


Figure 25: Top-three companies in each production stage in 2021

Mining	Cell Components	Battery Production	EV Production
<ul style="list-style-type: none"> - Lithium Sociedad Quimica y Minera de Chile (Chile) Pilbara Minerals (Australia) Allkem (Australia) 	<ul style="list-style-type: none"> - Cathode Sumitomo (Japan) Tianjin B&M Science and Technology (China) Shenzhen Dynanonic (China) 	<ul style="list-style-type: none"> CATL (China) LG Energy Solution (Korea) Panasonic (Japan) 	<ul style="list-style-type: none"> Tesla (US) VW Group (Germany) BYD (China)
<ul style="list-style-type: none"> - Nickel Jinchuan Group (China) BHP Group (Australia) Vale SA (Brazil) 	<ul style="list-style-type: none"> - Anode Ningbo Shanshan (China) BTR New Energy Materials (China) Shanghai Putailai New Energy Technology (China) 		

SOURCES: CGS-CIMB RESEARCH, INTERNATIONAL ENERGY AGENCY

Figure 26: Battery production capacity by country in 2021

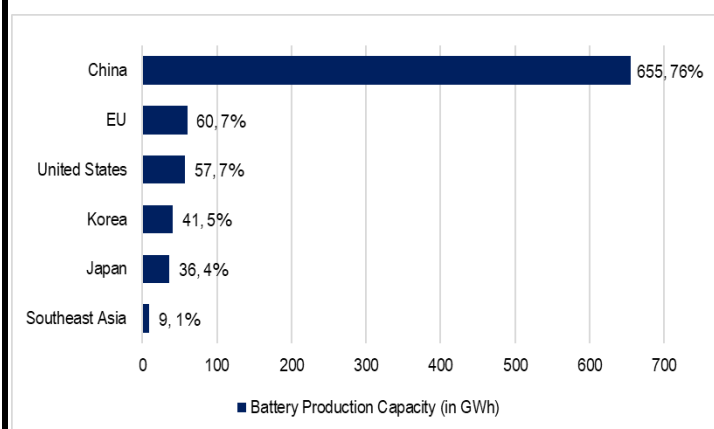
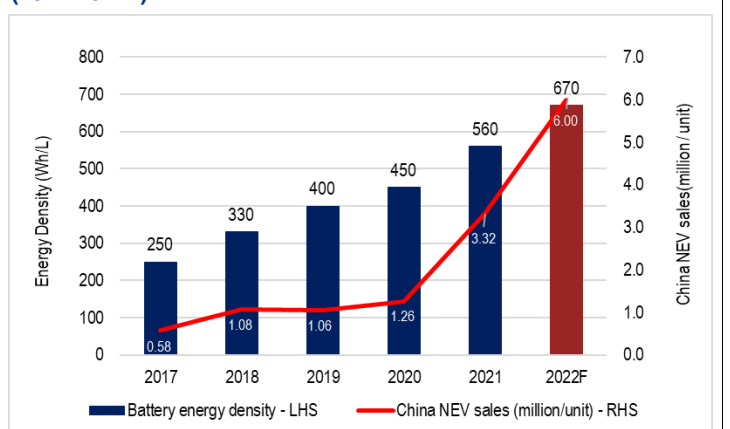


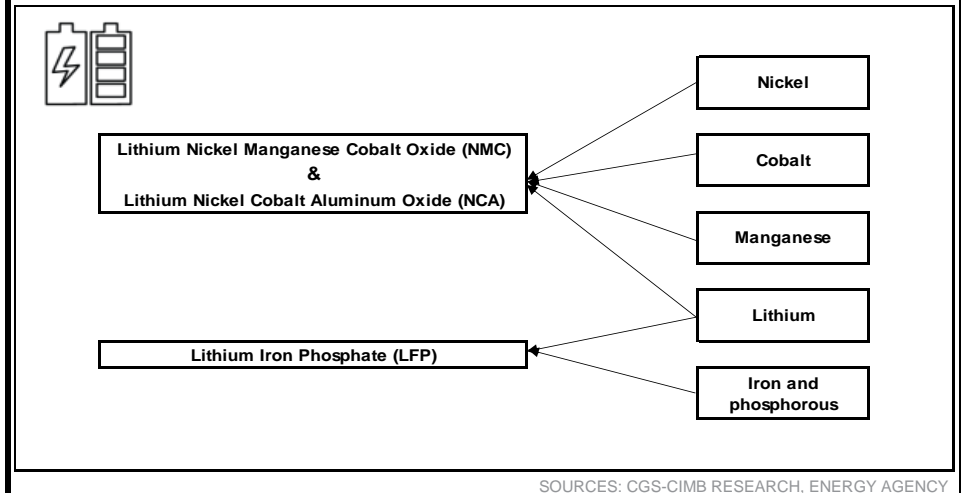
Figure 27: Battery volumetric energy density vs. China NEV Sales (2017-2022F)



EV batteries in three categories. Currently, there are three broad categories of cathode chemistry that are most relevant in the automotive industry: Lithium Nickel Manganese Cobalt Oxide (NMC); Lithium Nickel Cobalt Aluminum Oxide (NCA); and Lithium Iron Phosphate (LFP). The first two, NMC and NCA, have the same mineral composition with different proportion, and are dominating the

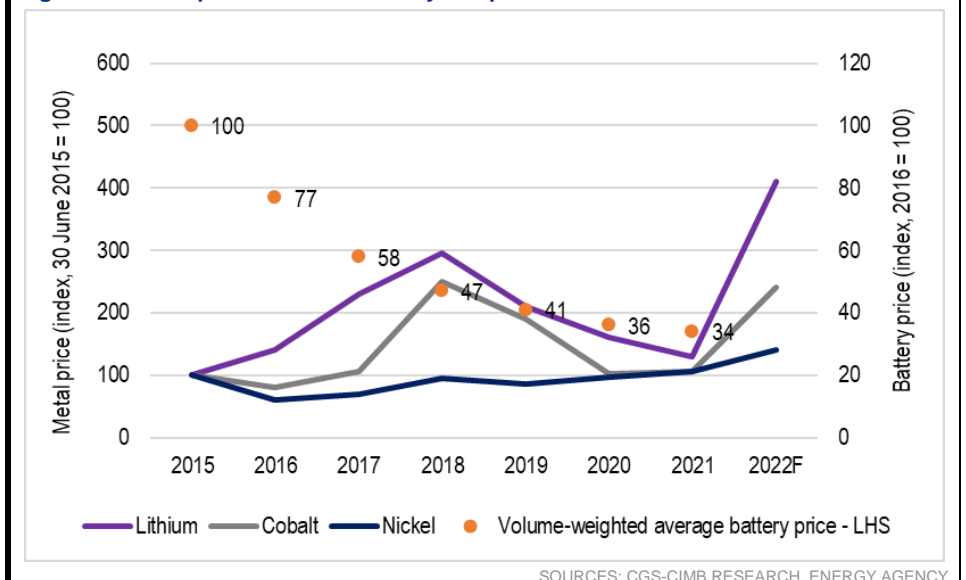
battery chemistry market, given its high energy density based on high nickel content. Both compositions consisted of lithium, nickel, cobalt, and manganese. For LFP, it takes away others except lithium, and replaced by iron and phosphorous, generating 65-75% of energy density of the above two, but produced at a lower cost and with more stable chemistry (Fig 28).

Figure 28: Mineral composition of the three broad categories of cathode chemistry



Upward cost pressure on battery components. Battery cathodes with different mineral composition imply different sensitivities to the rising metal prices. The prices of lithium, nickel and cobalt have risen substantially since 2H21, especially lithium. However, the increase has yet to be reflected in the battery cell price. We believe that this phenomenon is mainly due to two reasons. Firstly, manufacturers use inflation-adjusted contracts in buying batteries from suppliers. Most EV manufacturers now sign contracts where material costs are linked with commodity prices for high volume battery orders to avoid the volatile commodity prices. Secondly, manufacturers are shifting towards lower-cost cathode chemistries with less commodity price exposure, such as LFP (zero-reliance on nickel and cobalt). Companies such as BYD and NIO announced a new cell-to-pack (CTP) technology, which has improved the energy density of LFP batteries by eliminating the need for modules to house cells in the battery pack, which reduces the dead weight in the pack, resulting in doubling global market share for LFP from 7% in 2020 to c.15% in 2021. Therefore, despite the rising commodity prices, battery prices still declined by c.6% yoy in 2021 (Fig 29).

Figure 29: Metal price index vs. Battery cell price index



Resurgence of LFP. LFP has taken the EV cathode material demand share of 25% in China, driven by the increased uptake of EVs. In addition to LFP, the Chinese government has phased out the subsidies for high-nickel chemistries, bringing cost advantages for Chinese EV makers who are using LFP. In terms of global view, major non-Chinese EV makers, such as Tesla and Volkswagen, announced shift to LFP for supplying entry-level high volume EV models, and almost half of all Tesla EVs produced in the 1Q22 used LFP.

Future developments of China's battery industry. From a long-term perspective, China plans to promote the development of the Na-ion (sodium-ion) battery industry, as delineated in its 14th Five-Year Plan (2021-2025). Na-ion batteries (NIB, or Sodium-ion (SIB)) are a type of rechargeable battery analogous to the above three lithium-ion batteries. The current Na-ion battery can only achieve over half of the energy density of leading high-nickel chemistries and 20% lower than that of LFP but offers better safety characteristics compared to lithium-ion batteries. We are of the view that the government's support of the development of Na-ion batteries will be a shot in the arm for the long-term growth of the NEV industry given that Na-ion batteries are safer than lithium-ion batteries. Moreover, sodium (NA) is much more abundant and thus cheaper than lithium so that input costs cannot be manipulated easily, guaranteeing a fair EV market structure. Another focus area for the government is the battery recycling industry, the last stage of the EV battery supply chain. The central government has urged companies that recycle used batteries to manage the whole battery life cycle, including product design and production, quality control, packaging and transportation, etc.

Administrative policies (supply side) are the key to guaranteeing healthy China NEV industry development ➤

Financial incentives (demand side) for consumers are short-term catalysts. We believe financial incentives for consumers, such as government subsidies and purchasing tax exemption for NEVs, are all short-term policies that will help modify consumption patterns and solidify consumer demand for NEV. We expect these short-term financial measures to be phased off over the next few years.

Administrative policies (supply side) are more effective for promoting healthy industry growth. Administrative policies, such as increasing the number of charging piles in residential areas and charging stations along highways, encourage EV technology development (such as safer and more efficient EV batteries, new-type EV batteries and the supply chain) while financial support to automakers, such as Parallel Credit Administration and local governments' taxation benefits, will be key over the longer timeframe for guaranteeing healthy NEV market development. Major China automakers have already adjusted business strategies since the implementation of the dual credit policy.

NXL sets themselves apart with smart features

Chinese government includes smart and connected vehicles in its NEV industry development plan >

Chinese government sets goal to develop smart and connected vehicles in EV industry. In addition to the NEV boom, the China market is also heading to the “smart” stage. The Chinese government has set out its vision for the smart and connected vehicles in the NEV Industry Development Plan. Specific strategic goals include (i) achieving mass commercialisation of high level of autonomous driving for specific scenarios by 2025; and (ii) strengthening the research and development of the key auto parts and systems in relation to connected vehicles. Therefore, China has seen a surge in demand for smart battery electric vehicles (Smart BEV) as they can enhance vehicle safety, relieve traffic congestion, and enable more in-car entertainment.

Comparison of NXL’s smart technology >

“Smart” elements to be differentiating factor and boost NXL’s EV sales. We believe NIO, XPeng and Li Auto (NXL) are leaders in the ‘Smart EV’ field in China due to their localised advantage. NXL has been paying enormous attention to its products’ smart technologies, such as enhancing the geographical coverage of its advanced driver assistance system (ADAS), sending upgrades via Over-the-air (OTA) and improving Human-Machine Interaction (HMI) with Augmented Reality (AR) and Virtual Reality (VR) capabilities, voice assistance (local language) and three-dimensional (3D) interactive systems.

More importantly, we believe NXL’s self-developed ADAS has a huge local advantage over Tesla’s Autopilot (the major rival in China’s smart EV market) as the former’s ADAS software systems provide more accurate and reliable assistance and instructions, thanks to data collection on Chinese driving behaviours and China’s road and tariff conditions.

As sophisticated ADAS and intelligent operating systems are the key deciding factors for customers’ smart EV purchases, we believe NXL’s self-developed ADAS and intelligent operating systems give them an edge, helping them carve out a nice slice of China’s NEV market.

ADAS, OTA and HMI are the three key smart elements. The typical “smart” element is made up of three core aspects: 1) autonomous driving, 2) over-the-air (OTA) upgrades, and 3) intelligent cabin with human-machine interaction (HMI), to optimise users’ driving and riding experience. In the below section, we compare the smart technologies offered by NIO, XPeng and Li Auto.

1) ADAS and Autonomous Driving

Autonomous driving refers to a transport system that can perform driving tasks without intervention by a human driver. Technically, advanced driver assistance system (ADAS) can be classified into levels 0-5: No Automation (Level 0), Driver Assistance (Level 1), Partial Automation (Level 2), Conditional Automation (Level 3), High Automation (Level 4), and Full Automation (Level 5). According to CIC, many smart vehicles use Level 2 autonomous driving on highways and certain urban areas (Fig 30).

What is the difference between ADAS and Autonomous Driving? ***Autonomous driving is an extension of ADAS. Based on the above classification levels for autonomous driving, we refer to Level 1 and 2 as ADAS, which provide driver support, while Level 3 to 5 is autonomous driving, as it performs most/all operations.***

Figure 30: Illustration of 5 levels of autonomous driving

Level 0	Level 1	Level 2	Level 3	Level 4	Level 5
The driver is fully responsible and permanently carries out all aspects of the driving tasks	The driver can delegate either steering or accelerating / braking to the system	The driver must permanently monitor the system	In certain situations, the driver can turn attention away from the road, but must always be ready to take full control again	The driver can transfer complete control to the system and devote himself to other activities. However, he can take control at any time if he wants	No driver needed
No driver assistance systems	The system will perform one of the driving tasks	The system will perform several of the driving tasks	The system can autonomously control the vehicle on defined routes	The system is able to perform all driving tasks	The system controls the vehicle autonomously under all conditions

SOURCES: CGS-CIMB RESEARCH, WIKIPEDIA

NIO’s autonomous driving technology – NAD. NIO Autonomous Driving (NAD) is currently the core and latest technology of NIO. NIO launched NAD, a full-stack solution equipped with perception algorithms, localisation, control strategy, and platform software developed in-house on Jan, 2021. According to the company, NIO will gradually cover use cases from expressways, urban roads, parking, and battery swaps to provide a safer and more relaxing autonomous driving experience from point A to point B for its users. The ET7, which began deliveries to consumers in Mar 2022, is the first NIO EV to be equipped with NAD (Fig 31).

Going forward, NIO also announced that it will roll out NAD through a monthly subscription under an autonomous-driving-as-a-service, or ADaaS, solution.

Figure 31: NIO Autonomous Driving (NAD) key parameters

Aquila Super Sensing	Adam Super Computing	AD Algorithm	Vehicle Platform for AD
33 High-Performance Sensing Units 8 MP High-Resolution Cameras Ultralong-Range High-Resolution LiDAR 360° Vision Redundancy All-Direction Fusion	4 x NVIDIA DRIVE Orin 1,016 TOPS Super ISP Pipeline Ultrahigh-Bandwidth Backbone Network Hot Standby Redundancy	Multit-Solution Perception Fusion Multi-Source Integrated Localisation Multi-Modal Prediction and Planning Crowd AI Personalisation	NIO Vehicle Operating System Power Supply and Communication Redundancy Steering Redundancy, Parking Brake Redundancy, Dual Motors

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPeng’s autonomous driving technology – XPILOT. According to IHS Markit, XPeng is currently the only automotive company in China that develops full-stack autonomous driving software encompassing localisation and high definition map fusion, perception algorithm and sensor fusion, behavior planning, motion planning and control in house. XPeng has deployed abovementioned software on mass-produced vehicles.

XPeng introduced XPILOT 3.5 in Oct 2021. XPeng’s latest autonomous driving system 3.5 version was launched in Oct 2021, representing one of the most advanced autonomous driving technologies adopted in commercially available vehicles. XPILOT 3.5 is a new feature for driving in cities call “City NGP” which allows XPeng’s EVs to change lanes, speed up or slow down, or overtake cars and enter and exit highways.

XPILOT 4.0 is scheduled for launch in 1H23. The company is planning to roll out XPILOT 4.0 which will support wider geographical coverage and provide better vehicle interface and improve in-car experience for both drivers and passengers. XPeng plans to roll out XPILOT 4.0 in 1H23 (Fig 32).

Figure 32: XPeng Autonomous Driving (XPILOT) contents

XPILOT 2.5 (launched in 2019)	XPILOT 3.0 (launched in Jan 2021)	XPILOT 3.5 (launched in Oct 2021)	XPILOT 4.0 (to be launched in 1H23)
<ul style="list-style-type: none"> - Adaptive cruise control - Adaptive turning control - Lane centering control - Automated lane changing - Automated parking - Active safety features 	<ul style="list-style-type: none"> - Functions of XPILOT 2.5 - NGP for highway driving - Valet Parking Assist - Surrounding Reality (SR) display 	<ul style="list-style-type: none"> - Function of XPILOT 3.0 - NGP for major urban roads (in cities) - change lens, speed up or slow down - overtake cars and enter and exit highways 	<ul style="list-style-type: none"> - Function of XPILOT 3.5 - wider geographical coverage - better Q1 vehicle interface - improved in-car experience for both drivers and passengers

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Li Auto’s autonomous driving technology – Li Auto AD Max. Li Auto’s autonomous driving technology – Li Auto AD Max or Li Auto AD is currently applied to model L9, and ONE respectively. The former autonomous driving system is an updated version of latter, which has equipped more advanced equipment to improve driving assistance quality. Both of them have equipped the level 2 basic autonomous driving features such as adaptive cruise control, automatic emergency braking, automatic parking assist, forward collision warning, intelligent headlight control, lane change assist, lane departure warning, lane keep assist, and side view assist (Fig 33).

Figure 33: Li Auto ADAS Hardware Platform (New vs. Old)

Li Auto AD Max	Li Auto AD
<ol style="list-style-type: none"> 1) NVIDIA Orin X chips x2 2) Forward 128-line LiDAR x1 3) 8-megapixel Camera x6 4) 2-megapixel Camera x5 5) Ultrasonic Sensor x12 6) Forward Millimeter Wave Radar x1 7) Capacitive Hand Detection Steering Wheel 8) Steering Wheel with Vibration Alert 9) Attention Warning System 	<ol style="list-style-type: none"> 1) Horizon Robotics Journey 3 Processor x2 2) 8-megapixel camera x1 3) 2-megapixel camera x4 4) Fifth-generation Millimeter-wave Radars x5 5) Ultrasonic sensor x12

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Why NXL’s ADAS can be better than Tesla’s in China?

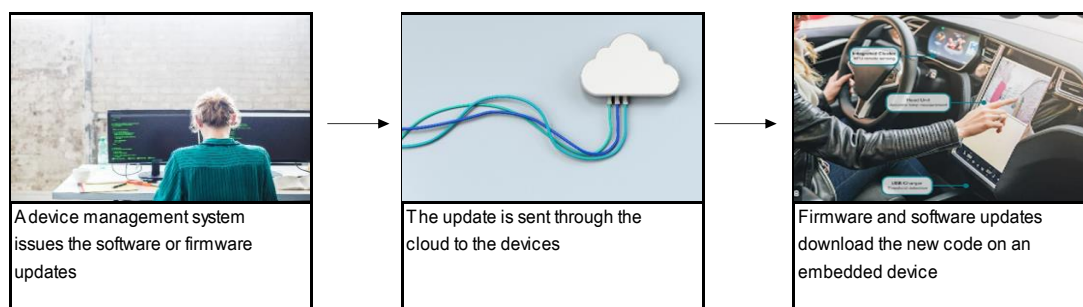
Localised ADAS software to be differentiating factor. It is important to point out that NIO’s NAD, XPeng’s NGP, and Li Auto’s AEB are optimised for Chinese road conditions, while Tesla’s Autopilot is not. Traffic patterns, highway exit/entrances, and road rules differ around the world, and therefore, there is no one-size-fits-all approach for ADAS. Meanwhile, Tesla would have advantages in adapting their systems for roads in the EU and the US.

NIO and XPeng are developing ADAS for the EU. NIO’s NAD and XPeng’s NGP’s have been localising their ADAS software system for Norwegian users. Since NIO and XPeng continues to improve their autonomous driving system by collecting data on their users driving behaviour, the roads and tariffs, their ADAS technologies could be more advanced and comparable to Tesla’s Autopilot in European markets in the near future

2) Over-the-air (OTA) upgrades

OTA upgrades. OTA is a technology that updates vehicle software remotely through a cloud network, which is a foundation of smart vehicles. OTA upgrades can distribute new features wirelessly to customers at home. As assisted driving progresses towards full autonomous driving, OTA will be essential to enable the distribution and upgrades of these functions (Fig 34).

Figure 34: OTA Illustration



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO’s OTA upgrades. NIO is the first auto company in China that offers both firmware OTA (FOTA) and software OTA (SOTA) to its users. Its FOTA updates enable users to upgrade the operating firmware down to the individual programmable Electronic Control Unit (ECU) level across the vehicle’s core systems, such as digital cockpit, autonomous driving domain controller and electric powertrain, while SOTA improves the flexibility of NIO’s digital cockpit as it allows continued updates with new features and applications to NIO’s operating system, or NIO OS.

XPeng’s OTA upgrades. XPeng is able to deliver effective OTA firmware upgrades with its well-designed software and hardware integration and electronic architecture. Below are the OTA upgrades by XPeng (Fig 35):

Figure 35: XPeng OTA upgrade content

Date	OTA Upgrade Content
Jun-21	Rolled out our Xmart OS 2.6.0 through an OTA firmware update to the P7 and introduced new functions and updates, including the Valet Parking Assist, an advanced automated parking function
Mar-21	Completed 15 major OTA firmware updates with 55 new features added to the G3, as well as seven major OTA firmware updates with 73 new features added to the P7
Jan-21	Updated P7 model with 40 new features, including the NGP for highway driving of our autonomus driving system XPILOT 3.0, and our in-car intelligent opearting system Xmart OS 2.5.0
Oct-20	Covered 35 ECUs, including vehicle control unit, battery management system, sensor cotrol unit and autonomus driving unit

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Li Auto’s OTA upgrades. Li Auto’s OTA upgrades (also known as FOTA) can automatically pause if there are issues during the upgrade process and resume later, allowing for flexibility for its users. In Dec 2020, the company introduced the 2.0 vehicle system update for Li ONE via FOTA upgrade, which enhanced the driving quality, energy efficiency, user interface, operating experience, and in-car content offerings.

3) Intelligent Cabin with Human-Machine Interaction (HMI)

Intelligent Cabin with Human-Machine Interaction (HMI). HMI is an indispensable capability for smart vehicles as it enables people to connect with and control vehicles smoothly. Simply speaking, it enables computers or smart devices to assist humans in completing functions. Currently, ways of assisting include voice recognition and interaction, touch panels, infotainment screens, and in-car applications.

NIO's HMI. The HMI of NIO is an AI driven, scalable and flexible architecture, which is known as NOMI. It can listen to, communicate and interact with users to build a strong connection between vehicles and users. Currently, NIO plans to deliver PanoCinema, a panoramic digital cockpit with AR and VR capabilities, to its users. NIO users can also update its digital system through SOFA to optimise their experience with new features and applications.

XPeng's HMI. The HMI of XPeng is called Xmart OS. It is an in-car intelligent operating system and supports a broad range of smart connectivity functions, such as AI voice assistant, smart navigation, ecosystem for third-party apps and service, digital car keys, intelligent recommendations, and remote control. Xmart OS can perform remote updates through OTA firmware, and XPeng has rolled out Xmart OS 2.6.0 in the P7 model, introducing the Valet Parking Assist, an advanced automated parking function, to improve user experience.

Li Auto's HMI. The smart technologies, or intelligent systems in Li L9, feature a 1) five-display interactive system, 2) its three-dimensional interactive mode, 3) Dolby Atmos technology combined with 4D vibration units. These are supported by a computing platform composed of two Qualcomm Snapdragon automotive-grade 8155 chips. Meanwhile, Li Auto's Li ONE, features a four-display interactive system, full-coverage in-car voice control systems, and operates with a Qualcomm Snapdragon 820A processor and a Texas Instruments Jacinto 6 processor. Both of them implement FOTA upgrades to continuously improve and update the smart features and car performance.

Figure 36: NIO HMI (display panel)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 37: Xpeng HMI (display panel)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 38: Li Auto HMI (display panel)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NXL's HMI could best Tesla's

NIO's face recognition features mood and emotion identification while Tesla does not. We believe NIO's digital assistant, NOMI, delivers a more welcoming experience for drivers and passengers that is not limited to merely accessing functions. NOMI can tailor its response based on facial expressions and image recognition technologies that identify users' mood and emotions. For example, if NOMI's cameras recognise the user is tired after a long day at work, the system can be programmed to play relaxing music or initiate a casual, cheerful conversation. NOMI can also play storyteller to engage a bored child's attention or serve up some educational games on the backseat touchscreen. On the other hand, Tesla's face recognition is designed to provide more passive interaction, ensuring the driver is seated and paying attention.

We believe the future of HMI is greater active interaction, like NOMI, while accessing functions via face recognition will become the basic and minimum configuration of future EVs. Therefore, we believe NIO's HMI bests Tesla's in terms of facial recognition technologies.

XPeng and Li Auto offer gesture control over the vehicle while Tesla does not. Gesture interaction uses the in-car camera to identify a gesture and report to the vehicle system's control unit, which will then call out the function corresponding to the gesture. XPeng's EVs support gesture recognition outside the car while Li Auto's new flagship model, Li L9, offers a three-dimensional interactive mode that allow drivers and passengers to control screen displays via hand gestures without having to physically touch the screens. Tesla has gesture control, like two- and three-finger gestures, but requires users to tap and touch the screen to perform it. We believe that gesture control will become a more vital smart element for EVs as it is more accurate, quicker and easier to use than voice control. Currently, in terms of gesture control technologies, XPeng and Li Auto outperform Tesla.

Battery technologies provide the edge

Comparison of NIO, XPeng and Li Auto battery technologies ➤

We discuss NXL's different battery technologies, how NXL mitigates battery issues, and how they upgrade battery technologies in the following section.

The aim of battery technology iterations. Technically, battery technology iterations aim to extend the NEDC range and lower the charging time for NEVs, thus improving users' experience. NXL has its own unique battery technologies.

For example, NIO has launched battery swapping services to eliminate the time-consuming charging experience, XPeng has provided rapid charging services to its users to optimise the charging experience, and Li Auto is offering EREV to allow users to either charge or refuel its vehicles with electricity or gasoline, respectively. On the other hand, NIO's premium eSUV achieve the longest driving range among Chinese automakers with NEDC at 1,000km in the E7 model. XPeng also produces long driving range models in the P7 model with NEDC over 700km.

The New European Driving Cycle (NEDC)

The New European Driving Cycle (NEDC) is a driving cycle, last updated in 1997, designed to assess the emission levels of car engines and fuel economy in passenger cars. It is also referred to as MVEG cycle (Motor Vehicle Emissions Group).

The NEDC, which is supposed to represent the typical usage of a car in Europe, is repeatedly criticised for delivering fuel economy-figures which are unachievable in reality. It consists of four repeated ECE-15 urban driving cycles (UDC) and one Extra-Urban driving cycle (EUDC).

Although NEDC was originally designed for petrol-based road vehicles, the driving cycle is now also used for diesel vehicles and to estimate the electric power consumption and driving range of hybrid and battery electric vehicles (source: Wikipedia).

NIO's battery technologies:

A wide range of battery choices. NIO is sourcing battery from CATL (300750 SZ). It currently offers two battery options to its customers: Standard Range Battery and Long Range Battery. The Standard Range Battery is a 75 kWh cell-to-pack battery with hybrid LFP/NCM cells, while the Long Range Battery is a 100kWh cell-to-pack battery. In Jan 2021, NIO announced a 150 kWh Ultra-Long Range Battery with next generation battery technology, and plans to start delivering the Ultra-Long Range Battery in 4Q22.

Battery swapping of NIO. NIO introduced battery swapping services for its smart electric SUVs with the launch of the ES8 in 2017.

Nowadays, all NIO EVs are equipped with its proprietary battery swapping technologies (NIO holds over 1,200 patented technologies for battery swapping), providing users a convenient and excellent recharging experience – they can simply swap their EV's battery for another fully-charged battery within minutes. Upgrade options also allow users to benefit when battery technology advances.

NIO Power Swap station 2.0. In Apr 2021, NIO began rolling out its second-generation battery swapping stations, dubbed NIO Power Swap stations 2.0, in partnership with Sinopec. NIO Power Swap stations 2.0 significantly increased NIO's battery-service capacity by reducing the time needed to swap the battery of NIO vehicles to under three minutes. Each station has 14 battery slots, and the capacity to handle 312 swaps per day.

The third-generation battery swap station. On 6 Jul 2022, the second annual NIO Power Day, the company announced that it is developing the third-generation battery swap station which will have larger capacity and a more flexible layout. More details will be revealed by end-2022 and the company expects to be rolled out in 2H23F.

Launched battery-as-a-service (BaaS) model in 2020. We believe NIO set itself apart from other Chinese EV makers when it launched the industry-first battery-as-a-service (BaaS) solution in 2020, which allowed customers to purchase a NIO

EV without a battery pack and lease one from the company. By decoupling the battery price from the purchase price of a NIO EV and allowing users to subscribe for the usage of batteries, customers were able to enjoy lower upfront vehicle purchase costs and flexible upgrade options for batteries of various capacities on a monthly or yearly basis.

All of NIO's EVs adopt the in-house developed electric powertrain. Supported by continuous R&D capabilities, NIO offers a variety of electric motors, including 240kW induction motor, 160kW permanent magnet motor, 180kW permanent magnet motor, 300kW induction motor, 150 kW induction motor and 210 kW permanent magnet motor. Currently, all of NIO's EVs adopt the in-house developed electric powertrain.

XPeng's battery technologies:

A wide range of battery options. XPeng offers both lithium NCP cells and LFP cells for its G3i and P7 models to provide a wider range of options for its customers. Models equipped with LFP batteries are sold at a slightly lower price. For example, a premium P7 with LFP cells is sold at Rmb239,900, while a premium P7 with NCM cells is sold at Rmb259,900. This is because of the lower of NEDC range supported by LFP cells, compared to that of NCM cells (480km vs. 586km). However, this cheaper option is more affordable, and Chinese users tend to drive shorter distances in the cities.

Batteries designed and produced in-house. XPeng's G3 battery pack is designed in-house and produced either by a contract manufacturer or in-house, while its P7 battery pack is designed and produced in-house in collaboration with CATL, which allows it to improve product quality and reduce cost. The battery pack has water-and-dust resistance capabilities that reach IP68, the highest standard in the industry, as it can be immersed under water at a depth of one-meter for 48 hours without leakage. It also contains non-combustible materials, which optimise the placement of the high-voltage electrical circuit within the battery to enhance electrical safety in the event of a collision.

Widespread charging network for customers. XPeng is now offering three charging solutions, including home charging, rapid charging stations, and third-party charging piles. Customers can access each of these services based on their needs. The company started a free charging programme in Sep 2020, and covers 140 cities in China as of Mar 2021. Also, it is expanding its rapid charging network coverage to enhance users' charging experience. Currently, its P7 battery pack can be charged from 30% to 80% of battery capacity in less than 30 minutes. Furthermore, the P7 battery pack demonstrates durable cycle performance and retains over 90% of its initial capacity after approximately 160,000 kilometers, adding a convenience factor for customers.

Li Auto's battery technologies :

Li Auto's batteries. Li Auto's vehicles use lithium-ion batteries. The company purchases battery packs from CATL (300750 SZ). Its two models Li ONE and Li L9 (coming to be delivered in Aug 22), are equipped with 40.6kWh and 44.5kWh battery packs, and deliver an electric-only NEDC range of 180km and 215km, respectively.

Proprietary EREV solutions. Li Auto is launching vehicles with spell out (EREV) powertrain. The energy source of an EREV powertrain comes from both the battery pack and range extension system. Most range extenders are ICE designed (internal combustion engine) with high fuel consumption efficiency to drive an electronic generator furnishing the electric battery and motor with electricity. An EREV will create CO₂ when its small range extender motor is operating, but not when the EREV is using its electric power. In addition to the range extension system, the powertrain is also equipped with FOTA upgrade capability, allowing it to continuously optimise the control algorithm and software configuration through receiving high volume closed-loop data feedback from the vehicles. According to

the spell out (CIC) report, EREV only contributes 2.8% of total NEV sales volume in China in 2020.

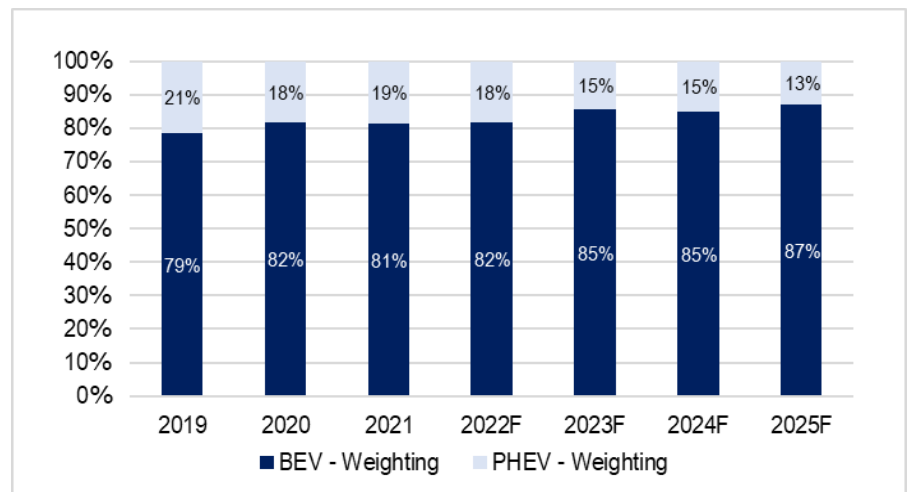
Moving to BEV technologies. Li Auto is preparing to launch a HPC BEV platform to compete in the BEV market in FY23F. Its R&D team has been focusing on high C-rated battery, high voltage platform, and ultra-fast charging capability since FY20. It plans to launch at least two HPC BEV models each year starting from FY23F.

BEV to expand its dominant position >

Hybrid vehicles will eventually phase out. We believe that battery electric vehicles (BEV) will remain the key player in the NEV market, and continue to increase its proportion of China's NEV shipments. In other words, plug-in hybrid electric vehicles (PHEV) will be gradually phased out in the coming years, in our view. Xe Xiaopeng, the CEO of XPeng, also believes that in the process of transforming traditional fuel vehicles into NEVs, hybrid vehicles have emerged and been in huge demand. However, after 2023 and 2024, hybrid vehicles will gradually decline, and bring different challenges, due to different uses of technology.

BEV likely to make up 88% of NEV shipments in 2025F. Currently, out of over 3.3m NEVs sold in China in 2021, c.81% were BEVs and c.19% were PHEVs and FCEVs (see Fig 39). We believe BEVs will maintain its dominant position in the NEV market, and gradually gain market share from PHEVs. We expect BEV to account for 87% of NEV shipments in 2025F, up 700bp from 2021.

Figure 39: NEV shipment composition in China – BEV likely maintain mainstream in China NEV market



SOURCES: CGS-CIMB RESEARCH ESTIMATES, IEA

China EV “New Forces”– NIO, XPeng and Li Auto

NIO, XPeng and Li Auto (NXL) – The “New force” for China EV market ➤

Comparison of NXL’s market performance, technology advantages, and their market share trend. In the following sections, we compare the fastest-growing China EV companies, NIO, XPeng and Li Auto (NXL), dubbed the “New Force”, in terms of market performance, technology advantages, and why we believe that NXL will gain significant market share in China’s EV and PV market.

NXL’s EV deliveries summary ➤

NXL reached the peak of EV deliveries in 2021. Thanks to early policy planning by the Chinese government, China has become a dominant player in the NEV market in terms of sales and battery supply chain. Among the rising companies in China, NIO, XPeng, and Li Auto (hereinafter referred to as “NXL”) have attracted the most attention because of their similar size and deliveries growth. According to NXL’s data, NIO’s FY21 EV deliveries achieved a record high at 91.4k units, rising c.109% yoy, while XPeng’s FY21 EV deliveries also reached 98.2k units, surging 263% yoy, and Li Auto’s FY21 EV deliveries peaked at 90.5k units, up 177% yoy.

NXL’s 1H22 NEV deliveries dropped c.10% hoh due to seasonality and the Omicron wave. NXL’s shipments dropped significantly in Feb 22 due to a seasonally weak sales performance, as a result of the Lunar New Year holiday. Also, shipments declined significantly in Apr 22, due to the prolonged lockdown implemented in several cities, particularly in Shanghai. These market headwinds limited consumers’ access to channels to purchase NEVs. As a result, NXL’s 1H22 EV shipments dropped c.10% hoh, from 199,588 units in 2H21 to 180,213 units in 1H22. The Figures below show NXL’s deliveries performance, showcasing the growth potential on the back of tailwinds from government policies (Fig 40).

Figure 40: NXL’s monthly shipment deliveries (Jun 2021 – Jun 2022)

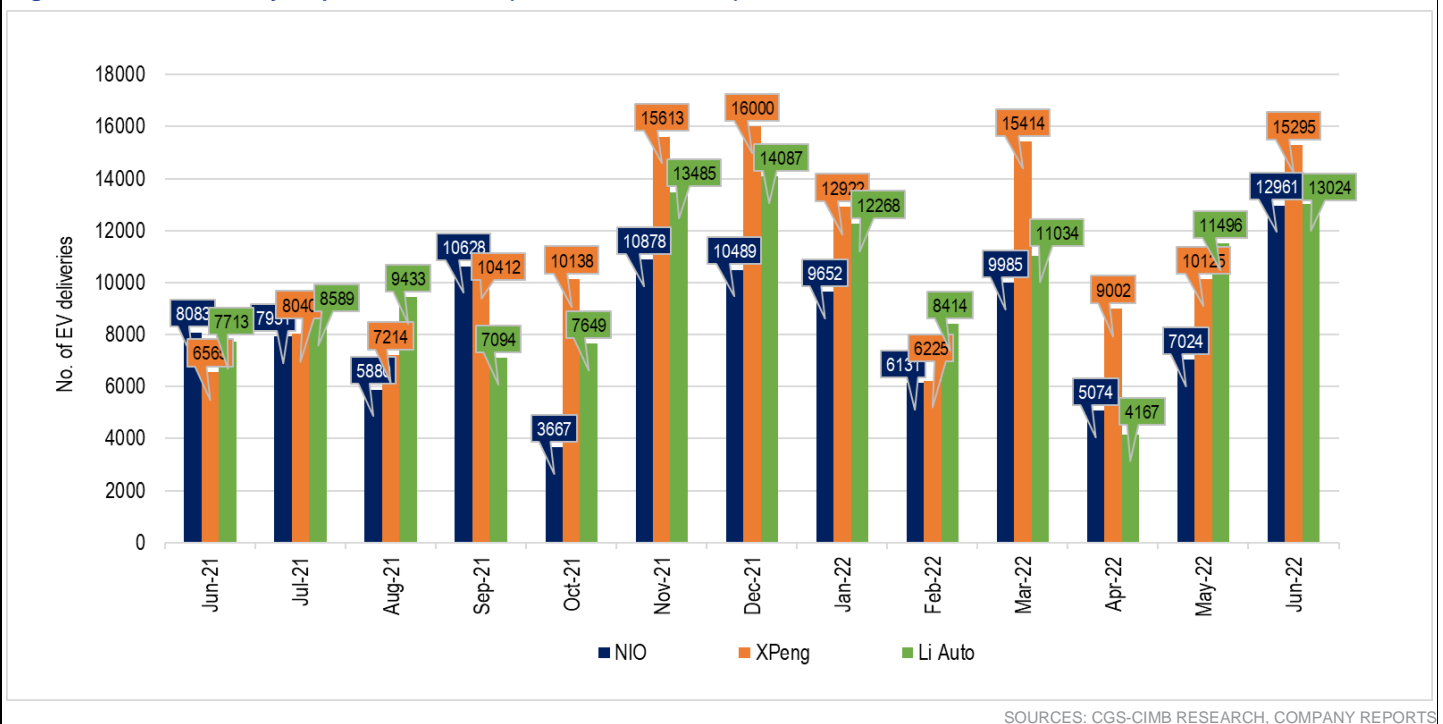
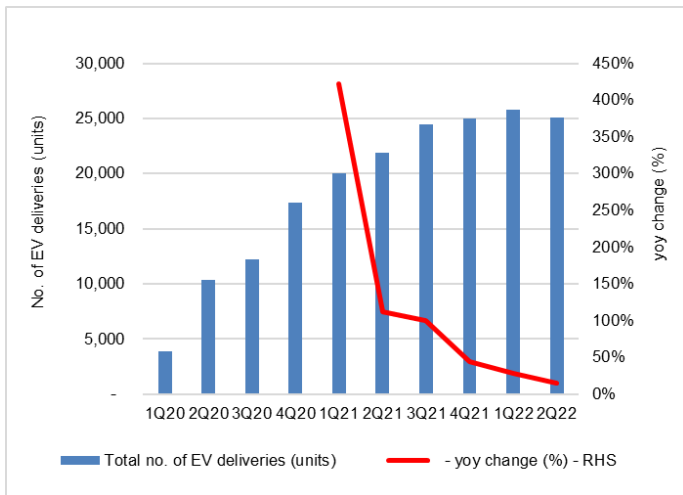
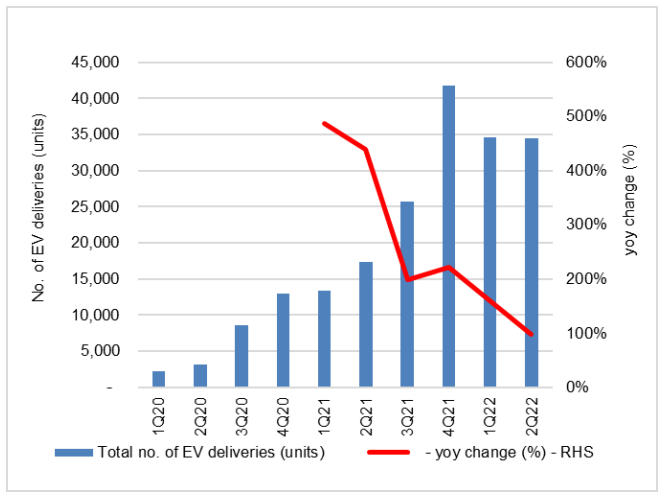


Figure 41: NIO's EV deliveries, by quarter (1Q20 to 2Q22)



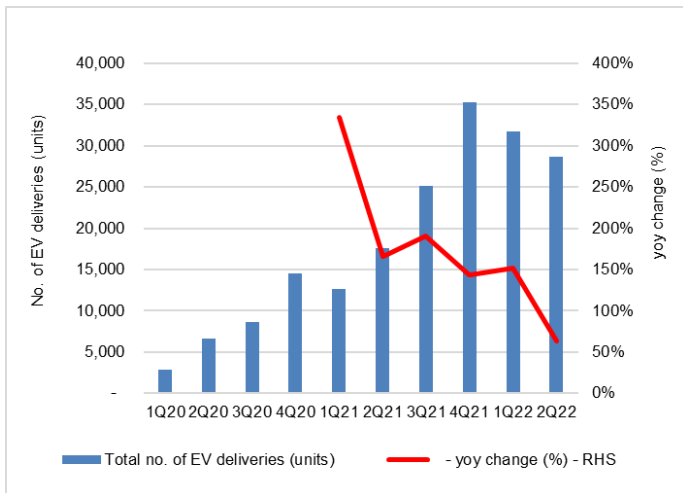
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 42: XPeng's EV deliveries, by quarter (1Q20 to 2Q22)



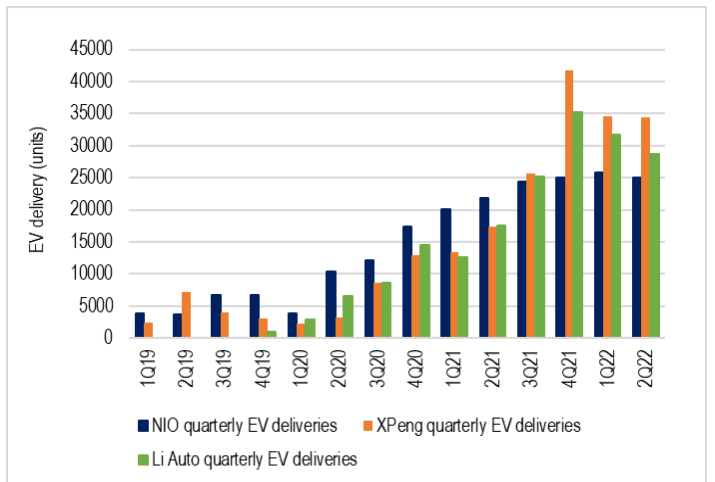
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 43: Li Auto's EV deliveries, by quarter (1Q20 to 2Q22)



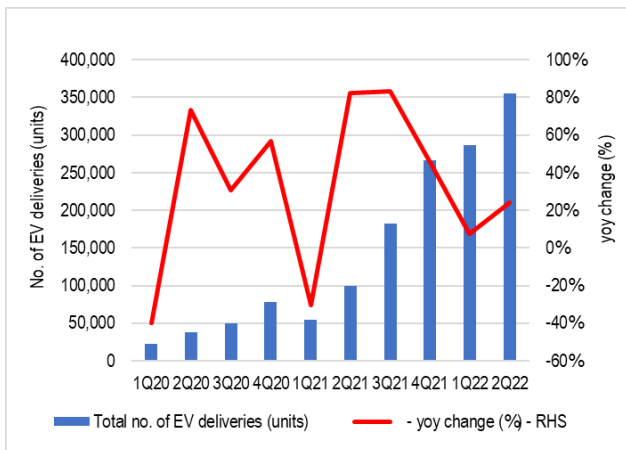
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 44: NXL's EV deliveries, by quarter (1Q20 to 2Q22)



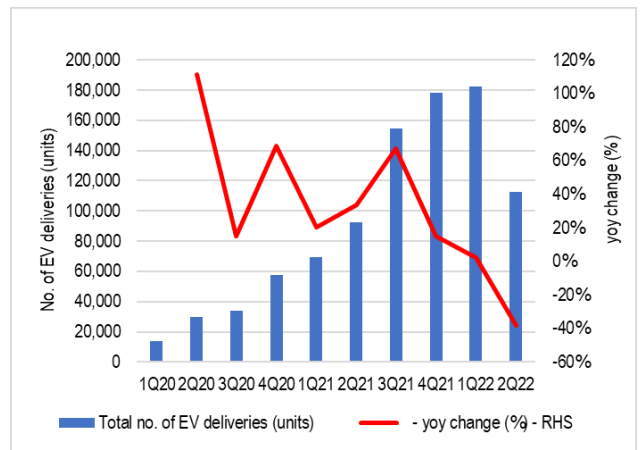
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 45: BYD's EV deliveries, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 46: Tesla's EV deliveries, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO topped revenue among NXL. NIO's FY21 revenue increased 122% yoy to Rmb36.1bn, driven by 91.4k EV deliveries, thanks to strong sales of the new EC6 model (started deliveries in Sep 2020). It delivered 11.3k units of EVs in FY18, and 20.6k units in FY19, then rose further to 43.7k units in FY20, and 91.4k units in FY21. As a result, NIO's market share (based on deliveries) in China reached approximately 2.8% in FY21. **1H22 deliveries.** EV deliveries growth decelerated to 21% yoy to 50.8k units in 1H22 due to production halts on the back of logistics disruptions and component shortages during the Covid-19 pandemic.

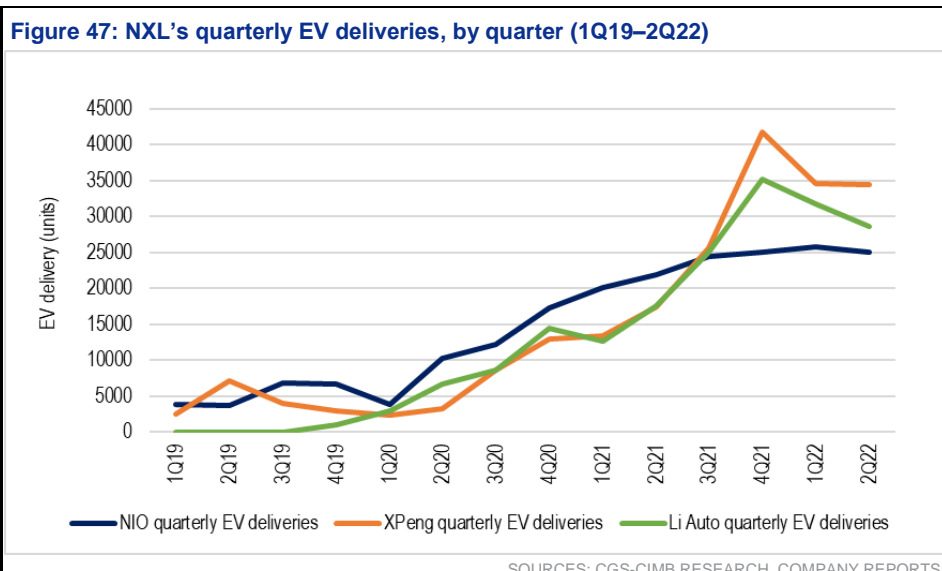
XPeng achieved the highest revenue growth rate among NXL. XPeng's FY21 revenue increased 259% yoy to Rmb20.99bn, driven by 98.2k EVs deliveries, mainly contributed by its P7 model, which accounted for c.62% of total deliveries in FY21. It delivered only 12.7k units of EV in FY19, 27.0k units in FY20, and 98.2k units in FY21. As a result, XPeng's market share (based on deliveries) in China reached approximately 3.0% in FY21. **1H22 deliveries.** EV deliveries growth decelerated to 124% yoy to 69.0k units in 1H22 due to production halts on the back of logistics disruptions and component shortages during the Covid-19 pandemic.

Li Auto exceeded 90k EV deliveries with only one product. Li Auto's FY21 revenue increased 186% yoy to Rmb27.01bn, driven by 90.5k EV deliveries, thanks to the robust and continuous growth of its only product, Li ONE (delivered since Dec 2019). It delivered 32.6k EV units in FY20, and 90.5k units in FY21, recording substantial yoy growth of 177%. As a result, Li Auto's market share (based on deliveries) in China reached approximately 2.7% in FY21. **1H22 deliveries.** EV deliveries growth decelerated to 100% yoy to 60.4k units in 1H22 due to production halts on the back of logistics disruptions and component shortages during the Covid-19 pandemic.

Different EV segmental growth rate in NXL ➤

NXL's EVs deliveries may be driven by different end-segment targets. According to Fig 47, despite seeing an overall rising trend in EV deliveries for NXL, we see higher EV deliveries for XPeng and Li Auto compared to NIO starting from 3Q21. One possible reason for this may be their different end-segment targets. NIO targets the luxury car market and aims to take market share of fuel cars from German luxury car companies, including BMW, Mercedes-Benz and Audi, while XPeng targets a broader market, hoping to attract a younger demographic with more affordable prices and a sleek, modern look. Li Auto, on the other hand, targets families with children, and has become one of the top choices for young parents today.

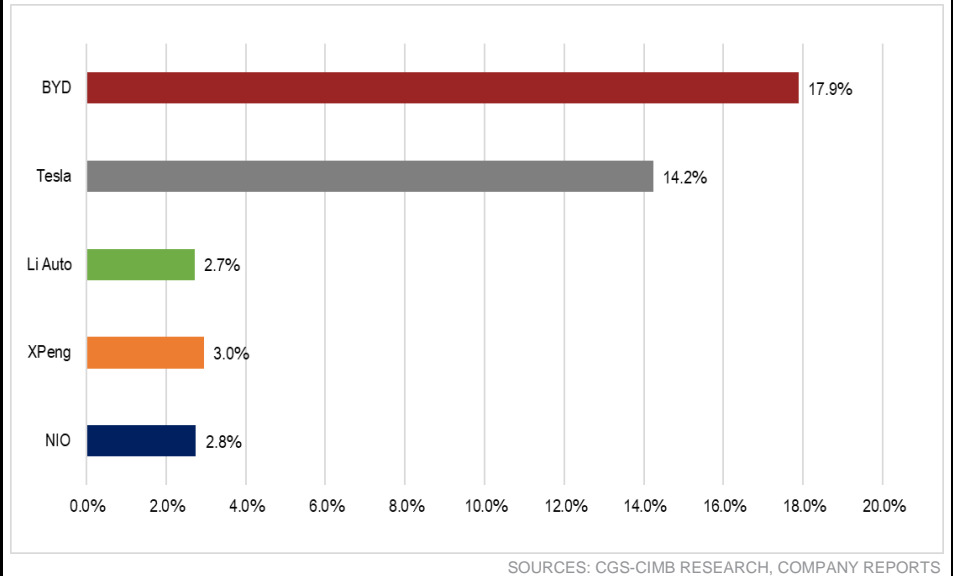
As a result, the EV deliveries growth rate for XPeng and Li Auto is higher than that of NIO due to their overall relatively affordable prices.



NXL has huge growth potential in China's EV market ➤

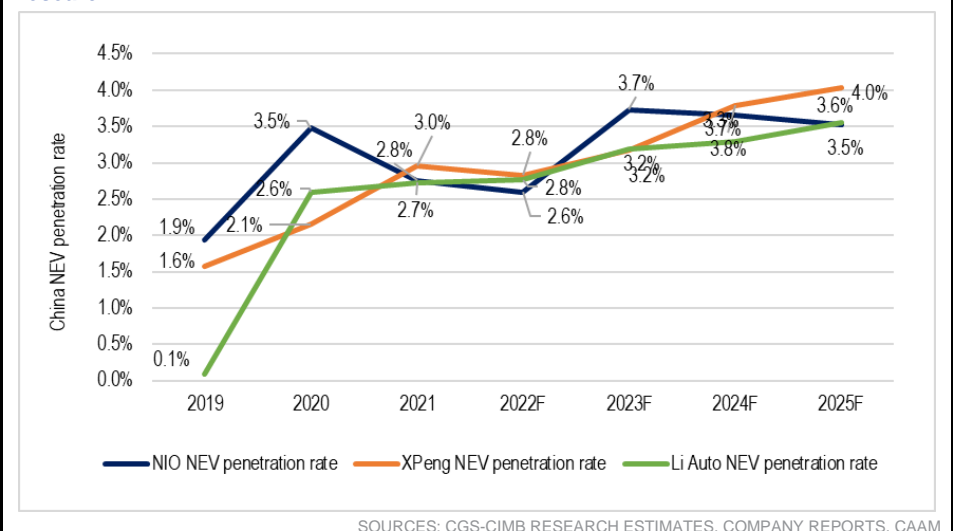
NXL has huge potential to gain further market share in the future. NXL combined held 8.5% of total NEV market share in China in 2021 (Fig 48). Although BYD and Tesla are first movers in global and China EV market which still dominate China's NEV market, we believe that NXL still has ample room to grow, driven by 1) continuous new models launches, 2) supportive government policies for domestic auto makers, 3) widespread charging network to tier-2-4 cities, and 4) ADAS, operating system (OS) and battery technologies iterations.

Figure 48: China's EV market share comparison in 2021 (NXL vs. BYD vs. Tesla)



NXL's EV combined penetration rate to reach 12.4% in FY25F. We believe that NXL's business will continue to benefit from the rising ICE/EV migration trend and supportive government policies in China. However, we anticipate potential new entrants in the NEV market, and traditional automakers are switching from fuel cell vehicles to NEVs. Therefore, we expect a much more intensifying competition in the EV market, and forecast NXL's market share in China EV market to increase slightly by 110bp - 140bp (XPeng: 4.0%, Li Auto: 3.5% and NIO 3.6%) from 2021 to 2025F (Fig 49).

Figure 49: NXL's China's EV market share (2019-2025F), estimate by CGS-CIMB Research



Why NXL should gain market share in China EV market ? ➤

We believe that NIO, XPeng and Li Auto, the “New Force” in Chinese EV market, are able to keep growing their EV sales and account for more market share in China EV market in 2022F-25F. This is underpinned by 1) continuous new model launches, 2) sophisticated ADAS system, 3) smart cockpit and intelligent operating system, 4) superior interior/exterior designs and high-quality vehicle system, 5) improving charging technologies and infrastructure, and 6) effective direct sales model and ecosystem built.

- 1. New model launches to drive NXL EV deliveries.** We believe NXL shipments should accelerate in 2H22F and onward due to more models are set to deliver in the next few years. For example, Li Auto launched Li L9 on 21 Jun 2022, and received over 30,000 orders within 72 hours. Also, NIO is planning to deliver its new BEV models, ES7 and ET5, in Aug 22 and Sep 22, respectively, while XPeng’s new model, G9, is set to be delivered in 4Q22F and P9 EV and G5 eSUV will be delivered in 2023F. With supportive government policies and rising electrification trend among consumers, demand for NXL’s EVs is likely to remain robust. Therefore, more new model launches are one the key drivers for them to gain market share amid the rising NEV penetration rate in China.
- 2. Sophisticated ADAS system.** NXL’s heavy R&D investment in ADAS can improve users’ driving experience by creating convenience. NIO’s NAD, XPeng’s XPILOT 3.5, and Li Auto’s Li AD Max are the latest ADAS systems of each company. Those systems are equipped with advanced hardware such as high-resolution cameras, LiDAR sensor cameras, and powerful chips to provide innovative features and services for users. More importantly, NXL can provide more details and reliable domestic navigation features compared to Tesla’s Autopilot.
- 3. Thoughtful smart cockpit and intelligent operating system.** NXL also emphasises the “Smart” element of its products. NXL’s continuous R&D development of smart cockpit has led to a more thoughtful and smart design of human-machine interaction (HMI). EVs with advanced HMI can allow easier access to functions of vehicle via voice, or action. For example, the 3D interactive mode of Li Auto’s HMI allows the use of hand gestures to give commands to the system and XPeng’s Smart OS features voice assistant and remote App control etc.
- 4. Superior interior and exterior designs and high quality of vehicle systems.** NXL also focuses on both interior and exterior designs to optimise passenger comfort and reduce travel fatigue. Furthermore, high quality vehicle systems guarantee better car performance such as increasing NEDC range, and acceleration time from 1-100km/s, and also provide flexible charging solutions such as Li Auto’s EREV powertrain, which further enhances product quality and safety, XPeng’s in-house designs and manufacturing capabilities.
- 5. Improving charging technologies and infrastructure.** Another feature that optimises users’ EV experience is charging technologies and infrastructure. With continuous improvement in charging technology, and ongoing expansion of charging infrastructure, the charging time can be lowered and charging options can be broadened. For example, NIO plans to implement more third-generation battery swapping station, and XPeng is offering rapid charging network to meet users’ needs and advocate mass EV adoption.
- 6. Effective direct sales mode and ecosystem built.** We also believe that the direct sales mode adopted by NXL can improve financial and operational efficiency and save cost. This allows NXL to utilise resources effectively. Furthermore, a well-established ecosystem can maintain users’ loyalty. For example, the NIO house and NIO community allow car owners to share ideas and feelings about the products and services so that company can connect R&D goals to the customers and generate effective solutions.

NXL's product summary >

Below is a product summary of NXL, showing the features of each model as well as the cumulative sales of the products (Fig 50).

Figure 50: NIO, XPeng and Li Auto's electric vehicle models summary

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)	Cumulative shipments
NIO										
 ES8	Jun-18 (seven-seater) Mar-19 (six-seater) Apr-20 (all-new)	Mid-large SUV	3,010	450/580/850 (with 75/100/150kWh battery pack)	4.9	400	725	NIO Pilot	468,000	59,413
 ES6	Jun-19	Mid-size SUV	2,900	465/610/900 (with 75/100/150kWh battery pack)	4.7	400	725	NIO Pilot	358,000	104,386
 EC6	Sep-20	Mid-size coupe SUV	2,900	475/615/910 (with 75/100/150kWh battery pack)	4.5	400	725	NIO Pilot	368,000	47,186
 ET7	Mar-22	Mid-large sedan	3,060	550/705/1000 (with 75/100/150kWh battery pack)	3.8	480	850	NIO Autonomous Driving	448,000	6,912
 ES7	Aug-22	Mid-large SUV	2,960	485/620/930 (with 75/100/150kWh battery pack)	3.9	480	850	NIO Autonomous Driving	468,000	-
 ET5	Sep-22	Mid-size sedan	2,888	550/700/1000 (with 75/100/150kWh battery pack)	4.3	360	700	NIO Autonomous Driving	328,000	-
Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)	Cumulative shipments
XPeng										
 G3	Dec-18	Compact SUV	2,625	401/520 (with 50.5/65.5kWh battery pack)	8.6	145	300	XPILOT 2.5	149,800 - 199,800	11,788
 P7	Jun-20	Mid-size sedan	2,998	480/586/706 (with 60.2/70.8/80.9kWh battery pack)	6.8	196	390	XPILOT 3.0	229,900 - 349,900	110,716
 P5	Oct-21	Mid-size sedan	2,768	600 (with 60.2k/80.9kWh battery pack)	7.5	155	310	XPILOT 3.0	157,900 - 223,900	10,400
 G3i	Sep 2021 (G3 updated facelift version)	Compact SUV	2,625	460/520 (with 60.2/70.8/80.9kWh battery pack)	8.6	170	380	XPILOT 2.5	149,800 - 185,800	53,233
 G9	3Q 2022	Mid-size SUV	2,998	702 (with 98kWh battery pack)	5.0	200	551	XPILOT 4.0	400,000 - 450,000	-
Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)	Cumulative shipments
Li Auto										
 LI ONE	Dec-19	Large-size SUV	2,935	180/800 (with 40.5kWh battery pack only/battery pack + petrol engines)	6.5	240	530	NVIDIA Orin SoC	338,000	184,528
 LI L9	Aug-22	Mid-large SUV	3,105	215/1315 (with 44.5kWh battery pack only/battery pack + petrol engines)	5.3	330	620	NVIDIA Orin SoC	450,000-500,000	-

SOURCES: CGS-CIMB RESEARCH, NIO, XPeng, and Li Auto websites

NXL's EV portfolio by price segment and product types ➤

Figure 51: NXL's EV portfolio by price segment and product-types

Price Level	SUV					Sedan		
	Each bar represent 10,000 units of delivery							
Luxury Rmb 400,001 to 500,000	Company	NIO	NIO	NIO	XPeng	Li Auto		
	Model	ES8	ET7	ES7	G9	Li L9		
	Delivery Date	Jun-18	Mar-22	Aug-22	3Q 2022	Aug-22		
	Cumulative deliveries	59,413	6,912	Upcoming	Upcoming	Upcoming		
Premium Rmb 300,001 to 400,000	Company	NIO	NIO	NIO	Li Auto			
	Model	ES6	EC6	ET5	Li ONE			
	Delivery Date	Jun-19	Sep-20	Sep-22	Dec-19			
	Cumulative deliveries	104,386	47,186	Upcoming	184,528			
Mid-to-high end Rmb 200,001 to 300,000						Company	XPeng	
						Model	P7	
						Delivery Date	Jun-20	
						cumulative deliveries	110,716	
Mid-to-high end Rmb 100,001 to 200,000	Company	XPeng	XPeng				Company	XPeng
	Model	G3	G3i				Model	P5
	Delivery Date	Dec-18	Sep-21				Delivery Date	Oct-21
	cumulative deliveries	11,788	53,233				cumulative deliveries	10,400

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Risks

Policy risks >

China government policy risks. Robust EV shipments growth in the NEV industry depends significantly on government incentives. Favourable policies such as one-time subsidy, tax exemption on NEV purchases, exemption from license plate restrictions, charging facilities implementation and expansion, etc. helped to create a healthy and solid ecosystem for the NEV industry.

Subsidies. The subsidy programmes announced by the central government already includes the gradual phasing out of subsidies. The current programme will lower subsidies by 10%, 20%, and 30% in 2020, 2021 and 2022, respectively, based on the subsidy of the previous year. This poses a risk to NEV sales, particularly as demand for NEV is becoming more elastic, with new NEV models coming to the market, and NLX combined market share of around 8.5% in terms of total NEV sales.

No limit on foreign ownership of NEV manufacturers. On 23 Jun 2020, the ministries announced the Special Administrative Measures for Market Access of Foreign Investment, or the 2020 Foreign Investment Negative List, under which foreign EV competitors could build wholly-owned facilities in China without the need for a domestic joint venture partner. For example, Tesla constructed the Tesla Giga Shanghai factory in Shanghai without a joint venture partner. Such changes have led to greater market competition and reduced the pricing advantage of local automakers.

Increasing competition in China's EV market >

Highly competitive EV market in China. China is the world's largest passenger vehicle market and battery electric vehicle (BEV) market. According to Frost & Sullivan, China's passenger vehicles sales volume was 20.2m units in 2020. China's EV market has been growing rapidly since 2016 on the back of various favourable government policies. We estimate a CAGR of 32% for China's NEV market from 2021 to 2025 and sales of 13m units in 2025. Nevertheless, China's EV market is highly competitive, with foreign brands to domestic traditional fuel vehicle automakers and fast-growing Chinese EV makers. They compete with each other on car designs, digital cockpit technology, autonomous driving, battery technology and customer service, as well as pricing.

China's automotive market is highly competitive. We expect competition in the premium EV segment to intensify in the future with new players and increasing R&D budgets for technological innovation on product safety and quality. Therefore, if peers successfully compete with or surpass the quality or performance of NXL's vehicles, this could adversely affect its profitability and operations.

Supply chain constraints >

Global chip shortage. The supply of semiconductors used for automotive production has been subject to a global shortage since Oct 2020. If the issue is prolonged, this could have a material impact to NXL's operations, especially as NXL uses similar strategies which concentrate on single-source suppliers for its key component.

For example, XPeng's chips are mainly sourced from NVIDIA (NVDA US), and Li Auto also sources its chipset from NIVIDA for developing Level 4 autonomous driving. Therefore, if any single-source suppliers of semiconductor-contained components are unable to meet demand, it may incur significant expenses in finding alternative suppliers.

Ongoing impact of Covid-19 pandemic on EV makers >

Impact on sales and operations. COVID-19 has had a significant impact on the global economy since Jan 2020. In China, the PRC government placed significant restrictions on travel within China, closed certain businesses and suspended industrial activities. For example, the recent Omicron wave led to Shanghai, one of the tier 1 cities in China, implementing a two-month lockdown and required citizens to stay at home except for medical and emergency situations. The lockdown measures implemented by cities caused EV deliveries in Apr 2022 to drop significantly. From Mar to Apr, NIO's EV deliveries dropped from 9,985 units to 5,074 units (-49.2% mom); XPeng's dropped from 15,414 units to 9,002 units (-41.6%); Li Auto's dropped from 11,034 units to 4,167 units (-73% mom). Therefore, if Covid-19, or any variants, continue for an extended period or worsens, this could significantly impact NEV sales and operations.

Impact on supply chains and logistics. The prolonged Covid-19 pandemic also impacted supply chains. A substantial number of manufacturing facilities were closed for certain periods in 1Q20 and 2Q22. As a result, given the single-source supplier strategy, some suppliers were unable to deliver components to Chinese automakers due to the Covid-19 pandemic. Also, significant restrictions on travel within China disrupted logistics, and led to higher delivery costs for new EV models. Therefore, a prolonged pandemic could yield higher operating costs for the automotive business.

Inadequate public and private charging stations >

Misallocation of public charging stations. According to Fig 23, most public charging stations are located in Tier 1 cities, such as Shanghai, Guangzhou, and Beijing. Poor allocation of these stations may be one of the factors impeding NEV adoption in China, as it may not be sufficient to support the growth of BEVs as those in rural regions or low-tier cities may find it difficult to charge their EVs.

Mis-planned residential area for deploying private charging piles. The development of private charging infrastructure is affected by factors such as limited residential parking spaces in cities with high population density, low percentage of residential parking space suitable for installing home charging stalls, and power grid capacity limits in aged residential areas. According to the CIC Research Inc (a full service marketing, economics and survey research firm) report, as of 31 Dec 2020, fewer than 25% of families in first-tier cities in China had a parking space suitable for installing home charging stalls, compared with over 70% of families in the United States. Lack of private charging piles may cause inconvenience to users, and is another downside risk to NEV adoption and decelerate the growth of BEVs.

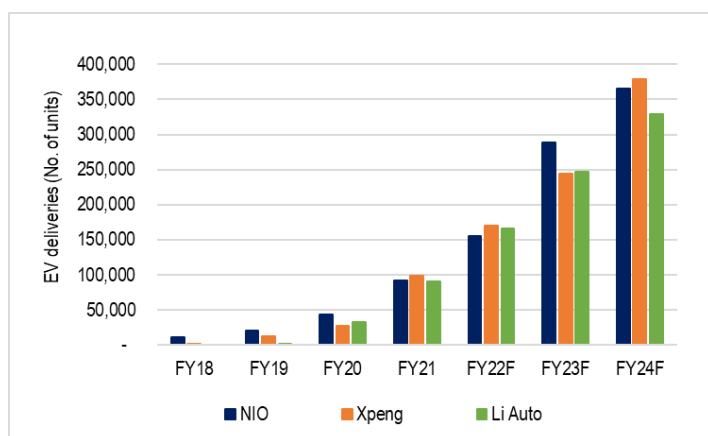
Financial comparison - NIO, XPeng and Li Auto

Compare EV deliveries and revenue ►

NXL EV deliveries to reach over 300k units in FY24F. Looking back at delivery history, NIO and XPeng started their first delivery in FY18, followed by Li Auto in FY19. The three companies then recorded substantial growth in their EV shipments. NIO was impressive in its consistent delivery growth, with over 80% yoy growth in three consecutive years (81%/113%/109% in FY19/20/21). XPeng had the largest delivery growth rate among NXL in FY21, at 267% yoy. Li Auto surprised with over 90k units in FY21 deliveries, the same level as NIO and XPeng, in a two-year time frame, taking the least amount of time among NXL.

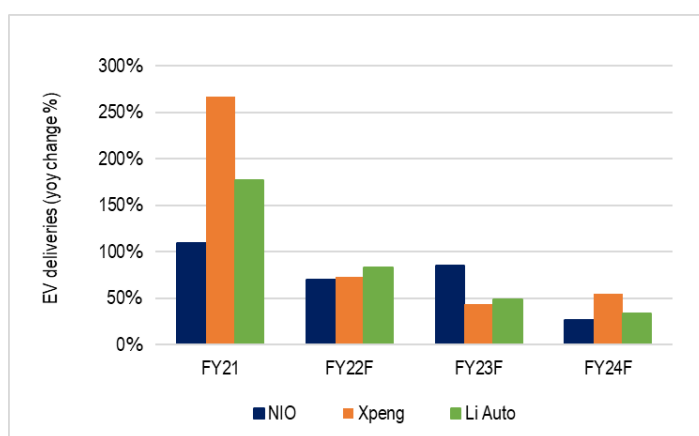
In FY21, NXL each achieved over 90k units of EV deliveries — NIO: 91,429 units (+109% yoy), XPeng: 98,155 units (+263% yoy), and Li Auto: 90,491 units (+177% yoy). Looking ahead, we estimate that NXL would achieve robust EV delivery CAGRs of 59%/57%/54% in FY21-24F, to reach 365k/378k/329k units in FY24F, driven by sustainable new model launches, market expansion (domestic and overseas), and market share gains amid rising NEV penetration rates in China.

Figure 52: NXL's EV deliveries (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 53: NXL's EV deliveries – yoy change % (FY18 to FY24F)

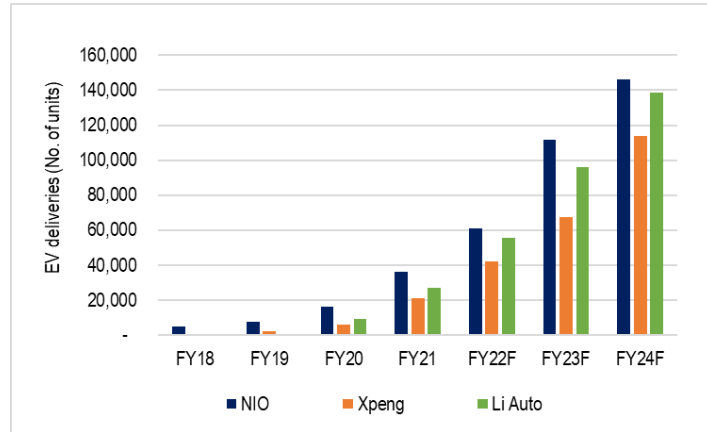


SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

NXL to achieve revenue CAGR of 59%/76%/73% in FY21-24F. Thanks to the robust EV deliveries, NXL's revenue also recorded significant growth in FY21. NIO's FY21 revenue increased to Rmb36bn (+122% yoy), highest among NXL. XPeng's FY21 revenue increased to Rmb21bn (+259% yoy, which is the largest growth rate among NXL). Li Auto's FY21 revenue increased to Rmb27bn (+186% yoy), with only a single product on the market. We estimate NXL achieving strong revenue growth of 59%/76%/73% CAGR respectively, in FY21-24F, and reaching 146bn/114bn/139bn in FY24F respectively.

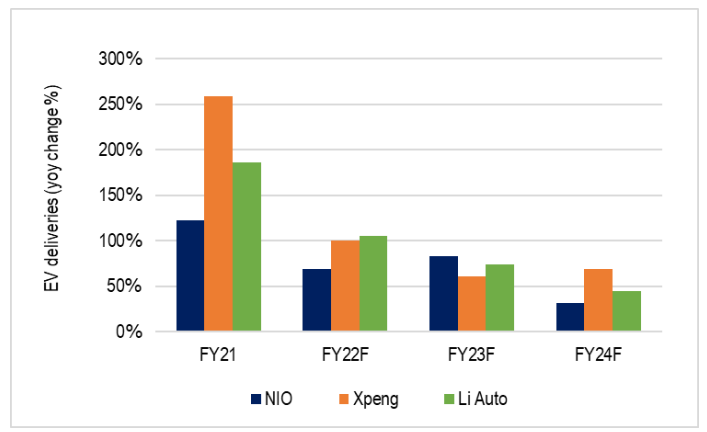
Our estimation is in-line with the current trend with NIO being the highest, followed by Li Auto, and then XPeng. It is based on the above EV deliveries in FY24F with NIO and Li Auto focus primarily in premium segment, while XPeng target at both mid-to-high-end segment.

Figure 54: NXL's revenue (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 55: NXL's revenue – yoy change % (FY18 to FY24F)



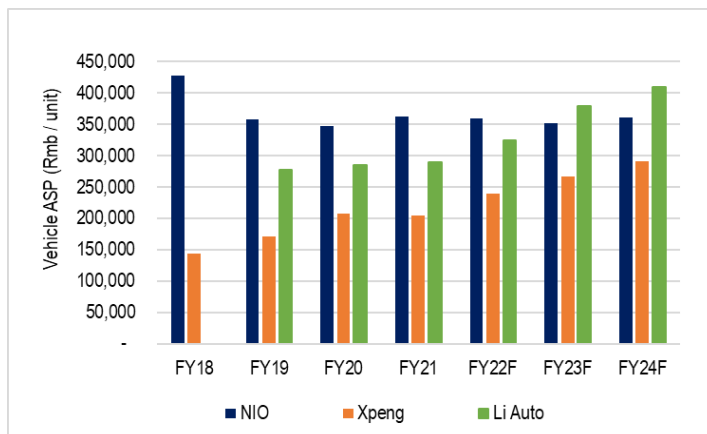
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Compare vehicle ASP ➤

NXL ASP trend is mainly driven by its model delivery schedule. NIO first delivered ES8 in Jun 18, priced at Rmb468k. Later, in Jun 19 and Sep 20, it further delivered ES6 and EC6, priced at Rmb358k and Rmb368k, respectively. With the roll-out of the lower pricing models in FY19 and FY20, both NIO's ASP and ASP's yoy growth dropped in that period. Conversely, XPeng, and Li Auto rolled out higher-priced models in FY20 and FY21 (XPeng: P7 and P5; Li Auto: 2021 Li ONE), hence, their ASP kept increasing in that period.

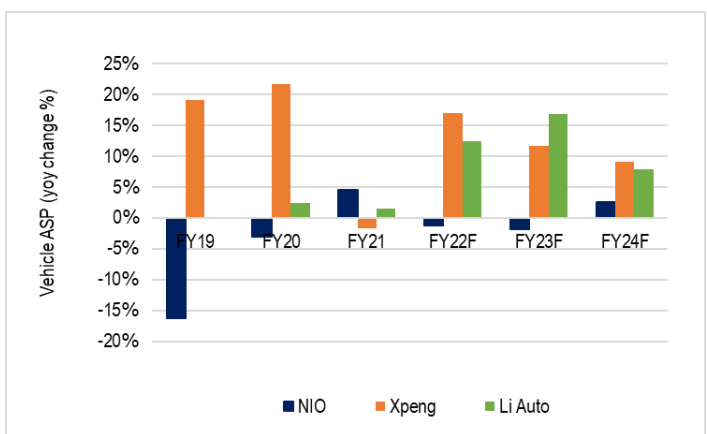
We forecast NIO's ASP to stay flat in FY22-24F due to its mature market strategies in the premium EV segment, while XPeng's ASP should continue to increase in FY22-24F as it is going to roll out more high-end models. Li Auto's ASP should also increase FY22-24F to capture more market share in the premium EV segment, in our view. In general, both NIO and Li Auto have higher ASPs as they focus primarily on the premium segment, while XPeng's ASP is relatively lower as it targets both the mid to high-end segments.

Figure 56: Vehicle ASP (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 57: Vehicle ASP – yoy change % (FY19-24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

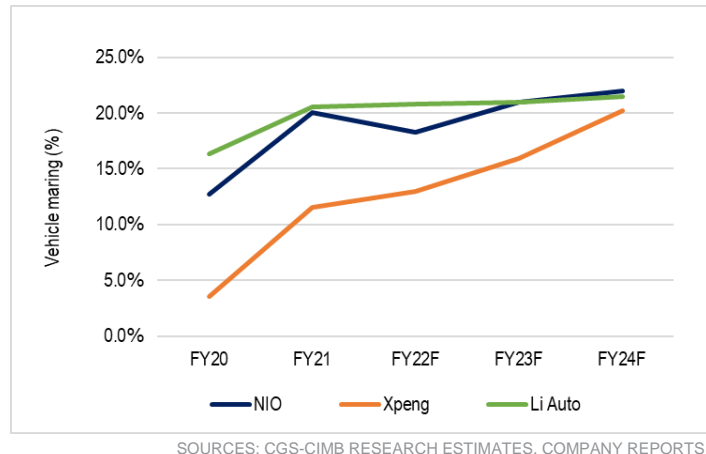
Compare vehicle margin, EBITDA and net profit margin ▶

NXL's vehicle margin be around 20% in FY24F. NIO and Li Auto both have higher vehicle margins in FY20 and FY21 (NIO:12.7% in FY20 and 20.1% in FY21; Li Auto: 16.4% in FY20 and 20.6% in FY21) compared with XPeng (11.5% in FY21 and 3.5% in FY20). We believe it is because of their different segment target, given that XPeng is offering EVs at a lower price to cover a wider range of users. We forecast NXL's vehicle margin increase to 22%/20.2%/21.5% in FY24F, expand 190/870/90bp respectively, from 20.1%/11.5%/20.6% in FY21 given that we believe both NIO and Li Auto will remain in the premium EV segment, and thus, will likely have more stable and higher margin, while we believe XPeng will roll out more premium models to boost its vehicle margin.

Li Auto is the first to turn EBITDA profitable. Among NXL, Li Auto is the only automaker that achieved close-to-zero EBITDA margin. Both NIO and XPeng are still at risk of negative EBITDA margins. We expect Li Auto to turn EBITDA positive in FY22F, fastest among NXL, as it is already at breakeven level, and for its EBITDA margin to reach 3.5% in FY24F, while NIO and XPeng are set to turn EBITDA positive in FY24F, with EBITDA margins of 3.9% and 2.9%, respectively, thanks to increasing EV deliveries, higher ASP and improved SG&A expense ratio.

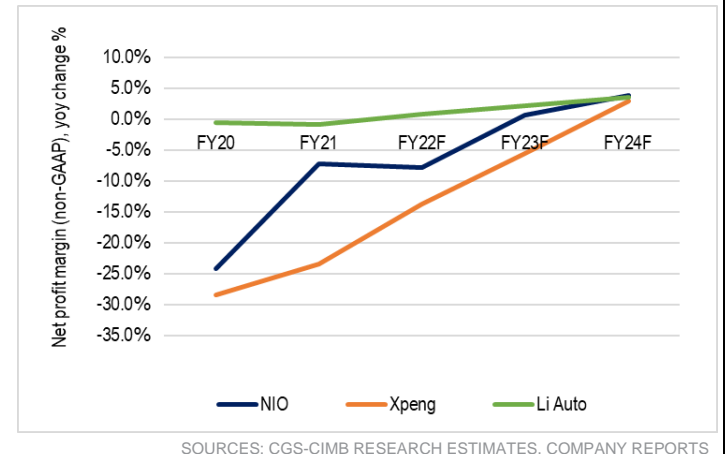
Li Auto, the only automaker among NXL to make profit from the start. Among NXL, Li Auto is the only automaker that achieved net profit in FY20. We estimate that both NIO and XPeng will steadily turn profitable by FY24F, with net profit margins (non-GAAP) of 1.9% and 2.1%, respectively, driven by improved EBITDA, while Li Auto's net profit margin can reach 4.5% by FY24F.

Figure 58: Vehicle margin (FY19 to FY24F)



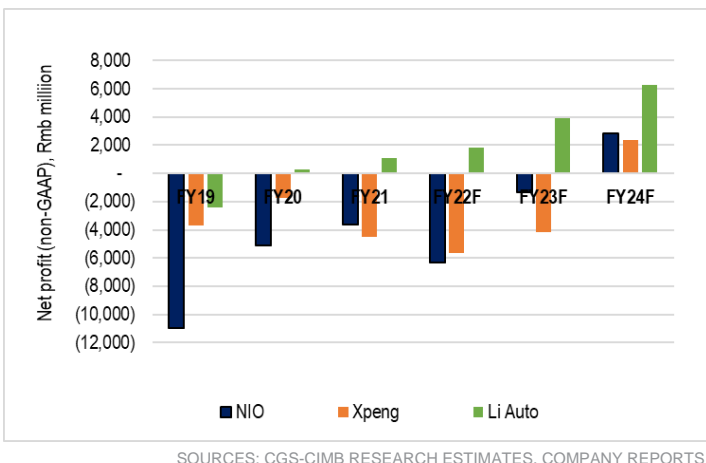
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 59: NXL's EBITDA (FY19 to FY24F)



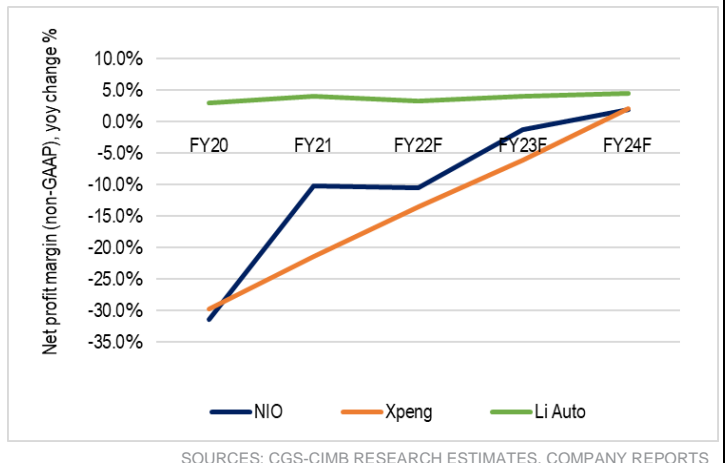
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 60: NXL's net profit (non-GAAP) (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 61: NXL's net profit margin (non-GAAP) (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

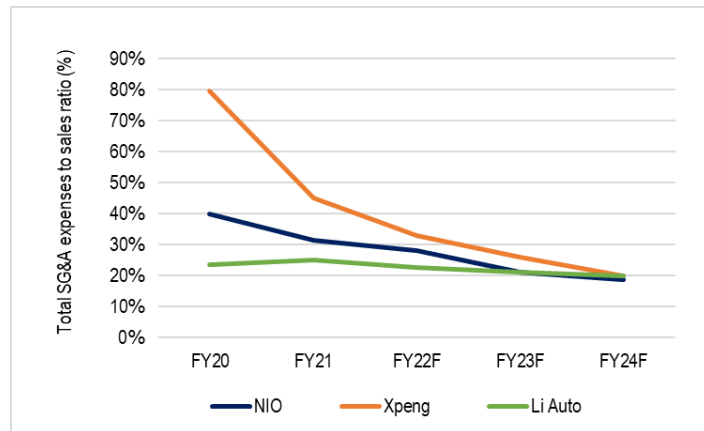
Compare R&D expenses-to-sales ratio ➤

NXL's R&D expenses-to-sales ratio is on a decreasing trend.

In FY21, XPeng had the highest R&D expenses-to-sales ratio of 20% among NXL, due to its keen investment in XPILOT (ADAS) and Xmart OS (intelligent cockpit), with the lowest sales base. Despite NIO had the largest R&D spending, its highest sales base among NXL made its R&D expenses-to-sales ratio ranked second with 13% in FY21. Li Auto ranked the last among NXL with R&D expenses-to-sales ratio of 12% in FY21.

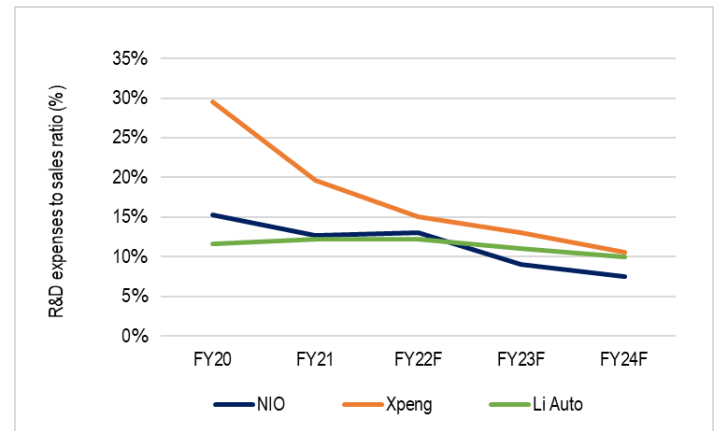
We estimate NXL's R&D expenses-to-sales ratio would drop from 13%/20%/12% in FY21 to 8%/11%/10% in FY24F, mainly due to the mature R&D planning and robust sales growth in FY22-24F. We also forecast NXL's SG&A expenses-to-sales ratio to drop and stabilise at 19%/20%/20% in FY24F, respectively from 31%/45%/25% in FY21 as they enjoy the benefits of economies of scale, better cost control and mature marketing strategies.

Figure 62: Total SG&A expenses-to-sales ratio (FY19 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 63: R&D expenses-to-sales ratio (FY19 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Valuation and recommendation

NXL set to gain bigger share of China smart EV market ►

Smart EV market should grow fast in the next 10 years. We believe that China's smart EV market will grow rapidly over the next ten years (2022F-32F) due to 1) favourable government policies supporting consumers switching to smart EVs and automakers investing in EV technology and capacity for EV manufacturing, 2) accelerating penetration rate due to narrowing price gap between EV and ICE vehicle, 3) significant electrification and autonomous driving trends, and 4) advance charging technology and sustained charging infrastructure expansion for EV users' convenience.

NIO, XPeng and Li Auto leading China's smart EV market. We are positive on the "New Force" (NIO, Xpeng and Li Auto, NXL) in China's smart EV market due to 1) rich connectivity with the human-vehicle interaction and intelligent features (smart cockpit and autonomous driving), 2) the manufacturing capability in vehicle system (chassis, powertrain and E/E architecture), and 3) energy-efficient and environmentally-friendly battery technologies (long driving range and advanced charging technologies) which enhance and revolutionise the mobility experience.

Huge growth potential justifies their premium valuation ►

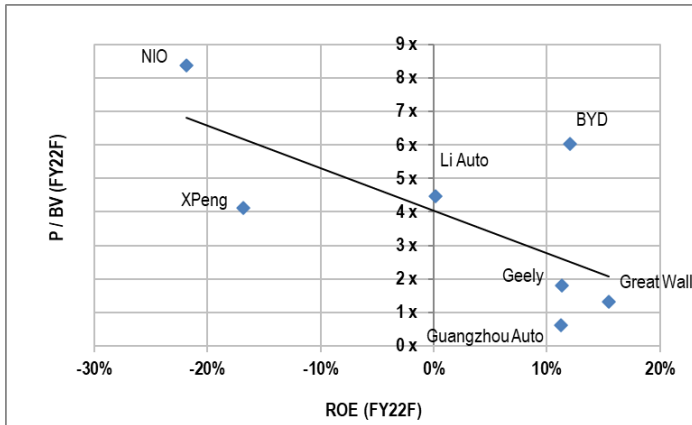
Investors paying premium valuation for huge growth in the future. Investors are investing and paying premium valuations on new Chinese EV makers "New Force" despite zero earnings. We believe that this is due to New Force's huge growth potential on robust EV deliveries in the next few years. This is supported by innovative and smart EVs captivating users with smart, connectivity, autonomous driving and green powered mobility experience. NXL, the three new EV makers in China, has been making losses since they delivered their first EV in 2018. We expect continued losses in FY22F and FY23F given they are investing huge amounts in R&D for autonomous driving, smart operating system, battery charging and vehicle system.

EV deliveries, new model rollouts, technology breakthrough are NXL's share price drivers. We believe that NXL should turn profitable in FY24F but cannot be valued on a P/E basis due to minimal profits. In the short term, we are more focused on 1) EV deliveries growth, 2) continuous new model rollouts, 3) software and hardware technology breakthrough, and 4) capacity expansion, which could be the key share price catalysts. However, the release of above figures could create volatile share price movements.

We use DCF valuation for NXL. NXL have been trading at a premium (no P/E valuations, 4x-8x FY22F P/BV or 3.0x-4.0x FY22F P/S ratio) over traditional automotive companies such as Guangzhou Auto (2238 HK, Not Rated, HK\$7.45), Geely Automobile (175 HK, Not Rated, HK\$17.00) and Great Wall Motor (2333 HK, Not Rated, HK\$12.70) that produce both ICE vehicles and electric vehicles. These traditional automotive companies have generally been trading at single-digit 5x-10x FY22F P/E, 0.5x-2.0x FY22F P/BV, or 1.0x-1.5x FY22F P/S ratios (Fig 64 and 65).

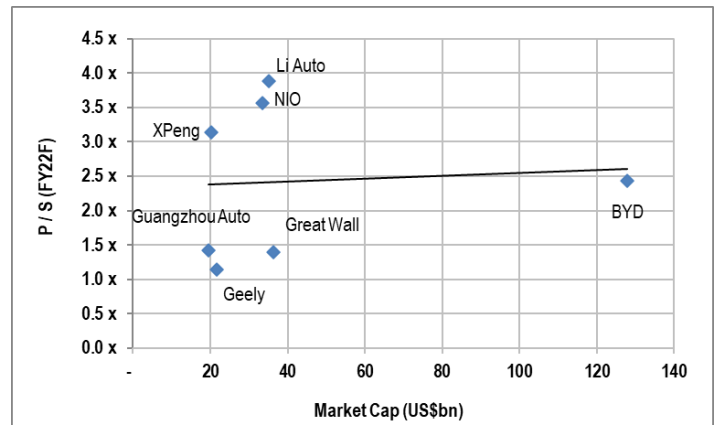
We adopt a discounted cash flow (DCF) model to value NXL as they are loss-making. We believe that DCF model can fairly reflect their long term value given we estimate profitability to substantially improve after FY25F due to improved economies of scale on higher vehicle margin.

Figure 64: P/BV vs ROE (FY22F), based on Bloomberg consensus estimates



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 65: Market cap vs P/S (FY22F), based on Bloomberg consensus estimates



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Initiate coverage on China smart EV sector at Overweight ➤

Initiate coverage on China’s smart EV sector at Overweight. We initiate coverage on China smart electric vehicle (EV) sector at Overweight and have Add ratings on NIO, XPeng and Li Auto.

XPeng is our sector top pick. XPeng is our top pick in the sector due to 1) it having the fastest EV sales growth with wider EV model portfolio, covering the fastest growing mid- to high-end segment, 2) the best-in-country autonomous driving technologies and operating system, and 3) overseas market expansion.

We recommend the companies in China smart EV sector in descending order: XPeng, Li Auto, NIO.

- **XPeng (9868 HK, Add, TP: HK\$207.5) is our top pick in the sector due to its fast-growing EV sales and industry-leading autonomous driving solution.**

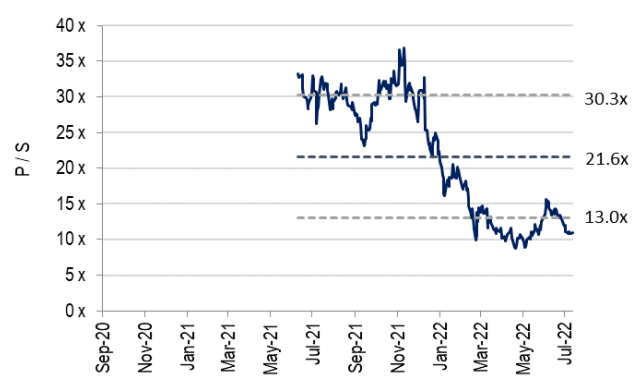
We initiate coverage on XPeng with an Add call and a DCF-based target price of HK\$207.5 (WACC: 12%, terminal growth rate 5%). We are positive on Xpeng’s market position in the fast-growing mass-market electric vehicle market in China. We believe that it stands out among new Chinese EV makers with its industry-leading autonomous driving technology and fast EV penetration growth.

Figure 66: XPeng’s P/BV



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 67: XPeng’s P/S



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

- **Li Auto (2015 HK, Add, TP: HK\$203.6) as its EREV is a hit among young parents in low-tier cities in China.**

We initiate coverage on Li Auto with an Add call and a DCF-based target price of HK\$203.6 (WACC: 11.2%, terminal growth rate 5%). We believe Li Auto will further penetrate rural markets and deliver robust EV sales due to its energy-saving long driving range EREVs.

Figure 68: Li Auto's P/BV



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 69: Li Auto's P/S



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

- **NIO (9866 HK, Add, TP: HK\$257.3) due to its renowned brand name and growing market share in China's premium EV segment.**

We initiate coverage on NIO with an Add rating and a DCF-based target price of HK\$257.3 (WACC: 8.0%, terminal growth rate 5%). We believe that NIO is well-positioned to capture greater market share in China's premium eSUV and EV segments, due to its well-recognised brand name, industry-leading technology in battery services, and autonomous driving.

Figure 70: NIO's P/BV



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 71: NIO's P/S



SOURCES: CGS-CIMB RESEARCH, BLOOMBERG

Figure 72: Peers comparison

Company	Bloomberg Code	Recom.	Price Target price		Upside (%)	Market Cap (US\$m)	P/E (x)		3-year EPS CAGR %	P/BV (x)		ROE (%)		EV/EBITDA (x)		Yield (%)	
			(local curr)	(local curr)			CY2022F	CY2023F		CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F
NIO, Li Auto and Xpeng																	
NIO Inc	9866 HK	Add	156.80	257.30	64%	33,368	na	89.9	na	8.4	7.1	-21.9%	-5.6%	na	257.4	0.0%	0.0%
Li Auto	2015 HK	Add	133.10	203.56	53%	35,039	190.9	72.6	na	4.5	4.5	0.1%	2.4%	363.3	80.4	0.0%	0.0%
XPeng Inc	9868 HK	Add	92.45	207.45	124%	20,273	na	88.2	na	4.1	5.4	-16.9%	-16.7%	na	na	0.0%	0.0%
Electric vehicle manufacturers																	
BYD Co.	1211 HK	Not Rated	287.00	N/A	n.a.	127,768	55.9	39.2	65.2%	6.0	5.2	12.1%	14.9%	22.2	17.2	0.2%	0.2%
Tesla Inc	TSLA US	Not Rated	891.83	N/A	n.a.	931,508	51.8	43.2	49.3%	15.3	11.4	33.2%	27.6%	30.8	23.9	0.0%	0.0%
Average							53.8	41.2	57.2%	10.6	8.3	22.7%	21.3%	26.5	20.6	0.1%	0.1%
China Automobile manufacturers																	
Geely Automobile	175 HK	Not Rated	17.00	N/A	n.a.	21,702	15.6	12.1	21.9%	1.8	1.6	11.3%	12.9%	7.8	6.3	2.1%	2.7%
Great Wall Motor	2333 HK	Not Rated	12.70	N/A	n.a.	36,299	9.0	7.3	24.9%	1.3	1.2	15.5%	17.7%	12.7	10.2	5.1%	6.8%
Guangzhou Auto	2238 HK	Not Rated	7.45	N/A	n.a.	19,528	5.7	5.0	23.6%	0.6	0.6	11.3%	11.8%	21.7	18.4	4.7%	5.4%
Average							10.1	8.1	23.4%	1.2	1.1	12.7%	14.1%	14.1	11.6	4.0%	5.0%
Foreign automobile manufacturers																	
Kia Motor	000270 KS	Add	81,200	110,000	35%	25,240	6.0	5.6	6.3%	0.8	0.7	14.7%	13.2%	2.8	2.6	1.5%	1.5%
Hyundai Motor	005380 KS	Hold	196,500	190,000	-3%	32,195	8.0	7.6	12.9%	0.7	0.6	8.3%	8.1%	9.4	9.1	2.0%	2.0%
Toyota	7203 JP	Not Rated	2,154.50	N/A	n.a.	268,264	9.9	8.9	17.9%	1.1	1.0	11.2%	11.4%	12.5	11.4	2.9%	3.3%
BMW	BMW GR	Not Rated	79.53	N/A	n.a.	53,346	5.5	5.3	-2.4%	0.6	0.6	10.5%	10.5%	4.4	3.6	6.2%	6.5%
Mercedes-Benz Group	MBG GR	Not Rated	56.87	N/A	n.a.	62,278	5.0	4.9	-5.6%	0.7	0.7	14.2%	14.1%	0.8	1.0	8.0%	8.2%
Volkswagen	VOW GR	Not Rated	193.90	N/A	n.a.	87,768	5.7	5.1	10.2%	0.6	0.6	10.5%	10.8%	2.4	2.2	4.9%	5.4%
Ford	F US	Not Rated	15.34	N/A	n.a.	61,670	7.5	7.4	4.4%	1.2	1.1	14.1%	12.8%	3.2	2.1	3.5%	3.5%
General Motor	GM US	Not Rated	36.77	N/A	n.a.	53,612	5.7	5.6	-2.1%	0.7	0.6	12.4%	11.4%	2.7	2.3	1.3%	2.0%
Average							6.7	6.3	5.2%	0.8	0.7	12.0%	11.6%	4.8	4.3	3.8%	4.1%
Battery manufacturers																	
CATL	300750 CH	Not Rated	523.87	N/A	n.a.	189,187	35.7	26.3	51.7%	8.5	6.4	25.4%	26.2%	23.0	17.2	0.2%	0.3%
EVE Energy	300014 CH	Not Rated	99.30	N/A	n.a.	27,899	32.5	22.8	39.7%	7.0	5.4	22.8%	25.0%	26.0	18.1	0.4%	0.5%
Gotion High-Tech	002074 CH	Not Rated	38.66	N/A	n.a.	10,176	55.5	38.2	85.7%	3.2	3.1	6.4%	8.9%	24.0	18.1	0.6%	0.7%
Shenzhen Desay Battery	000049 CH	Not Rated	43.34	N/A	n.a.	1,926	13.2	10.4	16.9%	2.8	2.4	23.8%	25.9%	7.9	5.5	1.6%	2.5%
LG Energy Solution	373220 KS	Not Rated	417,000	N/A	n.a.	74,636	66.4	47.5	37.8%	4.8	4.4	7.7%	9.7%	22.0	16.8	0.0%	0.1%
SK On	096770 KS	Not Rated	180,000	N/A	n.a.	12,729	7.7	7.7	43.8%	0.7	0.6	9.9%	8.9%	5.7	5.7	2.3%	2.3%
Samsung SDI	006400 KS	Add	572,000	750,000	31%	30,161	21.2	17.9	23.3%	2.4	2.2	9.7%	10.8%	8.7	7.0	0.2%	0.2%
Average							33.2	24.4	42.7%	4.2	3.5	15.1%	16.5%	16.7	12.6	0.7%	0.9%
Electric vehicle parts manufacturers																	
LK Technology	558 HK	Not Rated	12.64	N/A	n.a.	2,216	21.6	16.2	59.9%	3.9	3.3	19.9%	21.8%	14.8	11.5	0.9%	1.1%
Times Electric	3898 HK	Not Rated	33.25	N/A	n.a.	9,525	15.1	13.2	14.5%	1.1	1.0	7.4%	8.2%	16.6	14.6	1.8%	2.1%
Ningbo Joyson Electronic	600699 CH	Not Rated	20.93	N/A	n.a.	4,237	28.2	21.9	-218.5%	2.2	2.0	8.0%	9.4%	10.0	8.5	0.4%	0.4%
Continental AG	CON GR	Not Rated	67.30	N/A	n.a.	13,778	7.2	5.7	20.0%	1.0	0.9	13.8%	15.0%	3.3	2.8	4.2%	5.4%
Valeo	FR FP	Not Rated	20.85	N/A	n.a.	5,177	9.4	6.5	69.0%	1.2	1.1	13.6%	17.3%	3.3	2.7	3.8%	4.8%
Magna International	MGA US	Not Rated	64.23	N/A	n.a.	18,572	8.9	6.8	22.9%	1.5	1.4	17.5%	20.2%	4.9	4.1	2.9%	3.2%
Average							15.1	11.7	-5.4%	1.8	1.6	13.4%	15.3%	8.8	7.4	2.3%	2.8%

NOTE: ESTIMATES FOR NOT RATED (NR) COMPANIES ARE ALL BASED ON BLOOMBERG CONSENSUS ESTIMATES.
SOURCES: CGS-CIMB RESEARCH ESTIMATES, BLOOMBERG (PRICE AS AT 02 AUG 2022)

Company Briefs

Li Auto Inc

NIO Inc

XPeng Inc

Hong Kong

ADD (initiation)

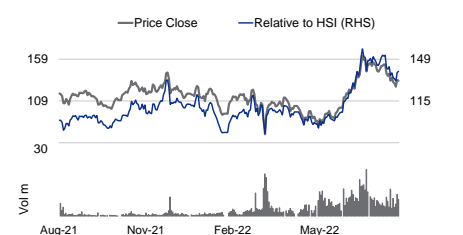
Consensus ratings*: Buy 15 Hold 1 Sell 0

Current price:	HK\$133.1
Target price:	HK\$203.6
Previous target:	HK\$
Up/downside:	52.9%
CGS-CIMB / Consensus:	13.7%
Reuters:	2015.HK
Bloomberg:	2015 HK
Market cap:	US\$35,039m HK\$275,057m
Average daily turnover:	US\$112.7m HK\$885.9m
Current shares o/s:	2,066m
Free float:	56.2%

*Source: Bloomberg

Key changes in this note

N/A



Source: Bloomberg

Price performance	1M	3M	12M
Absolute (%)	-13	37.6	
Relative (%)	-3.1	44.2	

Major shareholders	% held
Amp Lee Ltd.	23.8
Inspired Elite Investment Limited	13.2
Zijin Global Inc.	6.8

Analyst(s)


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Li Auto Inc

A pioneering EREV maker

- Li Auto offers flexible charging solutions via the EREV powertrain system, targeting mobility needs of young parents and the expanding rural market.
- Li Auto's EV deliveries are set to reach 329k units in FY24F, driven by new model launches, and product portfolio and market expansion.
- We initiate coverage with an Add call and DCF-based TP of HK\$203.6

Li ONE's EV deliveries can reach 329k units in FY24F

Li Auto recorded solid deliveries in FY21 despite having only one product, Li ONE, a premium smart extended-range eSUV. First delivered in Dec 19, Li ONE sold 33k units in FY20 before surging 177% yoy to 90k units in FY21. The success of Li ONE is mainly driven by the product update launched in 2021 (2021 Li ONE), powertrain system, and self-developed ADAS system and intelligent cockpit. We estimate that Li Auto's FY22F-24F EV deliveries can sustain its current momentum with over 166k/246k/329k units of deliveries in FY22F/23F/24F respectively, driven by new model launches, product portfolio expansion to BEVs, and market expansion to rural regions.

Li ONE is gaining market share in China's premium SUV market

Li ONE's sales ranking in China's premium SUV market has progressed to fifth place in 2021 with over 90k annual deliveries, from eighth position in 2020, overtaking Volvo XC60, Mercedes-Benz GLB, and GM Cadillac XT5. We believe its ranking in China's premium SUV market (price segment of Rmb300k and above) will continue to rise in FY22F after achieving 60k deliveries in 1H22, fast closing in on Audi Q5 (66k deliveries) in fourth position and Mercedes-Benz GLC (68k deliveries) in third place.

EREV powertrain's flexibility is a selling point for rural customers

Li Auto is currently offering an extended-range electric vehicle (EREV) powertrain, which provides a more flexible solution in powering a vehicle either by charging or refueling. Such flexibility allows for the mass adoption of Li Auto's products, particularly in tier-2 to tier-4 cities in China, where charging facilities are still currently inadequate.

Enthusiastic response to Li L9, the new model launched in 2022

On 21 Jun 2022, Li Auto officially unveiled its second model, Li L9, a flagship smart eSUV that offers superior space with self-developed ADAS system – Li Auto AD Max – and a five-screen and 3D interactive mode to fully optimise users' driving experience. The product received enthusiastic response, with over 30k orders within 3 days of the launch. We believe Li L9's sales will be one of the key growth drivers for Li Auto 2H22F revenue, following the success of Li ONE.

Initiate at Add with a DCF-based target price of HK203.6

We initiate coverage on Li Auto with an Add call and DCF-based target price of HK\$203.6 (WACC: 11.2%, terminal growth rate 5%) which is equivalent to 78x P/E and 50x EV/EBITDA in CY24F. We believe Li Auto will further penetrate rural markets and deliver robust EV sales due to its energy-saving long driving range EREVs. Share price catalysts include solid sales numbers for Li L9, broadening of the product portfolio and market expansion to rural areas. Downside risks: prolonged Covid-19 outbreak in China, keener competition, and sustained supply chain constraints.

Financial Summary

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue (Rmbm)	9,457	27,010	55,390	96,191	138,754
Operating EBITDA (Rmbm)	(348)	(427)	473	2,129	4,809
Net Profit (Rmbm)	(166)	(321)	60	1,241	3,262
Normalised EPS (Rmb)	(0.19)	(0.17)	0.03	0.60	1.58
Normalised EPS Growth		(9%)		1967%	163%
FD Normalised P/E (x)	NA	NA	3,946	191	73
DPS (Rmb)	-	-	-	-	-
Dividend Yield	0%	0%	0%	0%	0%
EV/EBITDA (x)	NA	NA	374.7	80.4	33.5
P/FCFE (x)	NA	58.16	58.52	67.84	36.34
Net Gearing	(99%)	(108%)	(113%)	(125%)	(141%)
P/BV (x)	6.96	5.77	4.47	4.51	4.41
ROE		(0.91%)	0.13%	2.35%	6.14%
% Change In Normalised EPS Estimates					
Normalised EPS/consensus EPS (x)			1.45	0.43	0.45

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Li Auto – A pioneering EREV maker



China’s first successful EREV maker

Li Auto is a pioneer in successfully commercialising EREVs in China. Li Auto Inc. (Li Auto) is a leading new energy vehicle (NEV) manufacturer that designs, develops, manufactures, and sells premium smart extended range electric vehicles (EREV). Currently, Li Auto only has one product, namely Li ONE, a premium smart electric sports utility vehicle (eSUV). Despite only having one product available in the market, cumulative deliveries of Li ONE have already reached over 180k by Jun 2022 and expected to break the 200,000 deliveries milestone by end-Aug 2022. Li Auto’s second model, Li L9, which was launched on 21 Jun 2022, has received positive feedback from customers, with over 30k orders just 72 hours after the launch. The company differentiates itself from its peers by offering a flexible battery solution to customers via EREVs, which allows users to power their vehicles either by charging or refueling. This convenience has attracted the attention of potential customers in tier-2 to tier-4 cities in China, where charging piles are inadequate.

Two models launched since 2018. In 2018, Li Auto first introduced Li ONE, and later in May 2021, it unveiled the latest version of Li ONE, and named it 2021 Li ONE. In Jun 2022, the company launched its second model, Li L9, a six-seat, mid-large size premium smart extended-range eSUV which it plans to start delivering by the end of Aug 2022. (Fig. 1)

- In Oct 2018, Li Auto launched Li ONE, its premium smart extended-range eSUV, available in six- or seven-seater models. Li Auto began generating revenue when it delivered the first Li ONE to customers in Dec 2019.
- In May 2021, Li Auto unveiled the latest version of Li ONE, which is called 2021 Li ONE. The new version is 10mm longer and 25mm higher than the previous model but is only offered with a six-seater version to provide users a more spacious environment. The standard price of 2021 Li ONE is Rmb348k and began delivery in Jun 2021. In Nov 2021, a new monthly record with over 13k deliveries of Li ONEs was reached, making Li ONE the first domestic branded premium model priced above Rmb300k in China to achieve the 10k monthly deliveries milestone.
- In Jun 2022, Li Auto released its second model, Li L9, a six-seater, mid-large size flagship premium eSUV, priced at Rmb460k. The new model features an improved ADAS system – Li Auto AD Max, and a five-screen and three-dimensional display interactive mode. The flagship eSUV is scheduled to start delivery by the end of Aug 2022.

Figure 1: Li Auto’s EV models as at 30 Jun 2022

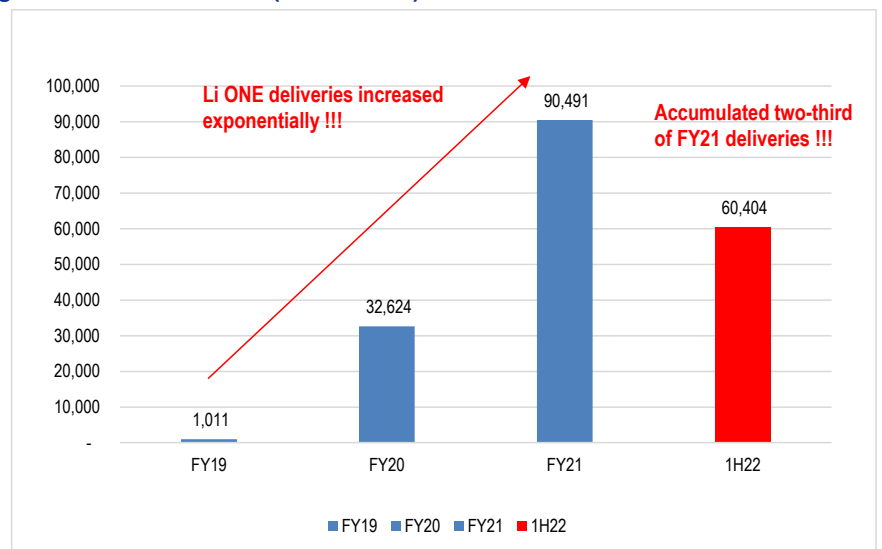
Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)	Cumulative shipments
 Li ONE	Dec-19	Large-size SUV	2,935	180/800 (with 40.6kWh battery pack only/battery pack + petrol engines)	6.5	240	530	NVIDIA Orin SoC	348,000	184,528
 Li L9	Aug-22	Mid-large SUV	3,105	215/1315 (with 44.5kWh battery pack only/battery pack + petrol engines)	5.3	330	620	NVIDIA Orin SoC	458,000	-

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Li ONE rising in the Rmb300k-400k SUV market segment ➤

Li ONE deliveries increased exponentially since first delivery in Dec 2019. Li ONE has achieved deliveries of 185k units by Jun 2022 since its first delivery in Dec 2019. In FY20, its annual deliveries reached 33k units, and the number jumped to 90k units in FY21, up 177% yoy. This year, despite the serious disruptions caused by the Omicron outbreak between Mar and May in China, Li ONE achieved deliveries of 60k units in 1H22, double that of the same period last year and making up two-thirds of its total FY21 deliveries. (Fig. 2) We expect Li ONE's FY22F deliveries to grow further to 136k units with the help of supportive government policies and the recovery in EV sales in 2H22F.

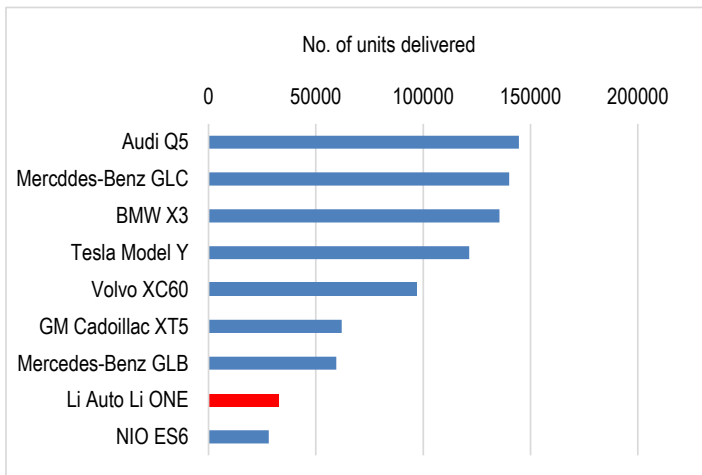
Figure 2: Li ONE deliveries (FY19 – 1H22)



Li ONE ranked fifth among China SUV deliveries in FY21. We believe that Li ONE is comparable to these models, namely Tesla model Y, BMW X3, Mercedes-Benz GLC and GLB, Audi Q5, Volvo XC60, NIO ES6, and GM Cadillac XT5, based on the vehicle size, and price segment at Rmb300k-400k.

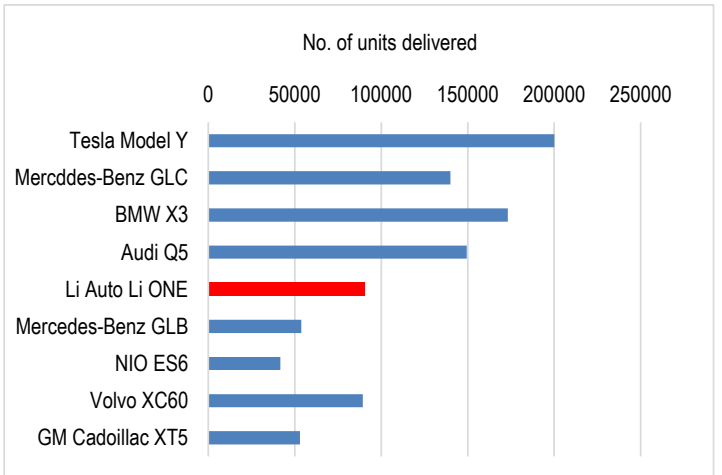
According to data from MARKLINES, an automotive information platform, Li ONE's ranking climbed to the fifth place in 2021 with 90k units of deliveries, up from eighth position in 2020 with 33k units, having surpassed Volvo XC60, Mercedes-Benz GLB, and GM Cadillac XT5. (Fig. 3 and 4)

Figure 3: 2020 Best-selling premium SUVs in China



SOURCES: CGS-CIMB RESEARCH, MARKLINES

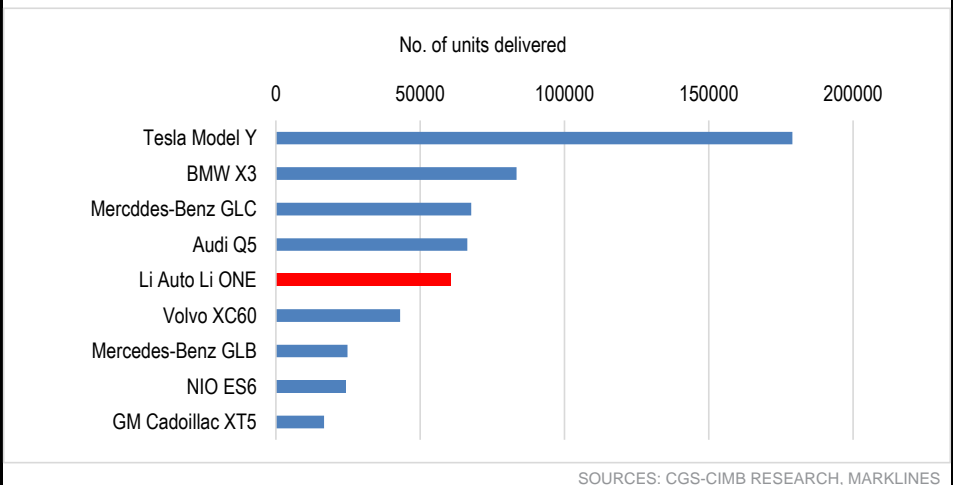
Figure 4: 2021 Best-selling premium SUVs in China



SOURCES: CGS-CIMB RESEARCH, MARKLINES

1H22 Li ONE narrows the delivery gap with top sellers. Li ONE's deliveries in 1H22 reached 60k units, still in fifth place in premium SUV sales in China but now much closer to third place Mercedes-Benz GLC (68k units) and fourth place Audi Q5 (66k units). (Fig. 5) In FY21 the gap between GLC and Q5 (deliveries of over 140k units each) and Li ONE (around 90k) was much wider. We expect Li ONE's FY22F deliveries to be on par or even exceed that of GLC and Q5; we think it is possible it could be ranked third place in China's premium SUV market in the Rmb300k-400k price segment.

Figure 5: 1H22 Best-selling premium SUVs in China



SOURCES: CGS-CIMB RESEARCH, MARKLINES

Li L9's upcoming debut in Aug 2022 ➤

Li Auto's second model, Li L9, was unveiled on 21 Jun 2022. Li L9 is a six-seater, mid-large size flagship premium eSUV, priced at Rmb460k or Rmb110k above Li ONE's Rmb350k. The new model offers users an excellent drivability with a CLTC range of 1,315 kilometers, self-developed autonomous driving system – Li AD Max – and a five-screen three-dimensional interactive system.

Li L9 received over 30k orders just 72 hours after the vehicle was available for reservation despite the requirement for a Rmb5k deposit which is refundable for a limited period of time. The positive feedback from customers implies solid consumer demand for Li Auto's EVs and assures a solid 2H22F sales performance. (Fig. 6 and 7) The new model will be officially delivered to buyers from the end of Aug 2022, and we expect its 9M22F deliveries to exceed 10k units.

Li Auto's EV deliveries forecasts >

Li Auto has delivered c.185k EVs since December 2019. Li Auto currently has one product on the market, Li ONE, its large premium extended-range electric SUV. The company unveiled its second product, the Li L9, a mid-large premium extended-range electric SUV, on 21 Jun 2022, and plans to start deliveries at the end of Aug 22.

With only one product available on the market, Li Auto's cumulative EV deliveries of its Li ONE model reached 185k units (Dec 2019 to Jun 2022). Deliveries in FY21 surged by 177% yoy to 90k units, while 1H22 deliveries have doubled compared to 1H21 deliveries (60k units in 1H22 vs. 30k units in 1H21), despite significant production disruptions from Mar to May 2022 due to Covid-19 lockdowns in China. (Fig. 6)

Figure 6: Li Auto's EV deliveries (Dec 2019 to Jun 2022)

Model	Type	Delivered day	2019	2020	2021	2022 (1-6)
Li ONE	Large-size SUV	Dec 2019	1,011	32,623	90,491	60,403
Li L9	Mid-large-size SUV	Aug 2022	n.a.	n.a.	n.a.	n.a.
Total no. of EV deliveries (units)			1,011	32,623	90,491	60,403
Total no. of EV sales (yoy change %)				3127%	177%	100%

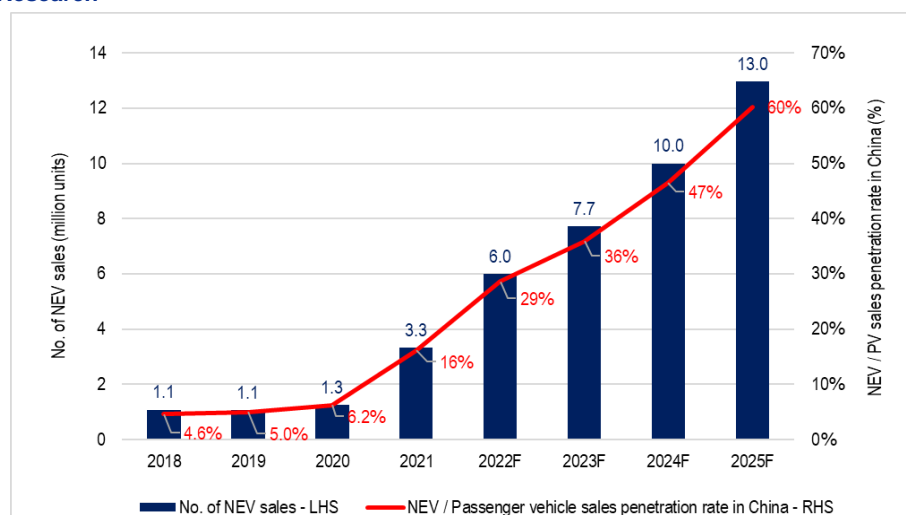
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Upside potential to China's SUV market. According to data from China Passenger Car Association (CPCA), 1H22 total SUV deliveries were at c.4.9m, increased c.4% yoy, despite the severe lockdown measures implemented in the country's wealthiest city, Shanghai.

We expect Chinese families to choose SUVs for daily commuting and weekend family trips due to their higher purchasing power, which should help boost growth in the SUV market over the next few years. Also, given the average SUV growth rate of c.4% yoy in 1H22 in China, and with 1H22 deliveries of Li ONE growing c.100% yoy, we believe Li Auto could gain significant market share from its peers.

NEV penetration rate in China to reach 60% in 2025F. According to China Association of Automobile manufacturers (CAAM), China's NEV penetration rate (NEV/total passenger car sales in China) reached 16%, at 3.3m units, in 2021. We estimate China's NEV penetration rate could increase from c.16% in 2021 to 60% in 2025F, or from 3.3m units in 2021 to c.13m units in 2025F. We believe this could come on the back of favourable government policies and a significant increase in the electrification trend within the automobile industry as well as the rising popularity of smart EVs. (Fig. 7)

Figure 7: China's NEV penetration rate (2018 to 2025F), estimates by CGS-CIMB Research



SOURCES: CGS-CIMB RESEARCH ESTIMATES, CAAM

Li Auto’s EV deliveries to grow by 83% yoy to 166k units in FY22F. We project Li Auto’s EV deliveries to increase 83% yoy to 166k units in FY22F due to 1) recovery of EV sales in China in 2H22F (EVs sales grew only 21% yoy in 1H22 due to the Covid-19 pandemic in China and lack of new model launches), 2) increased contribution from its new model, Li L9 (which received over 30k orders within the first 72 hours after the launch) and 3) consumers purchasing EVs ahead of time before subsidies end at end-2022. Li L9 is scheduled to start deliveries at the end of August, and we believe this new model could be a major growth driver for Li Auto due to positive feedback from customers with over 30k orders within the first three days after the launch, which exceeded the 29k units of deliveries in 2Q22. (Fig 8 and 9)

Figure 8: 2021 Li ONE (Li Auto’s only available product currently)



SOURCES: CGS-CIMB RESEARCH, LI AUTO INC

Figure 9: Li L9 (mid-large size 6-seater extended-range electric SUV) is scheduled for delivery in Aug 2022

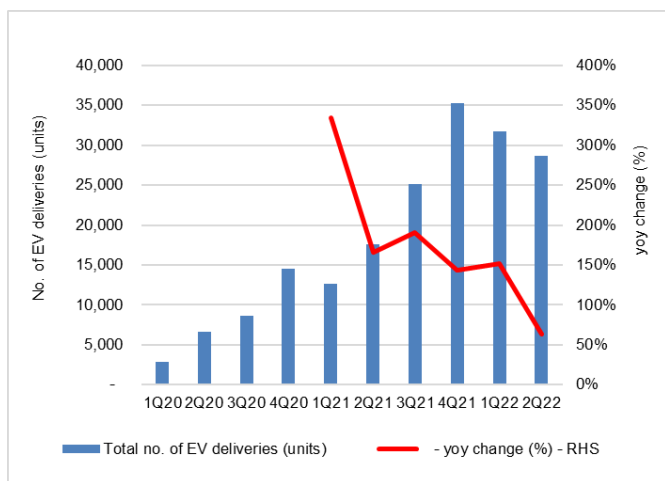


SOURCES: CGS-CIMB RESEARCH, LI AUTO INC

Li Auto’s EV deliveries likely to increase 49% yoy to 246k units in FY23F and rise 34% yoy to 329k units in FY24F. Li Auto plans to start production at its second production site in Beijing by the end of FY23F. This could increase production capacity to 200,000 units per year to meet the huge demand from consumers.

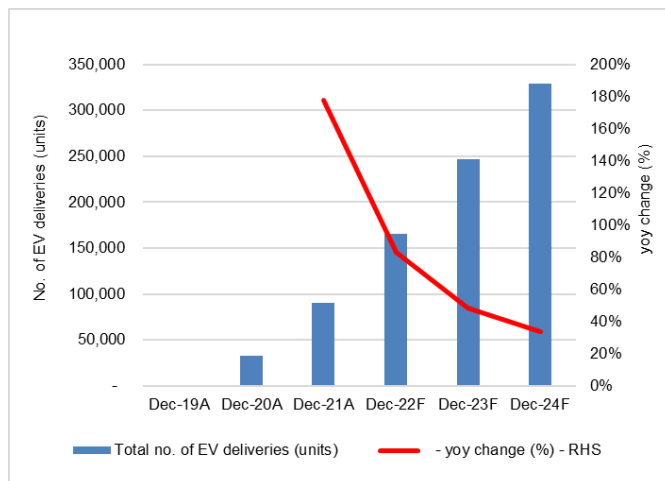
We expect Li Auto to see continued delivery growth in FY23-24F, thanks to growing demand for smart EVs in China and new types of model launches in the pipeline. We estimate Li Auto’s EV deliveries to jump 49% yoy to 246k units in FY23F and reach 329k units (+34% yoy) in FY24F, driven by 1) market share gain in China’s eSUV segment, 2) at least two HPC BEV models to be launched each year starting from FY23F and 3) at least one extended range electric SUV to be launched each year. (Fig 10 and 11)

Figure 10: Li Auto’s EV deliveries, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 11: Li Auto’s EV deliveries (FY19 to FY24F), estimate by CGS-CIMB Research

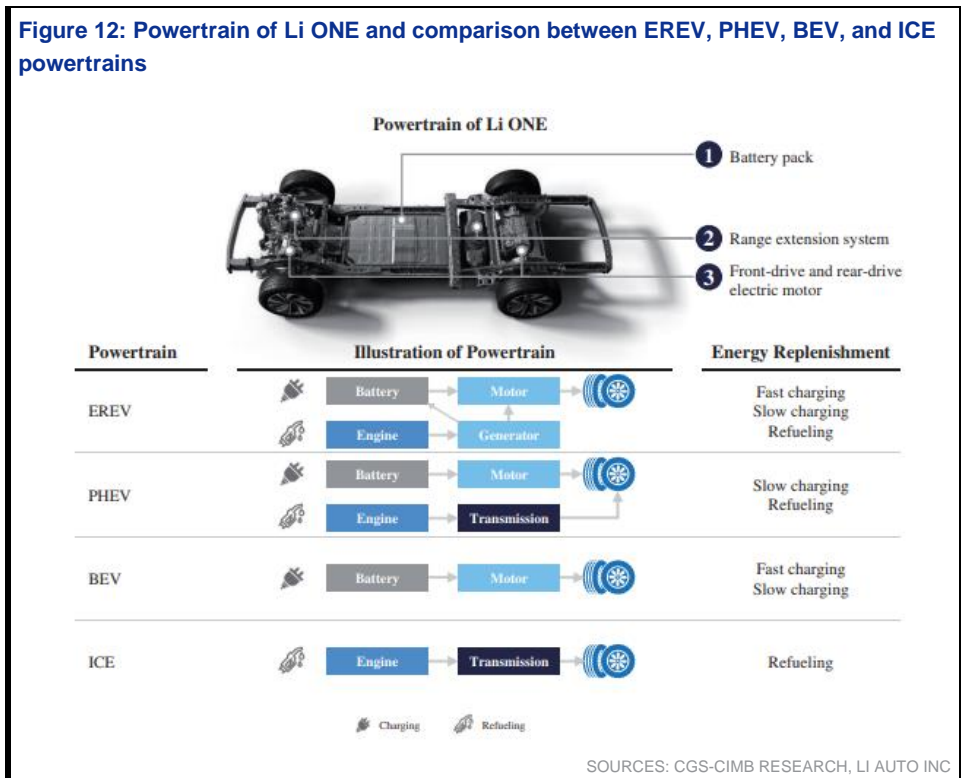


SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Li Auto offers flexible battery solutions ▶

Proprietary EREV solutions to free families from range anxiety. We believe providing flexibility when it comes to vehicle charging options can improve the overall user experience and attract attention and interest of consumers in tier-2 to -4 cities, where charging facilities are inadequate. Li Auto is launching vehicles with extended range electric vehicle (EREV) powertrains, which are powered by both battery packs and a range extension system. Most range extenders are internal combustion engines (ICE) that provide high fuel consumption efficiency using an electronic generator to furnish electric batteries and the motor with electricity. In other words, an EREV solution allows users to power a vehicle either by refueling or charging. (Fig 12) This flexibility, we believe, can help Li Auto achieve mass adoption with customers located in tier-2 to -4 cities, thus gaining more market share.

Figure 12: Powertrain of Li ONE and comparison between EREV, PHEV, BEV, and ICE powertrains



Li Auto’s batteries. We believe Li Auto’s close partnership with Contemporary Amperex Technology Co. Limited (CATL) (300750 CH, Not Rated) can facilitate its battery electric vehicle (BEV) development plan over the upcoming years. Li Auto’s vehicles use lithium-ion batteries, which it purchases from CATL. Its two models, Li ONE and Li L9 (to be delivered in Aug 22), are equipped with 40.6kWh and 44.5kWh battery packs, respectively, which deliver an electric-only NEDC range of 180km and 215km, respectively.

On 23 June 2022, CATL announced on its official Weibo channel that it will supply Qilin batteries to Li Auto next year, implying that Li Auto’s all-electric model slated for launch next year will carry the battery (Fig 13). The Qilin battery utilises third-generation cell-to-pack (CTP) technology and has energy density of 255Wh/kg, easily allowing vehicles to achieve range of 1,000km and to reach 80% charge in 10 minutes.

Figure 13: CATL on Weibo



Moving to BEV models and technologies. Thanks to its R&D team and close partnership with CATL, Li Auto is preparing to launch a high-power charging (HPC) BEV platform to compete in the BEV market in FY23F. The company's main focus in pure electric vehicle development is high charging efficiency batteries, high-voltage platforms, and supercharging technology. An announcement on CATL's official Weibo channel about Li Auto purchasing high-performance batteries from CATL is an evidence of the company's determination to break into the BEV market, in our view. Currently, it plans to launch at least two HPC BEV models each year starting from FY23F, together with extended-range electric SUVs, in an effort to diversify its offerings (source: Overseas Regulatory announcement, by Li Auto) (Fig 14).

Figure 14: Li Auto's EV development roadmap



Li Auto's autonomous driving technology

Improvements in Li Auto's autonomous driving technology. The company's autonomous driving technology – Li Auto AD Max and Li Auto AD - is currently applied to models L9 and ONE, respectively. The former is an updated version of latter and is equipped with more advanced equipment to improve driving assistance quality. Both are equipped the level 2 basic autonomous driving features, such as adaptive cruise control, automatic emergency braking, automatic parking assist, forward collision warning, intelligent headlight control, lane change assist, lane departure warning, lane keep assist and side view assist.

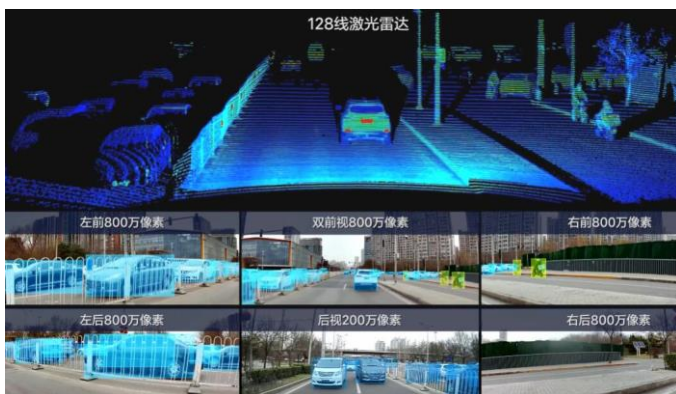
Li Auto AD Max on Li L9 >

Li Auto's flagship intelligent driving system as L9's standard configuration. Li Auto AD Max, the company's flagship intelligent driving system, is the standard autonomous driving system in Li Auto's new model, Li L9. The new system is full-stack and self-developed, with advanced hardware including:

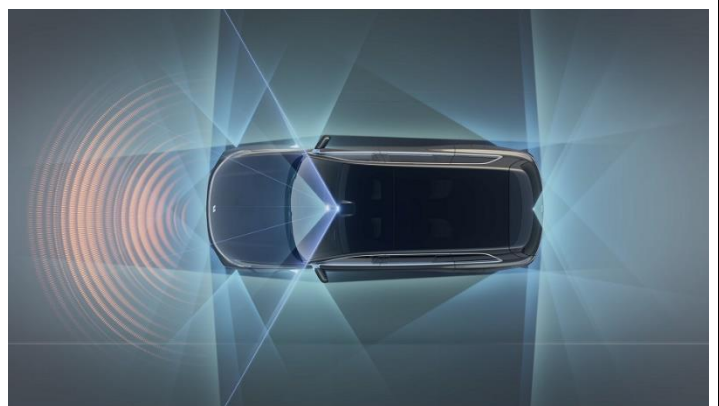
- 1) NIVIDA Orin X chips x2
- 2) Forward 128-line LiDAR x1
- 3) 8-megapixel Camera x6
- 4) 2-megapixel Camera x5
- 5) Ultrasonic Sensor x12
- 6) Forward Millimeter Wave Radar x1
- 7) Capacitive Hand Detection Steering Wheel
- 8) Steering Wheel with Vibration Alert
- 9) Attention Warning System

The cameras combined enable 360° perception around the body and at a distance and are able to recognise objects including vehicles, pedestrians and cone buckets at a wide 120° range and up to 550 meters away. This has enhanced the forward 128-line LiDAR ensures accuracy of the system's perception of the environment and helps vehicles improve recognition of stationary and shaped obstacles under scenarios where cameras are limited. With improved object recognition technology to handle Chinese roads, AD Max has an enhanced automatic emergency braking (AEB) feature to help reduce accidents. (Fig 15 and 16)

Figure 15: Demonstration of forward 128-line LiDAR, 8-megapixel cameras, and 2-megapixel cameras **Figure 16: Li Auto 360° perception**



SOURCES: CGS-CIMB RESEARCH, LI AUTO INC



SOURCES: CGS-CIMB RESEARCH, LI AUTO INC

Li Auto AD (NOA) on Li ONE ▶

Li ONE’s driving assistant. On 25 May 2021, Li Auto released 2021 Li ONE with NOA as a standard configuration. This became available to users on 6 Dec 2021. The NOA is equipped with hardware that includes:

- 1) Horizon Robotics Journey 3 AI Acceleration Processor x2
- 2) 8-megapixel camera x1
- 3) 2-megapixel camera x4
- 4) Fifth-generation Millimeter-wave Radars x5
- 5) Ultrasonic sensor x12

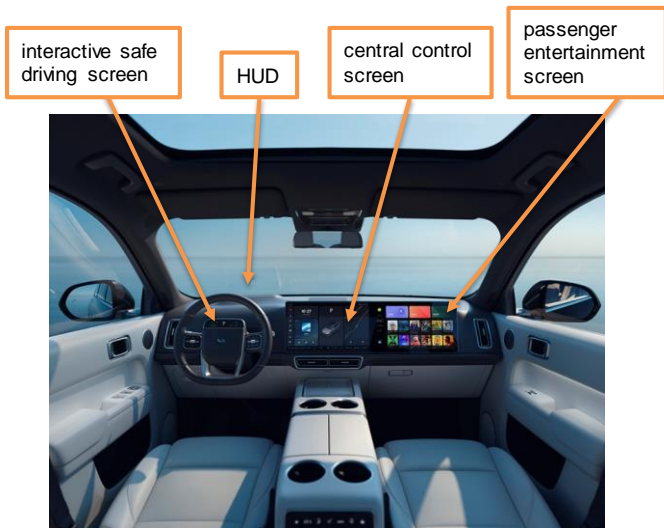
Functions include assist for going on and off ramps, automatic adaptive acceleration, and lane changes for certain limited access roads as well as Fully Automated Parking Assist (FAPA), which is a vision-based automatic parking feature.

Li Auto smart technology – OTA and HMI ▶

Li Auto’s OTA upgrades. Li Auto’s OTA upgrades (also known as FOTA) can automatically pause if there are issues during the upgrade process and resume later, providing flexibility to its users. In Dec 2020, the company introduced the 2.0 vehicle system update for Li ONE via FOTA upgrade, which enhances driving quality, energy efficiency, user interface, operating experience and in-car content offerings. Its new model, Li L9, is also equipped with FOTA upgrades for updates on its features.

Li L9’s HMI. We believe Li L9’s Intelligent Cabin with Human-Machine Interaction HMI is a pioneer in the NEV sector, with advanced hardware and thoughtful technologies. Li ONE features a five-screen three-dimensional interactive mode, which elevates users’ driving experience to a new level. Of the five screens, one provides a head-up display (HUD) and one an interactive safe driving screen. Key driving information is projected onto the front windshield through the HUD while the interactive safe driving screen, which is located above the steering wheel, adopts mini-LED and multi-touch technology, making interfacing easier and providing access to the vehicle’s functions. The other three screens are the vehicle’s central control screen, the passenger entertainment screen and the rear cabin entertainment screen, which are all 15.7-inch 3K automotive-grade OLED screens (Fig 17 and 18).

Figure 17: Interactive safe driving screen, HUD, vehicle’s central control screen, and passenger entertainment screen **Figure 18: Rear cabin entertainment screen**



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS



SOURCES: CGS-CIMB RESEARCH, , COMPANY REPORTS

Apart from the pioneering five-screen display, Li L9 is also equipped a three-dimensional interactive mode, supported by six microphones and a set of 3D ToF transmitters with deep-learning to provide smart experiences for all family members. The vehicle also features Dolby Atmos technology combined with 4D vibration units embedded in the second-row seats. Li L9's smart cockpit is supported by a computing platform composed of two Qualcomm Snapdragon automotive-grade 8155 chips.

Li ONE's HMI. Li ONE features a four-display interactive system, namely a digital dashboard screen (12.3 inch), console screen (16.2 inch), front-seat passenger entertainment screen (12.3 inch), and function control screen (12.1 screen). Also, it has full-coverage in-car voice control systems, which is supported by four omnidirectional high-sensitivity digital microphones and FOTA upgrades to improve system performance and enable users to access new features. Li ONE's smart cockpit is supported by a computing platform that uses Qualcomm Snapdragon 820A and Texas Instruments Jacinto 6 processors (source: Li Auto's website)

Li Auto's direct sales model and servicing network ►

Li Auto's direct sales model. We believe that Li Auto's direct sales model can improve the company's financial and operational efficiency as well as provide a consistently superior purchasing experience.

Li Auto locates its retail stores in selected shopping malls that its targeted users are likely to patronise instead of central business districts or landmark buildings. Its delivery and servicing centres, which provides in-person delivery and maintenance and repairs, are generally located in the suburbs with convenient access. More importantly, users can place their orders via the Li Auto app or website and the transaction will be handled by delivery specialists responsible for pre-delivery matters, such as financing and home charger installation.


Li Auto's servicing network. As of 30 June 2022, the company had 247 retail stores in 113 cities as well as 308 servicing centres and Li Auto-authorized body and paint shops operating in 226 cities.

SWOT analysis ►

Figure 19: SWOT analysis

Strengths	Opportunities
Li Auto is a leader and early mover in the EREV business. It was the first to successfully commercialise EREVs in China.	Li Auto should benefit from the rising EV penetration rate in China and gain market share as it continues to roll out new models.
Li Auto became China's largest premium electric SUV maker by volume in 2021, thanks to advanced Autonomous Driving technology and its family-oriented smart cockpits.	Li Auto is planning to expand its product range to BEVs in 2023. It plans to roll out at least two HPC BEV models starting from 2023.
Li Auto has successfully launched two models, and achieved its 180,000th delivery milestone with only a single product in the market.	Li Auto's newly-launched model, Li L9, has received positive feedback, with over 30,000 orders within 3 days of the launch.
Weaknesses	Threats
Li Auto sources the majority of its manufacturing materials, such as battery packs, ADAS components, cockpit components and various semiconductor chips, from different suppliers. Hence, Li Auto faces some difficulty in controlling its manufacturing costs.	Li Auto faces increasing competition in China's EV market from new players, including domestic traditional fuel automakers and EV makers, as well as foreign automakers.
	Any negative change by the government to its subsidies, economic incentives and other supportive policies for the NEV industry could adversely affect Li Auto's EV sales.

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

		Refinitiv ESG Scores					
ESG in a nutshell		C- ESG Score	A+ ESG Controversies Score	C- ESG Combined Score	D+ ESG Environment Pillar Score	C- ESG Social Pillar Score	B ESG Government Pillar Score
<p>In 2021, Li Auto stepped up its ESG efforts and established an ESG Working Group to coordinate relevant matters. The emphasis was on producing an eco-conscious product and thus the company has deployed various processes to eliminate harmful residue and materials in production. Li ONE has received five-star ratings for organic compounds, odour intensity, and electromagnetic radiation from the China Automobile Health Index (C-AHI).</p> <p>In our view, Li Auto is not involved in any environmentally-detrimental industry practices and takes the effort to minimise the environmental impact of its operations.</p>							
<p>Environmental</p> <p>In FY21, Li Auto released its first official ESG report but did not disclose data for ESG Key Performance Indicators in 2020. Therefore, we are unable to track yoy changes for the year.</p>	<p>Implications</p> <p>In FY21, total energy consumption reached 13,079 tce. Greenhouse gas (GHG) emission was 54,883 tCO₂e while emission intensity was 0.0020 tCO₂e/Rmb10,000. Hazardous waste produced was 668 tonnes. Non-hazardous waste produced was 17,131 tonnes. Refinitiv ranked Li Auto's environmental pillar 174th of 225 companies in the global automobile & auto parts sector. We project an improvement in the coming year with Li Auto's ESG initiatives.</p>						
<p>Social</p> <p>Li Auto values talent and the retention thereof. Therefore, apart from a comprehensive salary incentive system, it also developed a series of non-salary benefits for employees and their families to create a more harmonious and healthier working environment.</p>	<p>Implications</p> <p>In FY21, Li Auto gave out gifts to female employees in conjunction with International Women's Day. It also held its first Family Day, opening its Beijing R&D Center to family members for the first time and attracting as many as 1,000 employees and their family members. Other non-salary benefits include social insurance and housing fund, free medical examination, mental health services, mothers' rooms for female employees, etc. Refinitiv ranked Li Auto's social pillar 171st of 225 companies in the global automobile & auto parts sector. We project an improvement in the coming year with Li Auto's ESG initiatives.</p>						
<p>Governance</p> <p>In FY21, Li Auto identified 18 ESG issues after collecting feedback from stakeholders. It prioritised issues by their importance to stakeholders and the company.</p>	<p>Implications</p> <p>Considering issues that impact both the stakeholder and the company, Li Auto has identified 11 ESG points as its greatest concerns. Among those 11 tier-1 ESG issues, the top five are Innovative Development, Product Quality and Safety, Supply Chain Management, Information Security and Privacy Protection, and Talent Attraction and Retention. Refinitiv rated Li Auto's governance pillar a B and 79th of 225 companies in the global automobile & auto parts sector. We project an improvement in the coming year with Li Auto's ESG initiatives.</p>						

SOURCES: CGS-CIMB RESEARCH, REFINITIV

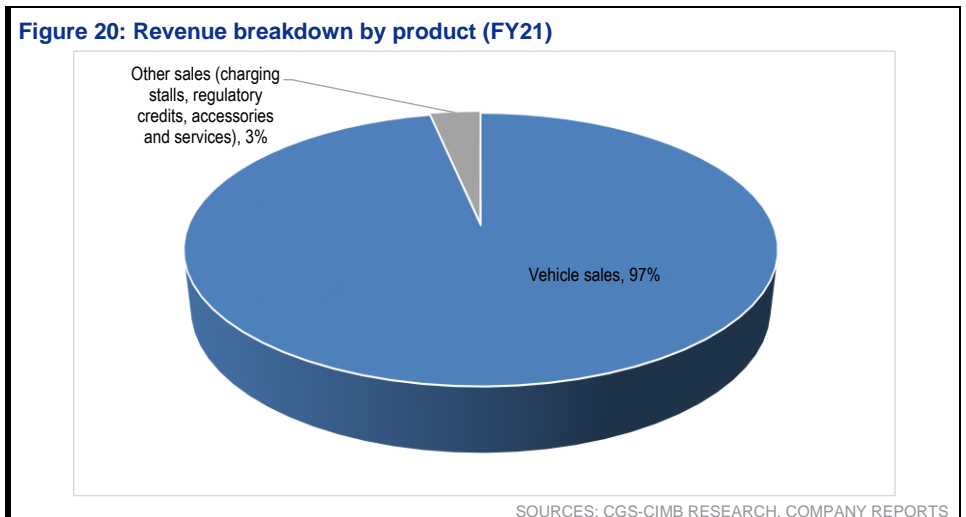
Financials

The only profitable automaker among NXL ▶

Li Auto's FY21 revenue grew 186% yoy to Rmb27bn. Since Li ONE (Li Auto's first product) first delivery started in Dec 2019, Li Auto has recorded a substantial revenue growth year by year. In FY20, revenue achieved Rmb9.5bn, and this amount jumped to Rmb27bn in FY21, surged 186% yoy, mainly driven by the popularity of Li ONE, which delivered 90k units annually, up 177% yoy.

In addition to Li Auto's revenue, other sales, included sales of charging stalls, accessories and services, increased 407% yoy to Rmb881.3m, accounted for 3.4% of the total revenue, and was in line with the boosting vehicle sales. (Fig. 20)

Figure 20: Revenue breakdown by product (FY21)



Improved profitability in FY21. Driven by the robust revenue growth and improved gross profit margin, FY21 net loss narrowed from Rmb792m in FY20 to Rmb321m this year. In terms of non-GAAP net profit, the amount rose 267% yoy to Rmb1.09bn from Rmb297m in FY20.

Impressive EV deliveries between FY20 and FY21. Li Auto FY21 EV deliveries reached 185k units, up 177% yoy, from 33k units in FY20. In May 2021, the company released an updated version of Li ONE, and was going to replace all old version starting from June 2021. In Nov 2021, 2021 Li ONE became the first domestic branded premium model, which is priced Rmb300k above to reach over 10k monthly deliveries in Nov 2021 (Fig 21 and 22).

Figure 21: Li Auto's EV deliveries and yoy change, by quarter (1Q20 to 2Q22)

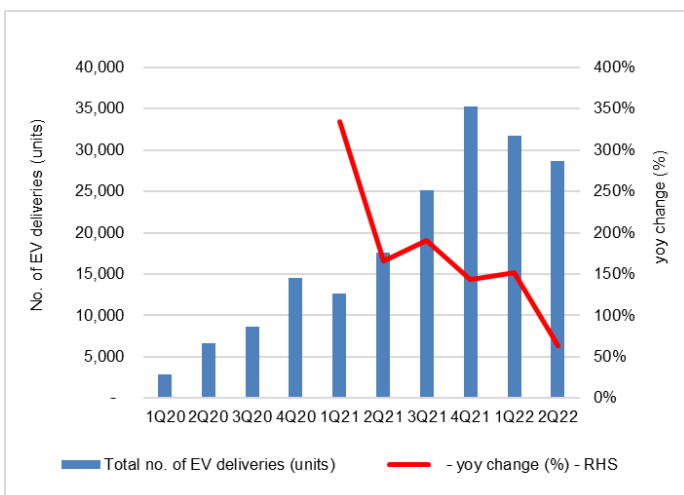
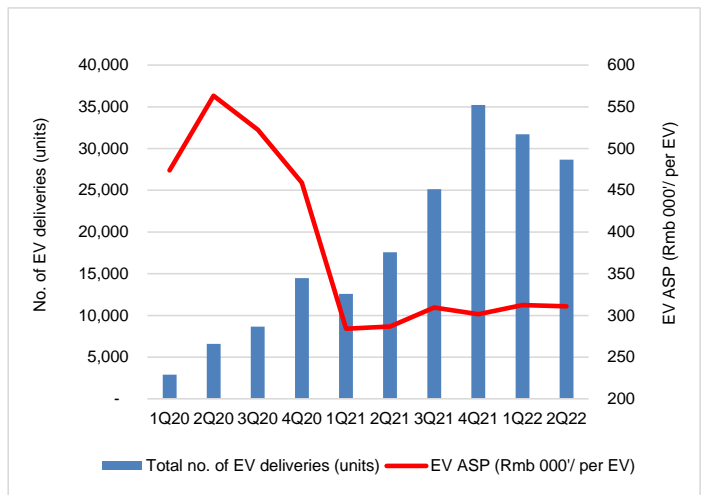


Figure 22: Li Auto's EV deliveries vs ASP, by quarter (1Q20 to 2Q22)

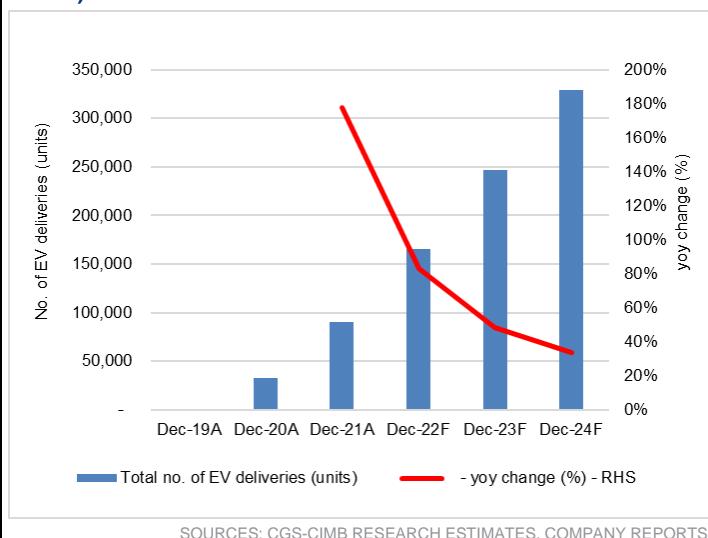


EV deliveries to grow further in 2H22F. 1H22 Li Auto's deliveries reached 60k units, rose c.100% yoy despite the severe lockdown measure implemented in China major cities, particularly Shanghai. We estimate that 2H22F deliveries may reach to 105k units, surged 75% yoy, thanks to the easing Omicron disruption, financial supports from the government (exemption from electric vehicle purchase tax and consumers buying EVs earlier as the subsidies should be ceased at the end-2022), and new model, Li L9, to be delivered in the end of August.

Strong revenue growth in FY22-24F on robust EV deliveries forecast. We predict Li Auto to deliver revenue CAGR of 73% in FY21-24F, driven by the strong growth in EV deliveries (rising from 90k units in FY21 to 329k units in FY24F, a CAGR of 54%). (Fig. 23 - 27).

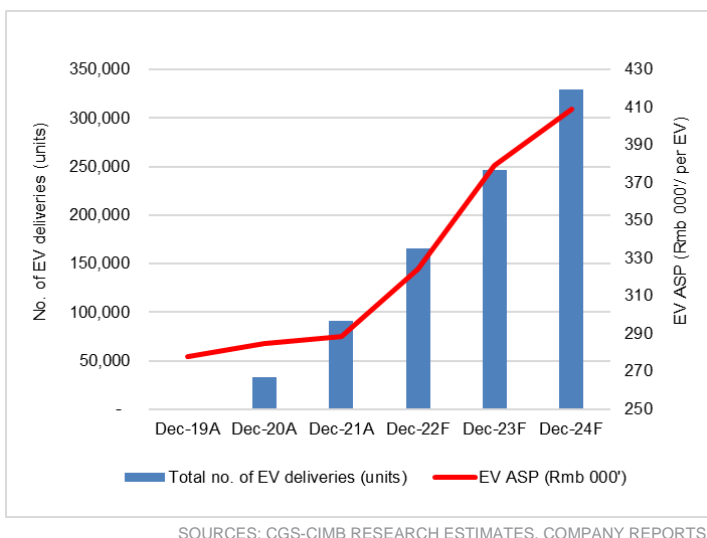
Expect non-GAAP profit to reach Rmb6.26bn in FY24F. Different from NIO and XPeng, the non-GAAP net profit has already reached Rmb283m in FY20, and further rose to Rmb1.09bn in FY21, surged 267% yoy. We estimate the non-GAAP net profit will further grow to Rmb1.82bn in FY22F, Rmb3.94bn in FY23F, and Rmb6.26bn in FY24F.

Figure 23: Li Auto's EV deliveries and yoy change (FY19 to FY24F)



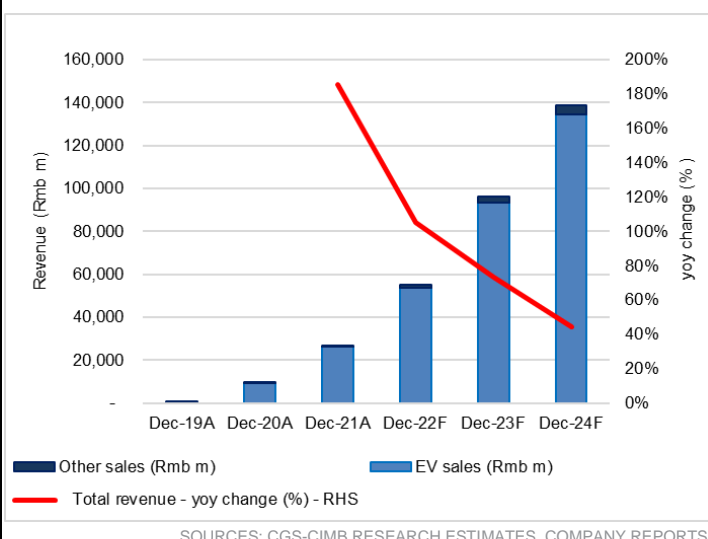
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 24: Li Auto's EV deliveries and ASP (FY19 to FY24F)



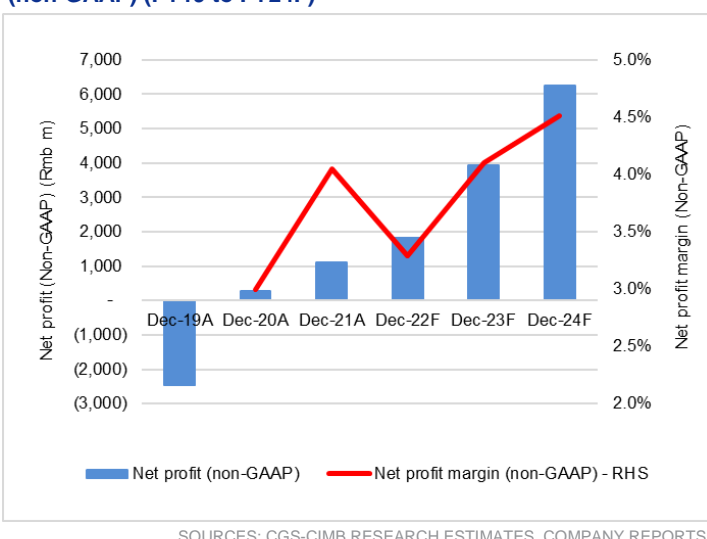
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 25: Li Auto's revenue and yoy change (FY19 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 26: Li Auto's net profit (non-GAAP) and net profit margin (non-GAAP) (FY19 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

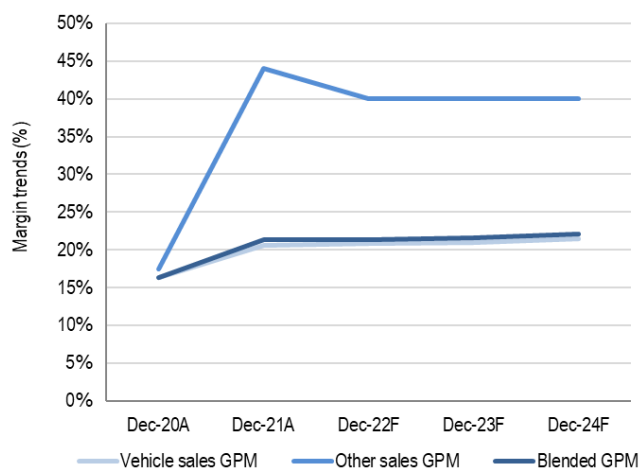
Profit margin trend ➤

Gross margin expanded 500bp yoy in FY21. FY21 gross profit margin (GPM) increased to 21.3%, expanded c.500 bp yoy from 16.4% in FY20, and matched with tier-1 automakers on average (15-20%), primarily driven by improved cost control on supply chain management, and higher average selling price attributable to the increasing EV deliveries with the launch of 2021 Li ONE (new version of Li ONE with selling price up Rmb10k).

Vehicle margin to reach 21.5% in FY24F. We estimate Li Auto's vehicle margin will increase from 20.6% in FY21 to 21.5% in FY24F, expanded 94bp yoy in total. As a result, the blended GPM will also increase slightly from 21.3% in FY21 to 22.0% in FY24F (Fig 27 and 28).

Figure 27: Gross profit margin (GPM), breakdown by product (FY20 - FY24F)

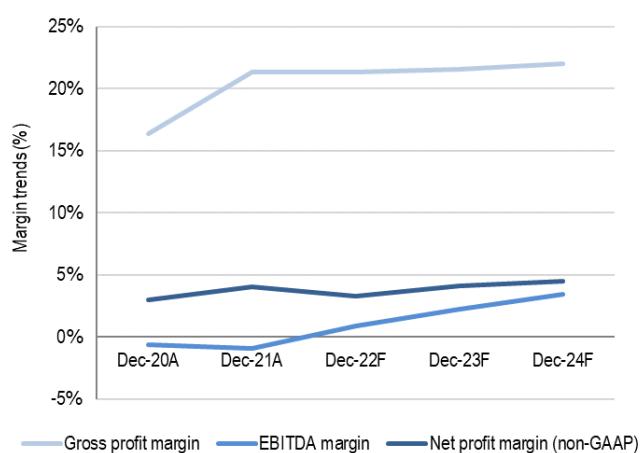
Other sales GPM was 17.4% in FY20 and 44.1% in FY21



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 28: Margin trends (FY20 - FY24F)

EBITDA margin was -0.6% in FY20 and -0.9% in FY21



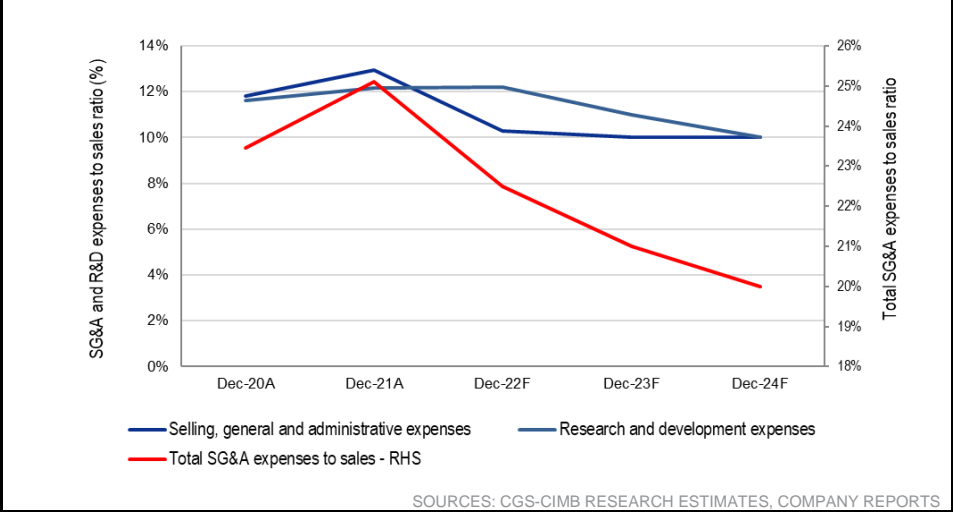
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

SG&A expenses-to-sales ratio to drop to 20% in FY24F. Li Auto's SG&A expenses comprised by selling, general and administrative expenses and research and development (R&D) expense. We estimate both expenses-to-sales ratio are following a decreasing trend, in which SG&A cost-to-sales ratio is expected to drop from 12.9% in FY21 to 10.0% in FY24F, while R&D expenses-to-sales ratio will decrease from 12.2% in FY21 to 10.0% in FY24F, making the blended SG&A cost to sales ratio also decrease from 25.1% in FY21 to 20.0% in FY24F, driven by better economies of scale, further improvement in supply chain management (Fig 29).

Despite decreasing R&D expenses-to-sales ratio, R&D expenses still play a vital role for Li Auto as continuous updated features on ADAS system and intelligent cockpit are essential. Therefore, we expect R&D expenses will increase from Rmb3.3bn in FY21 to Rmb13.9bn in FY24F.

Figure 29: SG&A expenses-to-sales ratio (FY20 - FY24F)

Total SG&A expenses to sales ratio was 23.5% in FY20 and 25.1% in FY21



Balance sheet and cashflow.➤

Net cash of Rmb29.3bn as at 31 Dec. As at 31 Dec 2021, Li Auto had total borrowing of Rmb6.0bn, and cash of Rmb50.2bn, translating to net cash of Rm44.2bn. Its long-term borrowings consist of 1) convertible debt due 2028 (principal amount is Rmb5.40bn, or US\$863m with annual interest rate at 0.25%); 2) secured bank loan (principal amount is Rmb600m or US \$96m with annual interest rate at 4.8%) borrowed in Sep 2021 from a commercial bank in the PRC. Within the secured bank loans, Li Auto also had Rmb37m short-term borrowings.

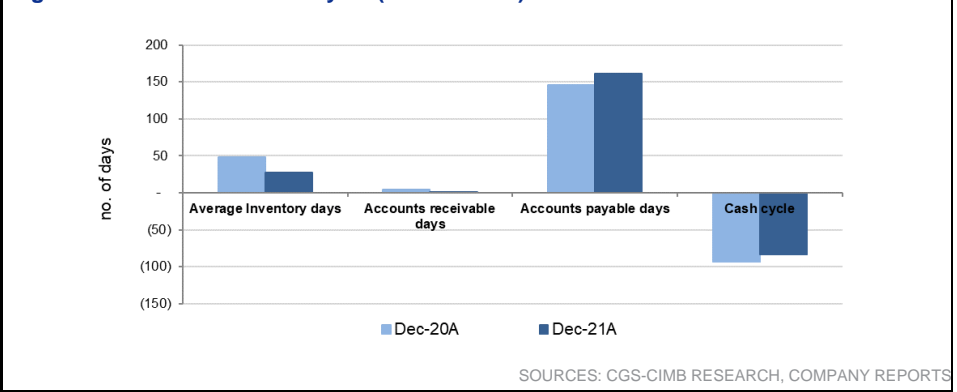
Net cash remains in FY22-24F. We expect Li Auto’s net cash will continue to grow from Rmb44.2bn in FY21 to Rmb75.7bn in FY24F, driven by robust EBITDA of Rmb2.13bn and 4.81bn in FY23F and FY24F (Fig 30 and 31).

Figure 30: Cash projection (FY20 – FY24F)

FYE Dec (Rmb m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(56)	(240)	473	2,129	4,809
Less : Change in working capital	2,497	6,429	5,506	7,557	8,971
Less : Capital expenditure	(675)	(3,445)	(4,000)	(4,000)	(3,700)
Less : Taxation	23	(169)	5	(219)	(576)
Free cash flow	1,788	2,576	1,984	5,467	9,504
Dividend paid	0	0	0	0	0
Net (debt) / cash	29,362	44,163	59,682	65,661	75,698
Cash and equivalents	29,874	50,161	67,743	71,745	78,795
Total borrowings	(512)	(5,998)	(8,061)	(6,084)	(3,097)

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 31: Cash conversion cycle (FY20 – FY21)



Valuation and recommendation

Initiate coverage with an Add rating and target price of HK\$203.6 ➤

Li Auto is a pioneer in successfully commercialising EREVs in China. We believe Li Auto's EV deliveries to accelerate with 60% CAGR in FY21-24F as more new models are rolling out, such as Li L9 in FY22F, and at least two BEV to launch starting from FY23F, flexible charging solutions that attract users from lower tier cities, where charging facilities are inadequate, and family-oriented vision and product that optimize the mobility needs of family. Also, we expect Li Auto's EV sales in FY22-24F are in line with its expected robust growth in EV deliveries, underpinned by its rising market share in China premium SUV market, the broadening EV portfolio (EREV and BEV), and supportive government policy.

Initiate coverage with an Add. We initiate coverage on Li Auto Inc (Li Auto) with an Add rating as we believe Li Auto has a competitive advantage in China's premium SUV market by looking at its rising market share in the last couple of years (FY20 and FY21) due to 2021 Li ONE launch, and its EREV powertrain that offer flexible charging solution to Li ONE users. We also believe Li Auto will further penetrate rural area and deliver robust EV sales due to its energy-saving long driving range EREVs.

Our DCF valuation for Li Auto is HK\$203.6 per share. We use a discount cash flow (DCF) methodology to value Li Auto as we expect it to be profitable only from FY23/24F onwards. Our DCF forecast is based on FY20-FY40F. We use an average WACC of 11.2% (WACC assumptions: risk free rate:3.5%, beta: 1.50, COE: 12.5%) and terminal growth rate of 5% (based on China's NEV industry growth) and arrive at a DCF per share of HK\$203.6. Our DCF target is equivalent to 78x P/E and 50x EV/EBITDA in CY24F (Fig. 32).

Figure 32: DCF valuation

FYE Dec (RMB m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F	Dec-25F	Dec-30F	Dec-35F	Dec-40F	Terminal
Revenue	9,457	27,010	55,390	96,191	138,754	169,280	393,763	502,552	641,398	818,604
Operating expenses	(9,512)	(27,249)	(54,917)	(94,062)	(133,945)	(160,816)	(338,636)	(432,195)	(551,602)	(704,000)
EBITDA	(56)	(240)	473	2,129	4,809	8,464	55,127	70,357	89,796	114,605
Plus : Depreciation/Amortization	321	590	1,105	1,597	1,980	2,134	4,752	7,636	10,486	13,730
Less : Change in working capital	2,497	6,429	5,506	7,557	8,971	2,539	5,906	7,538	9,621	12,279
Less : Capital expenditure	(675)	(3,445)	(4,000)	(4,000)	(3,700)	(3,724)	(8,663)	(11,056)	(14,111)	(18,009)
Less : Taxation	23	(169)	5	(219)	(576)	(702)	(1,634)	(2,085)	(2,661)	(3,397)
Free cash flow	2,109	3,167	3,089	7,064	11,484	8,710	55,488	72,391	93,130	1,931,073
Discount factor		1.00	1.00	0.90	0.81	0.73	0.43	0.25	0.15	0.09
PV FCF		2,109	3,167	2,848	2,499	5,142	11,864	16,471	12,528	9,457
Enterprise value (Rmb m)		409,325								
Less : Net debt / (cash)		44,163								
Equity value (Rmb m)		365,161								
Equity value - less minority		365,161								
Equity value per share (Rmb)		176.77								
Equity value per share (HK\$)		203.56								
Key assumptions										
WACC		11.2%								
Terminal growth		5.0%								

SOURCES: CGS-CIMB RESEARCH ESTIMATES.

Figure 33: Peers comparison

Company	Bloomberg Code	Price Target price Recom. (local curr) (local curr)	Upside (%)	Market Cap (US\$m)	P/E (x)		3-year EPS CAGR %	P/BV (x)		ROE (%)		EV/EBITDA (x)		Yield (%)			
					CY2022F	CY2023F		CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F		
NIO, Li Auto and Xpeng																	
NIO Inc	9866 HK	Add	156.80	257.30	64%	33,368	na	89.9	na	8.4	7.1	-21.9%	-5.6%	na	257.4	0.0%	0.0%
Li Auto	2015 HK	Add	133.10	203.56	53%	35,039	190.9	72.6	na	4.5	4.5	0.1%	2.4%	363.3	80.4	0.0%	0.0%
XPeng Inc	9868 HK	Add	92.45	207.45	124%	20,273	na	88.2	na	4.1	5.4	-16.9%	-16.7%	na	na	0.0%	0.0%
Electric vehicle manufacturers																	
BYD Co.	1211 HK	Not Rated	287.00	N/A	n.a.	127,768	55.9	39.2	65.2%	6.0	5.2	12.1%	14.9%	22.2	17.2	0.2%	0.2%
Tesla Inc	TSLA US	Not Rated	891.83	N/A	n.a.	931,508	51.8	43.2	49.3%	15.3	11.4	33.2%	27.6%	30.8	23.9	0.0%	0.0%
Average							53.8	41.2	57.2%	10.6	8.3	22.7%	21.3%	26.5	20.6	0.1%	0.1%
China Automobile manufacturers																	
Geely Automobile	175 HK	Not Rated	17.00	N/A	n.a.	21,702	15.6	12.1	21.9%	1.8	1.6	11.3%	12.9%	7.8	6.3	2.1%	2.7%
Great Wall Motor	2333 HK	Not Rated	12.70	N/A	n.a.	36,299	9.0	7.3	24.9%	1.3	1.2	15.5%	17.7%	12.7	10.2	5.1%	6.8%
Guangzhou Auto	2238 HK	Not Rated	7.45	N/A	n.a.	19,528	5.7	5.0	23.6%	0.6	0.6	11.3%	11.8%	21.7	18.4	4.7%	5.4%
Average							10.1	8.1	23.4%	1.2	1.1	12.7%	14.1%	14.1	11.6	4.0%	5.0%
Foreign automobile manufacturers																	
Kia Motor	000270 KS	Add	81,200	110,000	35%	25,240	6.0	5.6	6.3%	0.8	0.7	14.7%	13.2%	2.8	2.6	1.5%	1.5%
Hyundai Motor	005380 KS	Hold	196,500	190,000	-3%	32,195	8.0	7.6	12.9%	0.7	0.6	8.3%	8.1%	9.4	9.1	2.0%	2.0%
Toyota	7203 JP	Not Rated	2,154.50	N/A	n.a.	268,264	9.9	8.9	17.9%	1.1	1.0	11.2%	11.4%	12.5	11.4	2.9%	3.3%
BMW	BMW GR	Not Rated	79.53	N/A	n.a.	53,346	5.5	5.3	-2.4%	0.6	0.6	10.5%	10.5%	4.4	3.6	6.2%	6.5%
Mercedes-Benz Group	MBG GR	Not Rated	56.87	N/A	n.a.	62,278	5.0	4.9	-5.6%	0.7	0.7	14.2%	14.1%	0.8	1.0	8.0%	8.2%
Volkswagen	VOW GR	Not Rated	193.90	N/A	n.a.	87,768	5.7	5.1	10.2%	0.6	0.6	10.5%	10.8%	2.4	2.2	4.9%	5.4%
Ford	F US	Not Rated	15.34	N/A	n.a.	61,670	7.5	7.4	4.4%	1.2	1.1	14.1%	12.8%	3.2	2.1	3.5%	3.5%
General Motor	GM US	Not Rated	36.77	N/A	n.a.	53,612	5.7	5.6	-2.1%	0.7	0.6	12.4%	11.4%	2.7	2.3	1.3%	2.0%
Average							6.7	6.3	5.2%	0.8	0.7	12.0%	11.6%	4.8	4.3	3.8%	4.1%
Battery manufacturers																	
CATL	300750 CH	Not Rated	523.87	N/A	n.a.	189,187	35.7	26.3	51.7%	8.5	6.4	25.4%	26.2%	23.0	17.2	0.2%	0.3%
EVE Energy	300014 CH	Not Rated	99.30	N/A	n.a.	27,899	32.5	22.8	39.7%	7.0	5.4	22.8%	25.0%	26.0	18.1	0.4%	0.5%
Gotion High-Tech	002074 CH	Not Rated	38.66	N/A	n.a.	10,176	55.5	38.2	85.7%	3.2	3.1	6.4%	8.9%	24.0	18.1	0.6%	0.7%
Shenzhen Desay Battery	000049 CH	Not Rated	43.34	N/A	n.a.	1,926	13.2	10.4	16.9%	2.8	2.4	23.8%	25.9%	7.9	5.5	1.6%	2.5%
LG Energy Solution	373220 KS	Not Rated	417,000	N/A	n.a.	74,636	66.4	47.5	37.8%	4.8	4.4	7.7%	9.7%	22.0	16.8	0.0%	0.1%
SK On	096770 KS	Not Rated	180,000	N/A	n.a.	12,729	7.7	7.7	43.8%	0.7	0.6	9.9%	8.9%	5.7	5.7	2.3%	2.3%
Samsung SDI	006400 KS	Add	572,000	750,000	31%	30,161	21.2	17.9	23.3%	2.4	2.2	9.7%	10.8%	8.7	7.0	0.2%	0.2%
Average							33.2	24.4	42.7%	4.2	3.5	15.1%	16.5%	16.7	12.6	0.7%	0.9%
Electric vehicle parts manufacturers																	
LK Technology	558 HK	Not Rated	12.64	N/A	n.a.	2,216	21.6	16.2	59.9%	3.9	3.3	19.9%	21.8%	14.8	11.5	0.9%	1.1%
Times Electric	3898 HK	Not Rated	33.25	N/A	n.a.	9,525	15.1	13.2	14.5%	1.1	1.0	7.4%	8.2%	16.6	14.6	1.8%	2.1%
Ningbo Joyson Electronic	600699 CH	Not Rated	20.93	N/A	n.a.	4,237	28.2	21.9	-218.5%	2.2	2.0	8.0%	9.4%	10.0	8.5	0.4%	0.4%
Continental AG	CON GY	Not Rated	67.30	N/A	n.a.	13,778	7.2	5.7	20.0%	1.0	0.9	13.8%	15.0%	3.3	2.8	4.2%	5.4%
Valeo	FR FP	Not Rated	20.85	N/A	n.a.	5,177	9.4	6.5	69.0%	1.2	1.1	13.6%	17.3%	3.3	2.7	3.8%	4.8%
Magna International	MGA US	Not Rated	64.23	N/A	n.a.	18,572	8.9	6.8	22.9%	1.5	1.4	17.5%	20.2%	4.9	4.1	2.9%	3.2%
Average							15.1	11.7	-5.4%	1.8	1.6	13.4%	15.3%	8.8	7.4	2.3%	2.8%

NOTE: ESTIMATES FOR NOT RATED (NR) COMPANIES ARE ALL BASED ON BLOOMBERG CONSENSUS ESTIMATES
SOURCES: CGS-CIMB RESEARCH ESTIMATES, BLOOMBERG (02 AUG 2022)

Share price catalysts ➔

Li Auto's share price (ADRs) has risen by 197% since it was listed on the Nasdaq market in Jul 2020.

We believe its key share price catalysts include:

- Favourable policies: promotion policies of the central and local governments on EV purchasing, relaxation of automotive purchasing quota in key cities and EV purchase tax exemption.
- Strong order backlog for new model Li L9 eSUV.
- Flexible charging solution via EREV powertrain.
- Broader product portfolio starting from 2023, including both extended-range electric vehicle and battery electric vehicle.
- Market expansion in lower tier cities (tier-2 to tier-4).
- Robust EV sales and continuous new model rollouts.
- Continued share gains in China's EV market, especially in the premium eSUV market.
- Easing of supply chain constraints.

Key risks ►

China's automotive market is highly competitive. As a pioneer in successfully commercialising EREVs and one of the top 5 premium SUV sellers in China, Li Auto directly competes with ICE vehicles as well as new energy vehicles, including BEVs. Many of Li Auto's current and potential competitors or new market entrants have significantly greater financial, technical, manufacturing, marketing and branding, talents, and other resources than they do, and may be able to devote greater resources to the design, development, manufacturing, marketing, sales, and support of their vehicles. Li Auto could find it challenging to maintain its leadership position in China's EREV and SUV market, and to break into the BEV market.

Meanwhile, Li Auto has to consistently invest in R&D to maintain its competitive edge in EREV as well as in product quality, safety and reliability, etc., and potentially launch its BEV models in the China NEV market.

Chinese government policies supporting EV industry. China has introduced favourable policies to support the healthy development of its EV industry. Favourable government incentives and subsidies in China include one-time government subsidies, exemption from vehicle purchase tax, exemption from license plate restriction in some cities, preferential utility rate for charging facilities, among others.

Any change in government subsidies, economic incentives and government policies to support NEVs could adversely affect Li Auto's business performance.

Covid-19 impact. Since early-2020, in a bid to contain the spread of Covid-19 in China, the government has implemented a series of preventive measures, such as quarantining, asking residents to remain at home, and social-distancing measures, among others. These measures have influenced the production and sales of vehicles over the past two years. Although Covid-19 is largely under control in China, a new wave of Covid-19 outbreak in the country could again affect Li Auto's vehicle production and sales.

Li Auto's overall production and deliveries in Apr 2022 were also affected by the shortage of certain auto parts with a resurgence in Covid-19 cases in the Yangtze Delta region. As a result, Li ONE deliveries in Apr were down 62% mom and 25% yoy to 4,167 units.

Supply chain constraints. Persistent global chip shortages have negatively affected Li Auto's vehicle output in FY21 and 1H22. For example, due to the Covid-19 pandemic in Malaysia, the production of chips dedicated for Li Auto's millimeter-wave radar supplier was severely hampered, impacting production and deliveries in 3Q21. In Apr 2022, supply chain constraints following the resurgence of Covid-19 led to poor production and deliveries. Furthermore, Li Auto experienced increased costs related to procuring raw materials required to manufacture and assemble its vehicles.

Company background

Li Auto is one of China's leading smart electric SUV maker ➤

Li Auto's mission: 'Create a Mobile Home, Create Happiness'. Li Auto Inc. (Li Auto) was founded in April 2015 and listed on the Nasdaq (LI US) and HKEX (2015 HK) in July 2020 and in Aug 2021, respectively. Li Auto designs, develops, jointly manufactures and sells premium smart EVs in China. Its headquarters are in Beijing. The company targets families with children and aims to provide them with safe, convenient, and advanced smart EVs and technologies.

Li Auto first to successfully commercialise EREVs in China. There were a few mass-produced EREV models around the world prior to the release of Li ONE (Li Auto's first model) but they either had limited sales volume in China or production was discontinued. Therefore, its position as a pioneer in mass producing EREVs in China differentiates Li Auto from its peers. EREVs provide users a more flexible energy replenishment solution as users can choose to refuel their vehicle either by charging or refueling, based on their needs and constraints. This technology ensures Li ONE can operate even when users have no access to charging infrastructure, avoiding issues of inadequate private and public fast charging infrastructure, which mostly plagues tier-2 and -4 cities in China. As a result, Li ONE has steadily gained popularity, with over 90k units delivered in FY21, up 177% yoy.



What is EREV?

*An **Extended Range Electric Vehicle (EREV)** has a **range extender** which increases the driving range of itself. Most range extenders are small internal combustion engines that drive an **electric generator** furnishing the **electric batteries and motor** with electricity. As a result,*

Li Auto ranked top in China's smart electric SUV market. The company's first product, Li ONE, is the best-selling new energy SUV model in China, with a 9.7% market share in 2020, according to the report from CICRESEARCH, Inc, (CIC) a marketing, economics and survey research firm. Till 6M22, Li ONE's cumulative deliveries reached over 180k units, hitting this milestone with only a single model and after two-and-a-half years from Li ONE's first delivery in Dec 2019. Its second model – Li L9 - was unveiled on 21 June 2022 and received over 30k orders within 72 hours.

- Li Auto first launched Li ONE, a six-seater medium-large premium smart extended-range electric sports utility vehicle (SUV), in Oct 2018. The company shipped Li ONE to customers in Dec 2020 and its variant, the 2021 Li ONE, in June 2021.
- Li Auto launched Li L9, a six-seater large flagship smart electric SUV, in June 2022 and expects to deliver to customers in Aug 2022 (Fig 34).

Figure 34: Li Auto's EV models as at 30 Jun 2022

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)	Cumulative shipments
 Li ONE	Dec-19	Large-size SUV	2,935	180/800 (with 40.6kWh battery pack only/battery pack + petrol engines)	6.5	240	530	NVIDIA Orin SoC	348,000	184,528
 Li L9	Aug-22	Mid-large SUV	3,105	215/1315 (with 44.5kWh battery pack only/battery pack + petrol engines)	5.3	330	620	NVIDIA Orin SoC	458,000	-

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Company milestones ►

Figure 35: Company's key milestones (2015 to 2021)

2015	<ul style="list-style-type: none"> In April, Li Auto commenced business operation.
2016	<ul style="list-style-type: none"> In August, Li Auto held the Foundation Stone Laying Ceremony of its Changzhou Plant.
2018	<ul style="list-style-type: none"> In October, Li Auto launched Li ONE, a six-seater medium-large premium smart extended-range electric sport utility vehicle (SUV).
2019	<ul style="list-style-type: none"> In November, Li Auto started the volume production of Li ONE. In December, Li Auto started the delivery of Li ONE.
2020	<ul style="list-style-type: none"> In July, Li Auto listed its ADSs on the Nasdaq under the symbol "Li".
2021	<ul style="list-style-type: none"> In June, single-month orders of Li ONEs exceeded 10,000. In August, Li Auto undergone its secondary listing on the HKEX under the symbol "2015". In December, Cumulative deliveries of Li ONE exceed 90,000.

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Research and development ►

Li Auto relies heavily on research and development (R&D) to establish and strengthen its market position. The company's R&D team mainly covers vehicle R&D (vehicle design, development, and production), intelligent system R&D and autonomous driving R&D. As of 31 Mar 2021, the department employed over 1,600 staff.

On 1 May 2021, Li Auto commenced operation of its new R&D centre in Shanghai, which is mainly focused on developing next-generation powertrain systems, high C-rate batteries, high-voltage platform, ultra-fast charging technologies, autonomous driving technologies, next-generation intelligent cockpit, operating systems, and computing platform. One reason Li Auto established its new R&D centre in Shanghai was to strengthen cooperation with local top universities and to recruit more top talent in the coming years.

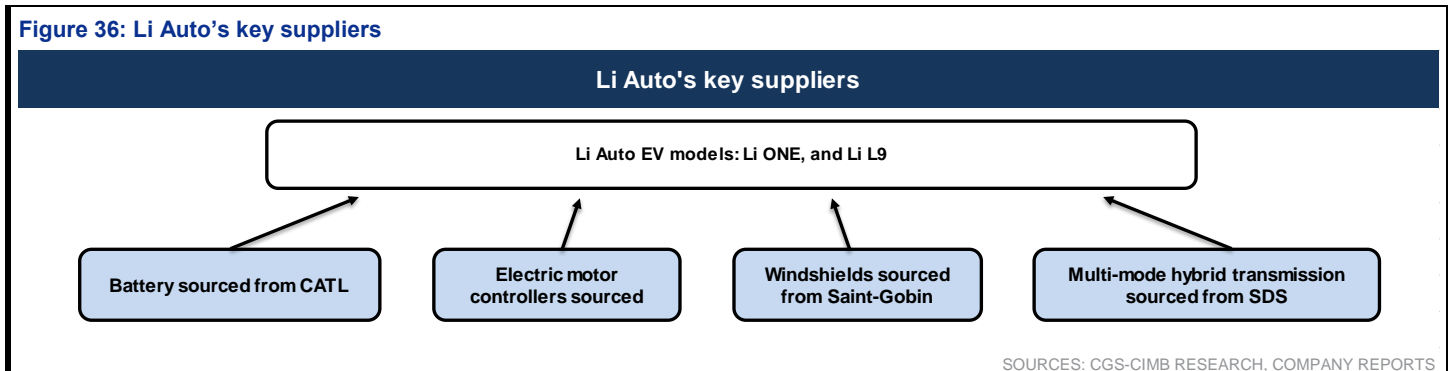
In Dec 2021, Li Auto made good progress in developing and applying Navigation On Autopilot (NOA) and vision-enhanced AEB functions to its 2021 Li ONE variant, making the company the world's third automaker capable of full-stack self-development of NOA. In light of the importance of R&D for Li Auto, its R&D expenses surged c.199% yoy to approximately Rmb3.3bn in FY21 while its R&D expenses to sales ratio expanded 60bp from 11.6% in FY20 to 12.2% to FY21.

Supply chain diversification and expansion ►

Concentrate on key parts and outsource the rest. Li Auto collaborates with over 190 suppliers for over 1,900 sourced parts to produce Li ONE while developing close partnerships with suppliers for key parts, such as CATL for battery packs, Inovance for electric motor controllers, Saint-Gobain for windshields, and SDS for multi-mode hybrid transmission. By building close relationships with key suppliers, Li Auto can enjoy volume-based pricing discounts even though the agreements do not typically include a fixed purchase quantity. Li Auto believes that the use of single-source suppliers for EVs' key components is

highly efficient and does not impose an imminent threat to its business sustainability. The company, however, has pre-qualification measures to identify alternative suppliers as back-ups (Fig 36).

Figure 36: Li Auto's key suppliers



Manufacturing base in Changzhou. Li Auto's current production capacity is 100,000 units per year and the company already delivered 90,491 units of Li ONE in FY21. Therefore, in order to meet huge consumer demand, in October 2021, the company officially started construction of its manufacturing base in Beijing's Shunyi District and plans to start production by the end of FY23F. The new manufacturing base is expected to achieve an annual capacity of 100,000 units of EVs per year, expanding total capacity to 200,000 units per year.

Upcoming SiC chip R&D and production base in Suzhou. Li Auto established a chip joint venture earlier this year with Sanan Optoelectronics (600703 CH), a Chinese chipmaker, to further develop third-generation semiconductor silicon carbide (SiC) chip modules, following the path of its competitors, such as BYD, NIO, and XPeng. This joint venture known as Suzhou Sike Semiconductor Co Ltd is 70% held by Li Auto and 30% by Sanan Optoelectronics. Construction for the production base began in mid-Jun, with prototype production expected to begin in May 2023, and full production in 2024.

Capital exercise >

Li Auto had a total 2,065.7m issued shares as at 30 Jun 2022. Li Auto's class A shares are listed on Nasdaq (Li US) and HKEX (2015 HK).

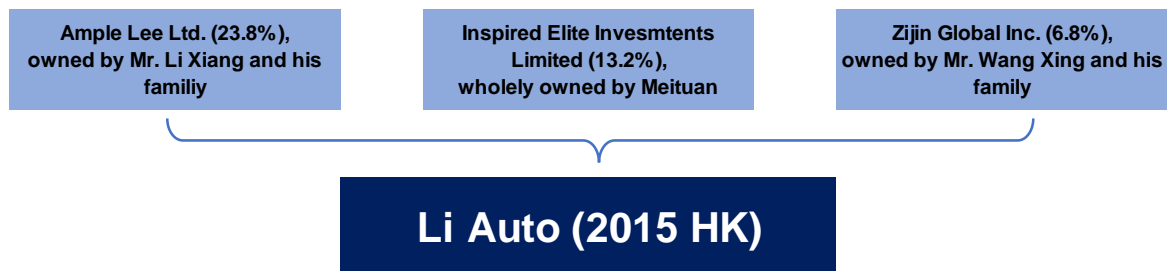
- Li Auto completed listing on Nasdaq on 30 July 2020. The IPO offered and sold 95m ADSs, representing 190m Class A shares (1 ADS = 2 Class A share) with the offer price of US\$11.50, raising approximately US\$1.3bn.
- Li Auto completed listing on HKEX on 7 July 2021. The IPO issued 100m Class A shares at the offer price of HK\$118.00 (US\$30.36) and raised approximately HK\$15.2bn (US\$1.96bn).
- On 28 Jun 2022, Li Auto announced plans to sell an aggregate US\$2bn of ADSs through an at-the-market equity offering programme (the "ATM Offering") on the Nasdaq Global Select Market. The company intends to use the net proceeds from the ATM Offering for:
 - 1) Research and development of next-generation EV technologies, including BEV technologies, smart cabin, and autonomous driving
 - 2) Development and manufacturing of future platforms and car models
 - 3) Working capital needs and general corporate purposes.

Shareholding structure ▶

Li Auto has a weighted voting rights (VWR) structure and its share capital comprises Class A ordinary shares and Class B ordinary shares. Each Class A ordinary share entitles its holder to exercise one vote while each Class B ordinary share entitles its holders to exercise ten votes.

- The major shareholder is Amp Lee Ltd., holding 108,577,400 of Class A ordinary shares and 355,812,800 of Class B ordinary shares, accounting for 23.79% of shareholding in total (75.74% of voting rights in the company). Amp Lee Ltd. was established by Mr. Li Xiang, who is deemed to be invested in the Class B ordinary shares held by Amp Lee Ltd.
- Inspired Elite Investments Limited is the second largest shareholder of Li Auto, holding 258,171,601 of Class A ordinary shares, accounting for 13.23% of shareholding in total (4.21% of voting rights in the company). Inspired Elite Investments Limited is a wholly-owned subsidiary of Meituan (Fig 37)
-

Figure 37: Shareholding structure (as at Jun 2022)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

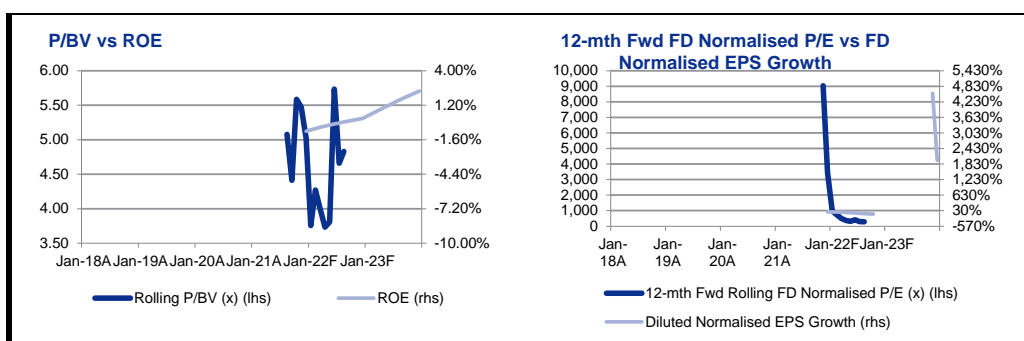
Key management ▶

Mr. Li Xiang (李想), aged 39, is the Founder, executive Director, Chief Executive Officer and Chairman of the Board. Mr. Li is responsible for the overall strategy, product design, business development and management of the company. Mr. Li has over 20 years of experience founding and managing internet technology companies in China, including over 15 years in the automotive industry. Mr. Li is the founder of Autohome Inc. (NYSE: ATHM; HKEX stock code: 2518 HK, Not Rated) (“Autohome”) and served as its president from 1999 to June 2015. Autohome is the leading online destination for automobile consumers in China. At Autohome, Mr. Li was primarily responsible for its overall strategy, content creation and product development. From May 2015 to September 2018, Mr. Li served as a director of NIO Inc. (NYSE: NIO). Mr. Li has served as an independent director of Beijing Siwei Tuxin Technology Co., Ltd. (北京四維圖新科技股份有限公司) (Shenzhen Stock Exchange stock code: 002405) since May 2017 and is also on the board of directors of several private companies. Mr. Li studied at Shijiazhuang No. 4 Middle School and decided to pursue a career in entrepreneurship following high school rather than pursue tertiary education.

Mr. Shen Yanan (沈亞楠), aged 43, is an executive Director and has served as President since November 2015. Mr. Shen is responsible for the overall strategy, business development, supply chain management and sales and marketing of Li Auto. Prior to joining the company, Mr. Shen held various positions at Lenovo, with his most recent position as vice president in charge of global supply chain operations. Mr. Shen received a bachelor’s degree in industrial foreign trade from Shanghai Jiao Tong University in July 1999 and a master’s degree in logistics and supply chain management from University of Edinburgh in December 2000. Mr. Shen obtained his EMBA degree from China Europe International Business School in October 2013.

Mr. Li Tie (李鐵), aged 43, is an executive Director and has served as Chief Financial Officer since July 2016. Mr. Li is responsible for the overall strategy, the accounting, legal and internal control functions and capital market activities of the company. Prior to joining Li Auto, Mr. Li worked at Autohome from March 2008 to June 2016 with his last position as a vice president. Before joining Autohome, Mr. Li worked at PricewaterhouseCoopers’s Beijing office from August 2002 to February 2008. Mr. Li completed the Senior Executive Leadership Program held by Harvard Business School in July 2019. He received his bachelor’s degree in accounting and master’s degree in management from Tsinghua University in July 1999 and June 2002, respectively.

BY THE NUMBERS



Profit & Loss

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Net Revenues	9,457	27,010	55,390	96,191	138,754
Gross Profit	1,549	5,761	11,831	20,732	30,580
Operating EBITDA	(348)	(427)	473	2,129	4,809
Depreciation And Amortisation	(321)	(590)	(1,105)	(1,597)	(1,980)
Operating EBIT	(669)	(1,017)	(632)	532	2,829
Financial Income/(Expense)	188	677	686	927	1,009
Pretax Income/(Loss) from Assoc.	0	0	0	0	0
Non-Operating Income/(Expense)	292	187	0	0	0
Profit Before Tax (pre-EI)	(189)	(153)	55	1,460	3,838
Exceptional Items	0	0	0	0	0
Pre-tax Profit	(189)	(153)	55	1,460	3,838
Taxation	23	(169)	5	(219)	(576)
Exceptional Income - post-tax					
Profit After Tax	(166)	(321)	60	1,241	3,262
Minority Interests	0	0	0	0	0
Preferred Dividends					
FX Gain/(Loss) - post tax					
Other Adjustments - post-tax					
Preference Dividends (Australia)					
Net Profit	(166)	(321)	60	1,241	3,262
Normalised Net Profit	(166)	(321)	60	1,241	3,262
Fully Diluted Normalised Profit	(166)	(321)	60	1,241	3,262

Cash Flow

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(348)	(427)	473	2,129	4,809
Cash Flow from Inv. & Assoc.	0	0	0	0	0
Change In Working Capital	2,497	6,429	5,506	7,557	8,971
(Incr)/Decr in Total Provisions					
Other Non-Cash (Income)/Expense					
Other Operating Cashflow	1,081	2,233	66	89	67
Net Interest (Paid)/Received	(67)	(63)	(66)	(89)	(67)
Tax Paid	(23)	169	5	(219)	(576)
Cashflow From Operations	3,140	8,340	5,984	9,467	13,204
Capex	(675)	(3,445)	(4,000)	(4,000)	(3,700)
Disposals Of FAs/subsidiaries	88,271	221,977	0	0	0
Acq. Of Subsidiaries/investments	0	0	0	0	0
Other Investing Cashflow	(106,334)	(222,789)	0	0	0
Cash Flow From Investing	(18,738)	(4,257)	(4,000)	(4,000)	(3,700)
Debt Raised/(repaid)	(145)	(430)	2,063	(1,976)	(2,987)
Proceeds From Issue Of Shares	21,026	11,005	13,000	0	0
Shares Repurchased	0	0	0	0	0
Dividends Paid	0	0	0	0	0
Preferred Dividends					
Other Financing Cashflow	3,830	6,134	534	511	533
Cash Flow From Financing	24,711	16,710	15,597	(1,465)	(2,454)
Total Cash Generated	9,113	20,793	17,581	4,002	7,050
Free Cashflow To Equity	(15,743)	3,653	4,047	3,491	6,517
Free Cashflow To Firm	(15,531)	4,146	2,050	5,556	9,571

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

BY THE NUMBERS... cont'd

Balance Sheet

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Cash And Equivalents	29,874	50,161	67,743	71,745	78,795
Total Debtors	469	601	1,233	2,141	3,089
Inventories	1,048	1,618	3,317	5,746	8,237
Total Other Current Assets	0	0	0	0	0
Total Current Assets	31,391	52,380	72,292	79,632	90,121
Fixed Assets	2,479	4,498	7,394	9,797	11,517
Total Investments	163	156	156	156	156
Intangible Assets	683	751	751	751	751
Total Other Non-Current Assets	1,657	4,062	4,062	4,062	4,062
Total Non-current Assets	4,982	9,468	12,364	14,767	16,487
Short-term Debt	0	37	61	84	97
Current Portion of Long-Term Debt					
Total Creditors	3,808	11,255	20,056	32,263	46,251
Other Current Liabilities	501	816	816	816	816
Total Current Liabilities	4,309	12,108	20,933	33,163	47,164
Total Long-term Debt	512	5,961	8,000	6,000	3,000
Hybrid Debt - Debt Component					
Total Other Non-Current Liabilities	1,713	2,562	2,562	2,562	2,562
Total Non-current Liabilities	2,224	8,523	10,562	8,562	5,562
Total Provisions	36	154	154	154	154
Total Liabilities	6,570	20,785	31,649	41,878	52,879
Shareholders' Equity	29,804	41,064	53,007	52,520	53,728
Minority Interests	0	0	0	0	0
Total Equity	29,804	41,064	53,007	52,520	53,728

Key Ratios

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue Growth	N/A	186%	105%	74%	44%
Operating EBITDA Growth	N/A	23%	N/A	350%	126%
Operating EBITDA Margin	(3.68%)	(1.58%)	0.85%	2.21%	3.47%
Net Cash Per Share (Rmb)	16.23	21.38	28.89	31.79	36.64
BVPS (Rmb)	16.47	19.88	25.66	25.42	26.01
Gross Interest Cover	(10.00)	(16.09)	(9.58)	6.00	42.27
Effective Tax Rate	0.0%	0.0%	0.0%	15.0%	15.0%
Net Dividend Payout Ratio	NA	NA	NA	NA	NA
Accounts Receivables Days	N/A	1.60	1.21	1.28	1.38
Inventory Days	N/A	22.90	20.67	21.92	23.65
Accounts Payables Days	N/A	107.7	109.3	105.4	110.6
ROIC (%)	N/A	(106%)	129%	(11%)	(23%)
ROCE (%)	N/A	(0.71%)	0.22%	2.58%	6.75%
Return On Average Assets	N/A	(3.56%)	(0.95%)	0.51%	2.39%

Key Drivers

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total no. of EV sales ('000 units)	N/A	90.5	165.7	246.3	329.3
Total no. of EV sales (units yoy% chg)	N/A	177.4%	83.2%	48.6%	33.7%
Vehicle sales (Rmb yoy % chg)	N/A	181.5%	105.8%	73.7%	44.2%
Vehicle sales (GPM %)	N/A	44.1%	40.0%	40.0%	40.0%

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Hong Kong

ADD (initiation)

Consensus ratings*: Buy 11 Hold 1 Sell 0

Current price:	HK\$156.8
Target price:	HK\$257.3
Previous target:	N/A
Up/downside:	64.1%
CGS-CIMB / Consensus:	16.6%
Reuters:	9866.HK
Bloomberg:	9866 HK
Market cap:	US\$33,368m HK\$261,940m
Average daily turnover:	US\$16.14m HK\$126.5m
Current shares o/s:	1,692m
Free float:	74.4%

*Source: Bloomberg

Key changes in this note

N/A.



Source: Bloomberg

Price performance	1M	3M	12M
Absolute (%)	-8.8	8.9	
Relative (%)	1.1	15.5	

Major shareholders	% held
Mr. Bin Li	10.5
Tencent	9.8
Baillie Gifford & Co.	5.3

Analyst


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NIO Inc

NIO – the leading premium EV player

- We believe that NIO is well positioned to ride on China's premium eSUV and EV growth due to its battery services and autonomous driving technologies.
- We see strong EV deliveries (+70%/+85%/+27% yoy in FY22F/23F/24F) on gains in eSUV segment, rising sedan EV sales, and EU market contribution.
- We initiate coverage with an Add call and DCF-based TP of HK\$257.3.

NIO is China's market-leading premium smart EV manufacturer

NIO Inc (NIO) is China's market-leading premium smart electric vehicle (EV) manufacturer, with over 60% market share in China's premium electric sport utility vehicle (eSUV) segment in 2021, thanks to its well-recognised brand name, industry-leading technology in battery services, and autonomous driving. We believe that NIO will remain competitive and continue to capture even more of the fast-growing China EV market, especially in the premium EV segment, as it continues to roll out innovative and high-performance EV models and enhance its battery swapping and autonomous driving technologies.

EV deliveries to see strong growth on sustained market gains

Since Dec 17, NIO has launched four premium models, namely ES8, ES6, EC6 and ET7, with two more (ES7 SUV and ET5 EV) in the pipeline this year. At end-Jun 22, NIO had delivered c.218k units of EVs (ES8, ES6, EC6 and ET7). This will be boosted in 2H22F by the deliveries of ES7 from Aug 22 onwards, and ET5 from Sep 22 onwards. NIO's EV deliveries slowed to a 21% yoy increase to 50.8k units in 1H22 (+113% in FY20, +109% in FY21) due to a Covid-19 production halt. We believe that NIO's EV deliveries should surge 112% yoy to 105k units in 2H22F, driven by ES7 and ET5 deliveries, and supportive government policies (exemption from electric vehicle purchase tax and subsidies ceasing at end-2022). We estimate NIO's EV deliveries to climb 70% yoy in FY22F, 85% yoy in FY23F and 27% yoy in FY24F, driven by 1) sustained market share gains in China's eSUV segment, 2) rising sedan EV sales, and 3) EU market contributions.

Battery services technology sets NIO apart from competitors

NIO's battery swapping technology and battery-as-a-services (BaaS) model substantially improves NIO's user experience in battery charging and maintains battery performance. We believe that this sets it apart from other EV makers, helping the company to maintain its leadership position in China's premium EV segment. NIO's battery swapping stations (over 1,000 stations across China) allow users to swap EV battery with another fully charged battery in minutes. NIO also launched the industry's first BaaS solution, which allows customers to purchase a NIO EV without a battery pack, thus ensuring lower upfront vehicle purchase costs and more flexible battery upgrade options.

Initiate at Add with a DCF-based target price of HK\$257.3

We initiate coverage on NIO with an Add rating and a DCF-based TP of HK\$257.3 (WACC: 8.0%, terminal growth rate 5%) which is equivalent to 149x P/E and 69x EV/EBITDA in CY24F. We believe that NIO is well-positioned to capture greater market share in China's premium eSUV and EV segments. Share price re-rating catalysts include strong order backlog for ES7 and ET5, sustainable innovative new model launches, and narrowing losses. Downside risks: prolonged Covid-19 outbreak in China, keener competition, and sustained supply chain constraints.

Financial Summary

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue (Rmbm)	16,258	36,136	60,861	111,660	146,405
Operating EBITDA (Rmbm)	(3,561)	(2,788)	(4,742)	751	5,652
Net Profit (Rmbm)	(5,610)	(10,572)	(6,588)	(1,662)	2,541
Normalised EPS (Rmb)	(4.74)	(6.72)	(3.96)	(0.98)	1.50
Normalised EPS Growth		41.7%	(41.0%)	(75.2%)	
FD Normalised P/E (x)	NA	NA	NA	NA	89.94
DPS (Rmb)	-	-	-	-	-
Dividend Yield	0%	0%	0%	0%	0%
EV/EBITDA (x)	NA	NA	NA	257.6	33.2
P/FCFE (x)	NA	207.1	NA	38.9	53.3
Net Gearing	(109%)	(101%)	(117%)	(108%)	(112%)
P/BV (x)	7.60	6.47	8.36	7.11	6.33
ROE		(34.2%)	(21.2%)	(5.6%)	7.4%
% Change In Normalised EPS Estimates					
Normalised EPS/consensus EPS (x)			0.96	0.81	0.65

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO – the leading premium EV player

China's premium smart electric vehicle maker >

NIO is China's leading premium smart EV maker. NIO Inc (NIO) is a pioneer in China's premium smart electric vehicle (EV) market, designing, developing, jointly manufacturing and selling premium smart EVs. The company has been investing heavily in research and development (R&D) to drive innovations in autonomous driving, digital technologies, electric powertrains and EV batteries. NIO differentiates itself from other EV players through continuous technological breakthroughs and innovations, such as its industry-leading battery-swapping technologies, battery-as-a-service (BaaS) model as well as its proprietary autonomous driving technologies and autonomous-driving-as-a-service (ADaaS) solution.







Six EV models launched since 2017. In 2016, NIO introduced the EP9 supercar (designed for Formula E racing only), the fastest EV then, setting the record for the fastest lap by an all-electric vehicle on the Nurburgring Nordschleife.

In Dec 2017, NIO launched ES8, its flagship premium smart electric sports utility vehicle (eSUV), which came in six- or seven-seater models. NIO began generating revenue when it delivered the first ES8 eSUV to a customer in China in Jun 2018.

Subsequently, NIO delivered the ES6 eSUV in Jun 2019, EC6 eSUV in Sep 2020, and ET7 the first sedan EV in Mar 2022. NIO is scheduled to deliver its newly-launched ES7 eSUV in Aug 2022 and ET5 EV in Sep 2022 (Fig 1).

In 2021, NIO started to deliver eSUVs and provide services in Norway, its first overseas market.

Figure 1: NIO EV models

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)
 ES8	Jun-18 (seven-seater) Mar-19 (six-seater) Apr-20 (all-new)	Mid-large SUV	3,010	450/580/850 (with 75/100/150kWh battery pack)	4.9	400	725	NIO Pilot	468,000
 ES6	Jun-19	Mid-size SUV	2,900	465/610/900 (with 75/100/150kWh battery pack)	4.7	400	725	NIO Pilot	358,000
 EC6	Sep-20	Mid-size coupe SUV	2,900	475/615/910 (with 75/100/150kWh battery pack)	4.5	400	725	NIO Pilot	368,000
 ET7	Mar-22	Mid-large sedan	3,060	550/705/1000 (with 75/100/150kWh battery pack)	3.8	480	850	NIO Autonomous Driving	448,000
 ES7	Aug-22	Mid-large SUV	2,960	485/620/930 (with 75/100/150kWh battery pack)	3.9	480	850	NIO Autonomous Driving	468,000
 ET5	Sep-22	Mid-size sedan	2,888	550/700/1000 (with 75/100/150kWh battery pack)	4.3	360	700	NIO Autonomous Driving	328,000

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

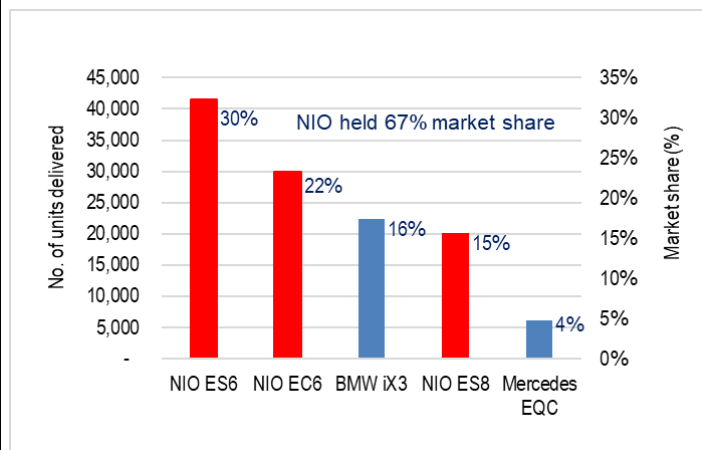
NIO continues gaining market share in China's premium electric vehicle segment ➤

NIO's pricing puts its EVs in the high-end segment. NIO models are priced from Rmb358k to Rmb624k (US\$55k to US\$96k), with its average EV at approximately Rmb430k (US\$66k). NIO's price positioning is significantly higher than those of domestic fuel car and EV brands, and higher than even the fuel models of some foreign brands like BMW and Audi.

NIO, No.1 in premium battery electric SUV market in China. NIO's premium eSUVs make it the most recognised EV brand among consumers in China, commanding over 67% share of China's premium e SUV market (*China premium segment: vehicles priced over Rmb300k*), in terms of sales volume in 2021, according to Frost & Sullivan's (industry research and consulting firm).

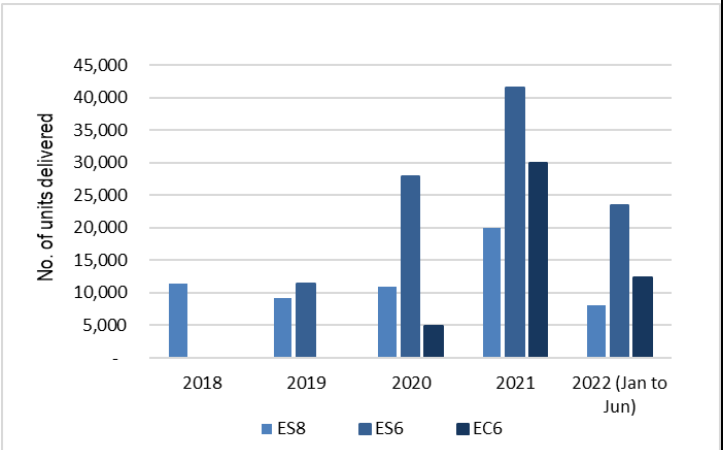
According to Frost & Sullivan, the NIO ES6, EC6 and ES8 were the top two and No. 4 premium electric SUV in China, in terms of sales volume, in 2021 (Fig 3 and 3).

Figure 2: The best-selling China's premium eSUV cumulative sales volume in 2021



SOURCES: CGS-CIMB RESEARCH, FROST & SULLIVAN

Figure 3: NIO's eSUV (ES8, ES6 and EC6) delivered (2018 to 2022 Jan to Jun)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

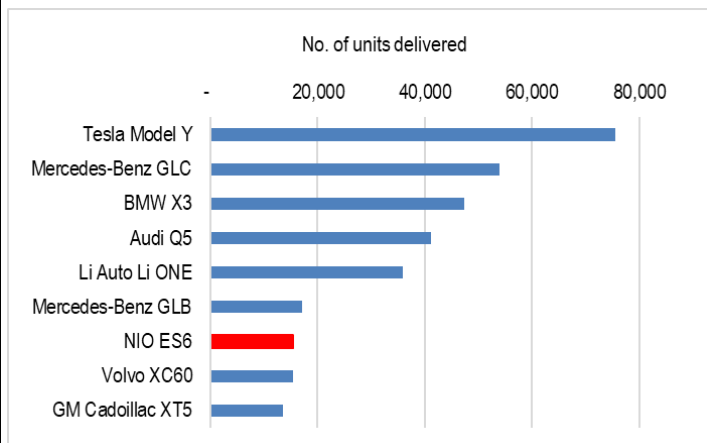
NIO set to gain larger share of China's premium SUV and sedan market. We believe NIO has built a strong brand name in China's premium automobile segment due to its industry-leading battery services model, advanced autonomous driving technology, and innovative cockpit system. We believe NIO will remain competitive and continue to capture more of the fast-growing China EV market, especially in the premium EV segment, underpinned by the roll out of innovative and high-performance new EV models, improving battery swapping stations coverage, and enhanced autonomous driving technologies.

NIO's ES6 eSUV ranked No.7 premium SUV in China in Jan-Apr 2022. According to China Passenger Car Association (CPCA), NIO ES6 (mid-size SUV, selling price at Rmb358k/US\$55k) was ranked No.7 premium SUV in China, in term of volume, in Jan-Apr 2022 (Fig 4).

ES6 was the most successful eSUV model in China and achieve cumulative deliveries of 104,386 units since its launch in Jun 2019, thanks to its high performance and relatively cheaper price than NIO's flagship ES8 (mid-large SUV, selling price at Rmb468k/US\$72k) first launched in Jun 2018 (delivered 59,413 units) (Fig 5).

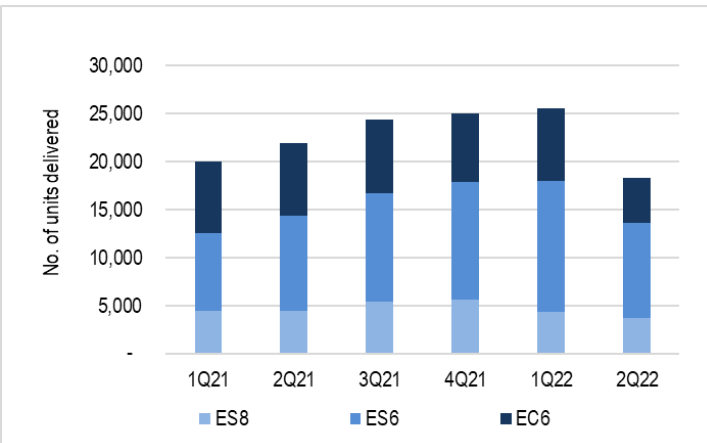
NIO also launched its third mid-sized coupe EC6 SUV (selling price Rmb368k/US\$57k) in Sep 2020 and achieved cumulative deliveries of 47,186 over 22 months. NIO is schedule to deliver its fourth eSUV model ES7 (mid-large SUV, selling price Rmb468k/US\$72k) in Aug 2022. With a 930km range, the ES7 eSUV has vehicle-to-load (V2L) capabilities and is equipped with the latest NIO Autonomous Driving (NAD), and also AR/VR compatible cockpit.

Figure 4: The best-selling premium SUVs in China (above Rmb300k/US\$46k) in China (Jan to Apr 2022)



SOURCES: CGS-CIMB RESEARCH, China Passenger Car Association

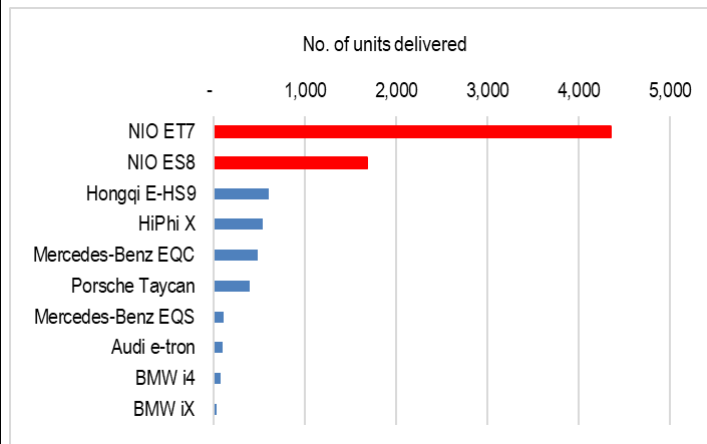
Figure 5: NIO's eSUV (ES8, ES6 and EC6) delivered (1Q21 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

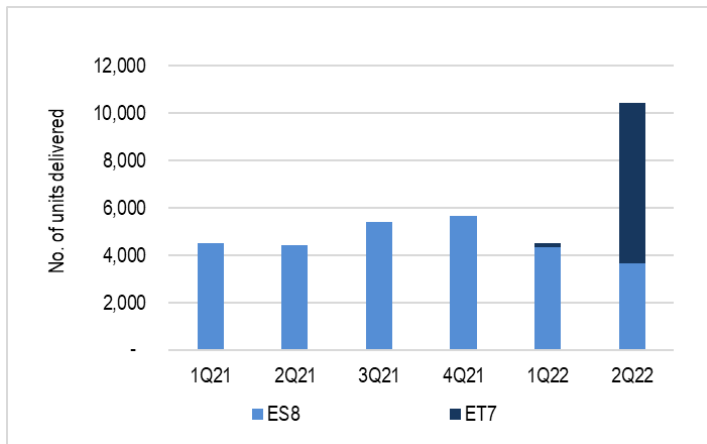
NIO is the clear market leader in China's premium EV segment at the price above Rmb400k (US\$62k). We believe that NIO has built strong brand recognition in China's premium EV segment. According to CPCA, NIO ET7 (selling price at Rmb448k/US\$69k) and ES8 (selling price at Rmb468k/US\$72k) ranked No.1 and No.2 in premium EV above Rmb400k segment, in terms of volume, in China in Jun 2022. The Jun sale figures reflect the outstanding performance of NIO premium's EV models, with a combined sales of 6,033 units in ET7 and ES8. This is substantially higher than Hongqi E-HS9's 601 units (selling price at Rmb510k/US\$78k) at third place and Mercedes-Benz EQC's 481 units (selling price at Rmb492k/US\$76k) at fifth place (Fig 6 & 7).

Figure 6: The best-selling premium EV (above Rmb400k/US\$62k) in China (Jun 2022)



SOURCES: CGS-CIMB RESEARCH, China Passenger Car Association

Figure 7: NIO's ES8 and ET7 delivered (1Q21 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

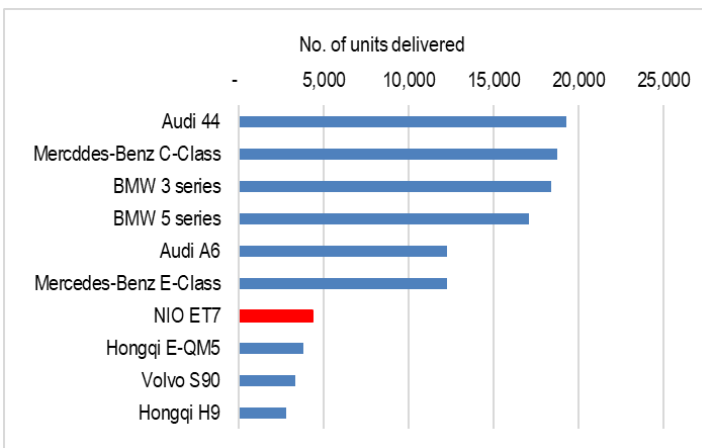
NIO's ET7 EV ranked No.7 premium sedan in China after just four months.

Although NIO only delivered its first sedan EV ET7 (mid-large sedan, selling price at Rmb448k) in Mar 2022, cumulative deliveries had reached 6,912 units in Mar-Jun 2022, ranking it No. 7 in the top 10 premium sedan (selling price above Rmb300k/US\$46k) sales in China in Jun (source: CPCA). We believe this is a new milestone for NIO as the sedan EV market is a new one for the company, which has traditionally done well in the eSUV market, helped by best-selling models such as ES8, ES6 and EC6 (Fig 8).

NIO's ET7 was behind only the fuel-powered models from German luxury brands, including Audi, Mercedes-Benz and BMW, which have been the dominant players in China's luxury segment for many years. More importantly, NIO's ET7 appears to be the only EV model in the best-selling premium sedan segment able to compete with foreign luxury brands' and domestic brands' fuel-powered models.

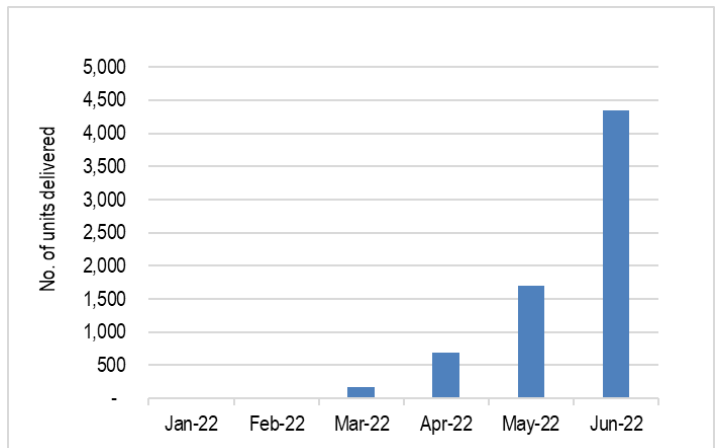
We believe the ET7 and the upcoming ET5 (mid-size sedan, selling price at Rmb328k/US\$51k) will help NIO enter China's premium sedan market and become the company's new growth drivers for EV sales in FY23-24F.

Figure 8: The best-selling premium sedan (Rmb300k/US\$46k) in China (Jun 2022)



SOURCES: CGS-CIMB RESEARCH, China Passenger Car Association (CPCA)

Figure 9: NIO ET7 delivered Mar 2022 to Jun 2022



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO's EV deliveries forecasts ▶

NIO delivered c.218k EVs since Jun 2018. NIO offers four high-performance smart electric vehicles: 1) the flagship ES8 eSUV which was launched in Dec 2017 (delivered in Jun 2018), 2) the ES6 (mid-large eSUV, delivered in Jun 2019), 3) the EC6 (mid-size coupe eSUV, delivered in Sep 2020), and 4) the first smart flagship sedan EV ET7 with autonomous driving capabilities in Mar 2022.

Cumulative deliveries of NIO's EVs reached 217,897 units (Jun 2018 to Jun 2022) while delivery of EVs increased by 21% yoy to 50,827 units in 1H22, despite serious production disruptions in Mar to May 2022 during the Covid-19 pandemic in China (Fig 10).

Figure 10: Delivered NIO's EVs (Jun 2018 to Jun 2022)

Model	Type	Delivered day	2018	2019	2020	2021	2022 (1-6)
ES8	Mid-large SUV (7 seat)	Jun 2018	11,348	9,132	10,861	20,050	8,022
ES6	Mid-large SUV (5 seat)	Jun 2019	n.a.	11,433	27,945	41,474	23,534
EC6	Mid-size coupe SUV (5 seat)	Sep 2020	n.a.	n.a.	4,922	29,905	12,359
ET7	Mid-size sedan (5 seat)	Mar 2022	n.a.	n.a.	n.a.	n.a.	6,912
ES7	Mid-large SUV (5 seat)	Aug 2022	n.a.	n.a.	n.a.	n.a.	n.a.
Total no. of EV deliveries (units)			11,348	20,565	43,728	91,429	50,827
Total no. of EV sales (yoy change %)				81%	113%	109%	21%

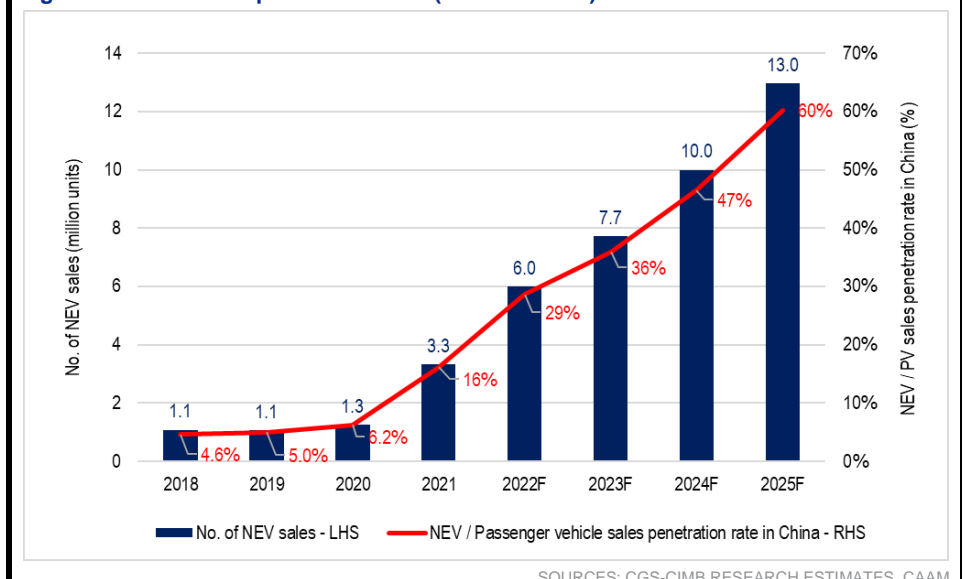
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

China premium EV segment to be the fastest growth segment. According to Frost & Sullivan, the premium EV segment in China will be the fastest growing segment at a CAGR of c.12% from 2020 to 2025F in China's vehicle industry.

We believe that NIO should be the key beneficiary of the rapidly-growing China's premium EV market due to its leading market position in premium eSUV segment, thanks to NIO's unique battery swapping technology and BaaS models.

NEV penetration rate in China to reach 60% in 2025F. According to China Association of Automobile manufacturers (CAAM), China NEV penetration rate (NEV/total passenger car sales in China) reached 16%, with 3.3m units, in 2021. We estimate China's NEV penetration rate to increase from c.16% in 2021 to 60% in 2025F or from 3.3m units in 2021 to c.13m units in 2025F. This should be driven by favourable government policies and a significant electrification trend within the automobile industry as well as the rising popularity of smart EVs.

Figure 11: China NEV penetration rate (2018 to 2025F)



NIO's EV deliveries to climb 70% yoy to 155.8k units in FY22F. We project NIO's EVs deliveries to rise 70% yoy to 155.8k units in FY22F, driven by 1) recovery of EV sales in China in 2H22F (EVs sales were only 21% yoy in 1H22 due to Covid-19 pandemic in China and lack of new model launches), 2) increased contribution from the three new model launches, and 3) consumers purchasing EV earlier as the subsidies will cease at end-2022.

NIO just delivered its first sedan ET7 EV in Mar 2022 (accumulative sales 6.9k units for four months).

NIO is scheduled to deliver ES7 eSUV in Aug 2022 and its second EV ET5 in Sep 2022 (Fig 12 to 13)

Figure 12: ET7 (mid-large size 5-seater sedan EV) delivered in Mar 2022



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 13: ES7 (mid-to-large 5-seater electric SUV) is scheduled for delivery in Aug 2022



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 14: ET5 (mid-size sedan 5-seater sedan EV) is scheduled for delivery in Sep 2022

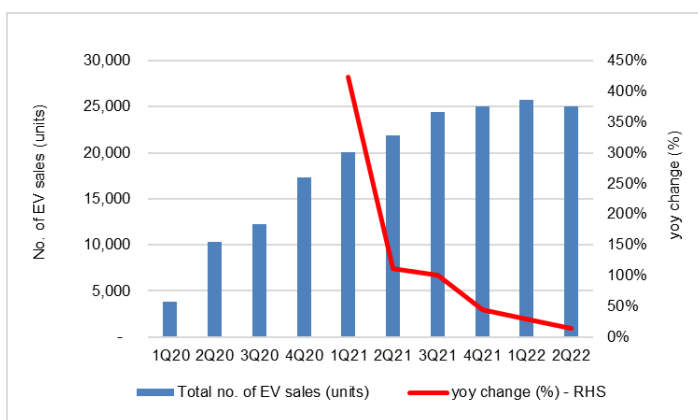


SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO's EV deliveries to jump 85% yoy to 288k units in FY23F and rise 27% yoy to 365k units in FY24F. NIO's second production site in NeoPark will commence production in 3Q22F to cater to the fast-growing China's EV market. On the other hands, NIO launched its official websites for Germany, the Netherlands, Sweden and Denmark in Jul 2022 in preparation for entering the EU market.

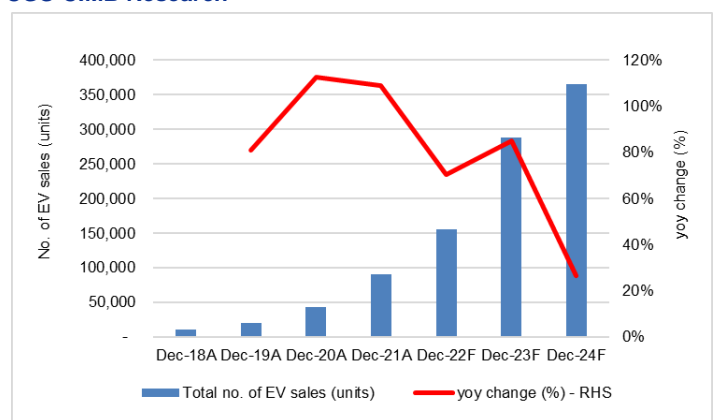
We expect NIO's robust EV deliveries to be sustained in FY23F-24F, thanks to tremendous demand for smart EVs in China and strong new model launches in the pipeline. We estimate NIO's EV deliveries to jump 85% yoy to 288.3k units in FY23F and reach 365.3k units (+27% yoy) in FY24F, driven by 1) sustained market share gains in China eSUV segment, 2) increasing sedan EV sales, and 3) the EU market contribution (Fig 15 & 16).

Figure 15: NIO's EV deliveries, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 16: NIO's EV deliveries (FY18 to FY24F), estimate by CGS-CIMB Research



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

NIO leads in battery services technologies >

A wide range of battery choices. NIO sources battery for its EV from Contemporary Amperex Technology (CATL, 300750 CH, Not Rated). NIO currently offers two battery options to its customers: Standard Range Battery and Long Range Battery. The Standard Range Battery is a 75 kWh cell-to-pack battery with hybrid LFP/NCM cells, while the Long Range Battery is a 100kWh cell-to-pack battery. In Jan 2021, NIO announced a 150 kWh Ultra-Long Range Battery with next generation battery technology, and plans to start delivering the Ultra-Long Range Battery in 4Q22.

Leader in battery services technologies in China EV segment. We believe NIO's battery-swapping technologies and battery-as-a-service (BaaS) model are unique and set it apart from other EV makers. A case in point is its flexible battery upgrade plan offered to all owners. We believe NIO's innovative battery services technologies help it to maintain a leadership position in China's premium EV segment.

Battery swapping

All NIO EVs are equipped with battery swapping technology. NIO introduced battery swapping services for its smart electric SUVs with the launch of the ES8 in 2017.

Nowadays, all NIO EVs are equipped with its proprietary battery swapping technologies (NIO holds over 1,200 patented technologies for battery swapping), providing users a convenient and excellent recharging experience – they can simply swap their EV's battery for another fully-charged battery within minutes. Upgrade options also allow users to benefit when battery technology advances.

Upgrade to NIO Power Swap station 2.0 in Apr 2021. In Apr 2021, NIO began rolling out its second-generation battery swapping stations, dubbed NIO Power Swap stations 2.0, in partnership with Sinopec. NIO Power Swap stations 2.0 significantly increased NIO's battery-service capacity by reducing the time needed to swap the battery of NIO vehicles to under three minutes. Each station has 14 battery slots, and the capacity to handle 312 swaps per day. Moreover, upon arrival at a new-generation Power Swap station, NIO's EVs are programmed to automatically park and replace a new battery without the driver having to leave their vehicle ([the video shows the battery swapping in NIO Power station 2.0](#)).

On 6 Jul 2022, the second annual NIO Power Day, the company announced that it is developing the third-generation battery swap station which will have larger capacity and a more flexible layout. More details will be revealed by end-2022 and the company expects to be rolled out in 2H23F.

The favourite power solution provider for NIO users. As at end-Jun 2022, NIO operated over 1,000 Power Swap stations (256 battery swap stations along highways in China), c.9,600 Power Chargers, and c.1,681 Destination Chargers; NIO users can also charge their EV battery through over 520,000 third-party charging piles in urban areas and expressways across 183 cities in China. Besides, NIO's battery swap stations store c.9,000 batteries, including c.3,800 long range batteries and c.5,200 standard-range batteries (Fig 17). NIO announced that it will have more than 4,000 battery swap stations worldwide by 2025F, 1,000 of which will be located overseas.

According to NIO, around 62% of NIO users live within 3km from the nearest NIO battery swapping station in Jun 2022. On average, each NIO battery swap station can serve over 250 vehicles a day. To date, NIO has made over 5m battery swaps for its users in China and this method is one of NIO users' favourite power solutions. We believe NIO will further expand its network of battery swap stations given its rapidly-growing user base. NIO targets NIO users to have at least one battery swap station within 3km of their homes by 2025F.

Introduced battery swapping in Norway in Jan 2022. Outside of China, NIO started offering its battery swapping services in Norway in Jan 2022 (NIO has been delivering EVs and providing services in Norway since 2021). According to

NIO’s website, the company intends to build 20 Power Swap stations in Norway by the end of 2022.

Figure 17: NIO has installed over 1,000 battery swap stations in China (as at end Jun-2022)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 18: NIO Power Swap station in a Sinopec petrol station

Figure 19: NIO Power Swap station



SOURCES: CGS-CIMB RESEARCH, NIO INC

SOURCES: CGS-CIMB RESEARCH, NIO INC

Battery as a service (BaaS)

Launched battery-as-a-service (BaaS) model in 2020. We believe NIO set itself apart from other Chinese EV makers when it launched the industry-first battery-as-a-service (BaaS) solution in 2020, which allowed customers to purchase a NIO EV without a battery pack and lease one from the company. By decoupling the battery price from the purchase price of a NIO EV and allowing users to subscribe for the usage of batteries, customers were able to enjoy lower upfront vehicle purchase costs and flexible upgrade options for batteries of various capacities on a monthly or yearly basis.

Rmb70k cheaper without battery pack. The listing price of a ES6 sports utility vehicle, one of the cheaper EV models in NIO’s portfolio, without a battery pack starts at Rmb274k (US\$42k); owners have to pay a monthly lease of Rmb980 (US\$148) for the battery. However, if you buy a battery pack for the ES6, the price

rises to Rmb344k (US\$53k), Rmb70k (US\$10.8k) higher. NIO also offers the Long Range Battery with battery upgrade plans. If users opt to purchase an ES8, ES6, EC6, ET7 or ET5 and subscribe for the Long Range Battery under the BaaS, they can purchase the vehicle without the battery while paying a monthly subscription fee of RMB1,480 (US\$228). For the ES8, ES6 and EC6 ordered between 16 Jan 2019 and 19 Aug 2020, NIO EVs customers enjoy Rmb100k deduction from the purchase price without battery pack. They can also adopt the BaaS arrangement to pay Rmb1,660 per month over a period of 60 months.

Given the flexibility offered by the battery upgrade option, over 50% of NIO's EVs delivered in FY21 opted for BaaS subscription. We are positive on NIO's BaaS business model as it helps to lower the upfront price for its EVs and significantly narrows the price gap between NIO and Xpeng and Li Auto.

NIO sells batteries to 19.8%-owned Battery Asset Company. Under the BaaS business model, NIO directly sells batteries on a back-to-back basis upon the sale of EVs to Battery Asset Company (NIO holds 19.8%) while the user subscribes for the usage of the battery from and pays a monthly subscription fee to the Battery Asset Company.

In-house electric powertrain capabilities >

In-house electric powertrain capabilities. NIO owns design and manufacture electric powertrain capabilities. NIO manufactures its own-used electric powertrain in its own facilities in Advanced Manufacturing Technology and Engineering Centre (AMTEC), in Nanjing, Jiangsu province, China.

All of NIO's EVs adopt the in-house developed electric powertrain. Supported by continuous R&D capabilities, NIO offers a variety of electric motors, including 240kW induction motor, 160kW permanent magnet motor, 180kW permanent magnet motor, 300kW induction motor, 150 kW induction motor and 210 kW permanent magnet motor. Currently, all of NIO's EVs adopt the in-house developed electric powertrain.

Supported by its strong in-house R&D capabilities, NIO can continue to improve and update, and adjust according to its users' driving behaviour. NIO's new generation electric powertrain will feature Silicon Carbide power modules which can minimise the switching loss compared with insulated gate bipolar transistor. It can improve supply efficiency with simpler cooling measures and reduce the size of peripheral components due to higher frequency operations.

NIO Autonomous Driving (NAD) - self-developed enhanced ADAS >

NIO Autonomous Driving (NAD), the core technology for NIO's smart EVs. NIO is one of the first EV makers in China that offers enhanced advanced driver assistance system (ADAS) capabilities in its electric vehicles. NIO Pilot, NIO's proprietary enhanced ADAS, is equipped with Navigate on Pilot (NOP), which can guide a vehicle on and off ramps, overtake other vehicles, merge lanes and cruise according to planned routes on highways and urban expressways.

In Jan 2021, NIO launched NIO Autonomous Driving (NAD), a full-stack solution equipped with perception algorithms, localisation, control strategy, and platform software developed in-house (Fig 20). According to the company, NIO will gradually cover use cases from expressways, urban roads, parking, and battery swaps to provide a safer and more relaxing autonomous driving experience from point A to point B for its users. The ET7, which began deliveries to consumers in Mar 2022, is the first NIO EV to be equipped with NAD.

Going forward, NIO also plans to roll out NAD through a monthly subscription under an autonomous-driving-as-a-service, or ADaaS, solution.

Figure 20: NIO Autonomous Driving (NAD) key parameters

Aquila Super Sensing	Adam Super Computing	AD Algorithm	Vehicle Platform for AD
33 High-Performance Sensing Units 8 MP High-Resolution Cameras Ultralong-Range High-Resolution LiDAR 360° Vision Redundancy All-Direction Fusion	4 x NVIDIA DRIVE Orin 1,016 TOPS Super ISP Pipeline Ultrahigh-Bandwidth Backbone Network Hot Standby Redundancy	Multi-Solution Perception Fusion Multi-Source Integrated Localisation Multi-Modal Prediction and Planning Crowd AI Personalisation	NIO Vehicle Operating System Power Supply and Communication Redundancy Steering Redundancy, Parking Brake Redundancy, Dual Motors

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO's other smart elements: OTA and HMI >

NIO's Over-The-Air (OTA) upgrades. NIO is the first auto company in China that offers both firmware OTA (FOTA) and software OTA (SOTA) to its users. Its FOTA updates enable users to upgrade the operating firmware down to the individual programmable Electronic Control Unit (ECU) level across the vehicle's core systems, such as digital cockpit, autonomous driving domain controller and electric powertrain, while SOTA improves the flexibility of NIO's digital cockpit as it allows continued updates with new features and applications to NIO's operating system, or NIO OS.

NIO's Human Machine Interaction (HMI). The HMI of NIO is an Artificial Intelligent (AI) driven, scalable and flexible architecture, which is known as NOMI. It can listen to, communicate and interact with users to build a strong connection between vehicles and users. Currently, NIO plans to deliver PanoCinema, a panoramic digital cockpit with AR and VR capabilities, to its users. NIO users can also update its digital system through SOFA to optimise their experience with new features and applications.

NIO's direct sales model and NIO community >

NIO's direct sales model. We believe that NIO's direct sales business model should help to reduce its selling costs, compared to traditional dealership models. Traditional dealerships have higher commission ratio and lack economies of scale. NIO provides a worry-free and holistic user experience and adopts a direct sales model via online and offline channels, most notably, its NIO app. The in-house developed app is not only designed for vehicle control, service access and NIO Life product purchases, one can also purchase a new NIO and sell used ones on it, place orders and configure vehicles.

NIO's EVs are generally made to order. NIO sells EVs directly to users primarily through NIO's mobile apps (NIO Houses and NIO Spaces), rather than through dealerships. NIO Houses have showroom functions while serving as clubhouses for users and their friends while NIO Spaces are mainly showrooms for the brand, vehicles and services. As at end-FY21, NIO operated 37 NIO Houses and 321 NIO Spaces across 143 cities in China.

NIO community. Via the app and its other customer touchpoints, including NIO House, NIO Space, NIO Radio and NIO Life, NIO has created a community that begins from but goes beyond the car.

The NIO community allows users to be involved in planning and participating in company- and user-organised events, including the annual NIO Day. Thanks to strong user engagement efforts, the user referral rate was over 60% in FY21, according to the company.

Customer-oriented services ➤

NIO's other customer-oriented services include NIO Power, NIO Services and NIO Certified.

NIO Power. NIO Power is an internet-based service featuring an extensive network of chargeable, swappable and upgradable batteries to provide NIO users with power solutions across all scenarios, at home or on the road.

NIO Services. As at end-2021, NIO operated 54 NIO service centres and had a network of 181 authorised third-party service centres in 139 cities across China. Via the NIO app, users can access a full suite of services, including applying for vehicle insurance through third-party providers, make appointments for repair and routine maintenance services, request for a courtesy vehicle, access nationwide roadside assistance, as well as purchase enhanced data packages for in-car internet access.

NIO Certified (used vehicle service). In Jan 2021, NIO launched a used car service called NIO Certified to provide high-quality services related to the buying and selling of pre-owned NIO vehicles, including vehicle inspection, evaluation, acquisition and sales. Customers interested in purchasing pre-owned NIO EVs can find product information and place orders on the NIO app. NIO Certified is available in major China cities.

SWOT analysis ➤

Figure 21: SWOT analysis

Strengths	Opportunities
NIO is the industry leader in battery-services due to its unique battery swapping technologies and battery-as-a-services model.	NIO should benefit from rising EV penetration rate in China and gain market share as it continually rolls out new models.
NIO was top in China premium electric SUV segment in terms of volume, in 2021, thanks to advanced Autonomous Driving technology and industry-leading battery-services technology.	NIO has expanded its product range from SUV-type EVs to sedan-type EVs. In Jan 2021, NIO launched ET7, a flagship premium smart electric sedan. The company also launched ET5, a mid-size premium smart electric sedan, in Dec 2021.
NIO has successfully launched new models, including ET7, ES7 and ET5, in FY22F to capture the fast-growing China EV market.	NIO will continue to expand its international market to capture the rising global EV demand. It launched its official websites for Germany, the Netherlands, Sweden and Denmark in Jul 2022.
Weaknesses	Threats
NIO does not have vehicle manufacture facilities and relies on third-party manufacturing capabilities. NIO manufactures its EVs through a strategic alliance with Jianghuai Automobile Group (JAC) Motors in Hefei, Anhui province, China.	NIO faces increasing competition in China EV market from new players including domestic traditional fuel automakers and EV makers as well as foreign automakers.
NIO sources the majority of its manufacturing materials such as battery packs, ADAS components, cockpit components and various semiconductor chips from different suppliers. Hence, NIO faces difficulty in controlling manufacturing costs.	If China government changes subsidies, economic incentives and other supportive policies for NEVs industry, it could adversely affect NIO's EV sales.

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO's ESG needs put more efforts >

ESG in a nutshell		Refinitiv ESG Scores					
ESG		D+	A+	D+	D+	C-	D
		ESG Score	ESG Controversies Score	ESG Combined Score	ESG Environment Pillar Score	ESG Social Pillar Score	ESG Governance Pillar Score
<p>NIO has yet to release an ESG report. Nevertheless, based on data from Refinitiv, we believe NIO has room for improvement in its ESG performance, particularly for its governance pillar, given that its three best-performing metrics are in the environmental and social categories.</p> <p>In our view, NIO is not involved in any environmentally-detrimental industry practices and takes the effort to minimise the environmental impact of its operations.</p>							
Keep your eye on	Implications						
NIO has yet to release an ESG report.	<p>Although the company has not released an official ESG report, we can examine its performance through third-party ratings.</p> <p>Refinitiv ranked NIO's governance pillar 175th of 225 companies in the global automobile & auto parts sector. Also, within the environmental category, environmental innovation is one of the company's best-performing metrics. We see an improvement in the coming years given NIO's ESG initiatives.</p>						
ESG highlights	Implications						
NIO has yet to release an ESG report.	<p>Refinitiv ranked NIO's social pillar 172nd of 225 companies in the global automobile & auto parts sector. Also, within the social category, product responsibility and community were the two best-performing metrics. We see an improvement in the coming years given NIO's ESG initiatives.</p>						
Trends	Implications						
NIO has yet to release an ESG report.	<p>Refinitiv ranked NIO's governance pillar 218th of 225 companies in the global automobile & auto parts sector. We see an improvement in the coming years given NIO's ESG initiatives.</p>						

SOURCES: CGS-CIMB RESEARCH, REFINITIV

Financials

NIO set to turn profitable in FY24F ▶

Revenue reached Rmb36.1bn in FY21. NIO started generating revenue in Jun 2018 when it delivered its first eSUV ES8 to a customer in China. Its revenue has since grown rapidly, from Rmb4.95bn in FY18 to Rmb16.3bn in FY20, driven by the rising number of EV deliveries (it cumulatively delivered 75.6k units of EV in FY18-20, that include models ES8, ES6 and EC6).

On the other hand, other sales, which include sales of packages, automotive regulatory credits, charging piles as well as battery upgrade services, increased from Rmb99m in FY18 to Rmb2.97bn in FY21, amid the gradual growth in NIO users. In FY21, other sales accounted for 8.2% of its FY21 revenue.

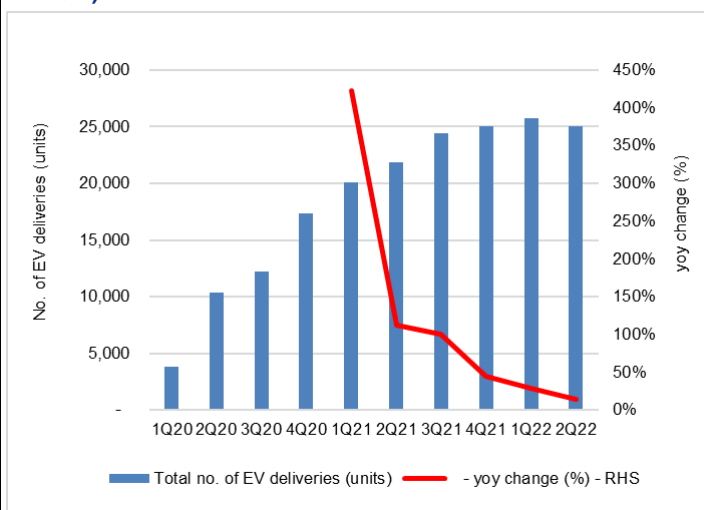
FY21 profitability improved. FY21 revenue increased 122% yoy to Rmb36.1bn, driven by 91.4k EVs deliveries, thanks to strong sales of the new model EC6 (delivered since Sep 2020). Its operating loss, meanwhile, narrowed from Rmb5.0bn in FY20 to Rmb4.31bn in FY21 despite SG&A expenses rising by 75% yoy. Net profit (non-GAAP) fell to Rmb3.65bn in FY21, from Rmb5.11bn in FY20.

Robust EV deliveries in FY19-21. From only 11.3k units of EV delivered in FY18, the numbers increased to 20.6k units in FY19, and 91.4k units in FY21. Meanwhile, ASP decreased from Rmb428k/per EV in FY18 to Rmb363k/per EV in FY21 due to a change in product mix (Fig 22 & 23).

EV deliveries to accelerate in 2H22F. NIO's EV deliveries growth slowed to 21% yoy to 50.8k units in 1H22 due to production halts on the back of logistic disruptions and serious component shortages during the Covid-19 pandemic. Yet, we believe that NIO's EV deliveries should accelerate in 2H22F with 1) the delivery of the ES7 eSUV and ET5 EV, 2) sustained increase in smart EV penetration in China's NEV market, and 3) supportive government policies (exemption from electric vehicle purchase tax and consumers buying EVs earlier as the subsidies (Rmb12,600 for 400km or above range) should cease at the end-2022). We estimate 2H22F EV deliveries to jump 112% yoy to exceed 105k units.

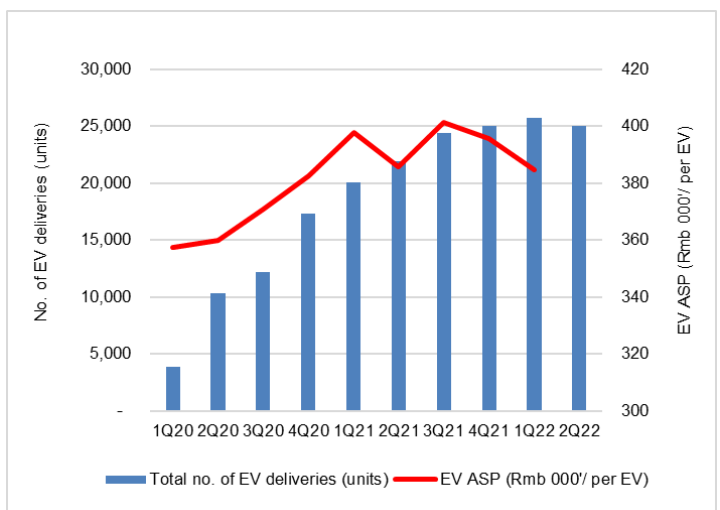
We forecast FY22F revenue to increase 68% yoy to Rmb60.9bn, supported by 155.8k EV sales and stable increase in other revenue (Fig 24).

Figure 22: NIO's EV deliveries and yoy change, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 23: NIO's EV deliveries vs ASP, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

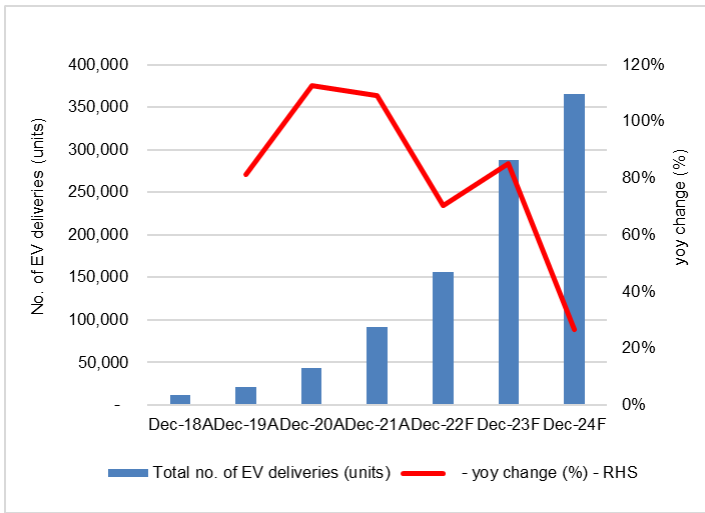
Strong revenue growth in FY21-24F on robust EV sales. We estimate NIO achieving 59% revenue CAGR in FY21-24F, underpinned by robust EV deliveries (rising from 91.k units in FY21 to 365.3k units in FY24F, a CAGR of 59%).

Turning profitable in FY24F. We expect NIO to report a profit of Rmb2.84bn (net profit non-GAAP) in FY24F, driven by robust EV deliveries (365k units in FY24F),

rising contributions from other sales and significant operating leveraging (GPM set to expand from 18.9% in FY21 to 20.6% in FY24F, SG&A to sales ratio forecast to decrease from 31.3% in FY21 to 18.5% in FY24F).

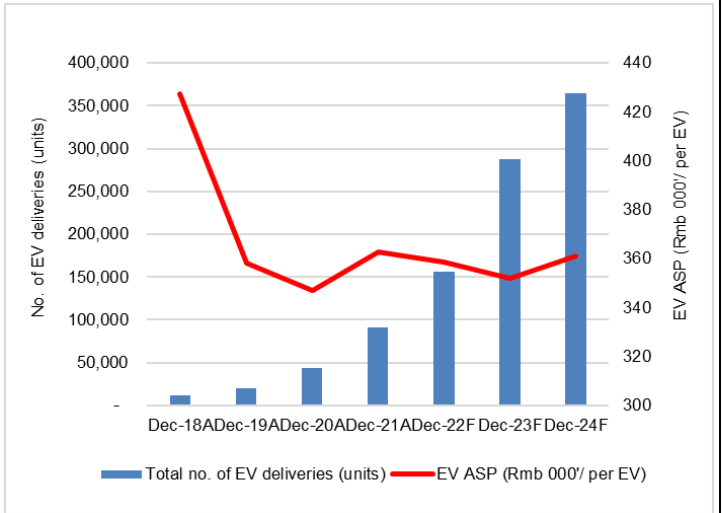
We expect net profit margin (non-GAAP) to improve from -10.1% in FY21 to +1.9% in FY24F (Fig 26 & 27).

Figure 24: NIO's EV deliveries and yoy change (FY18 to FY24F)



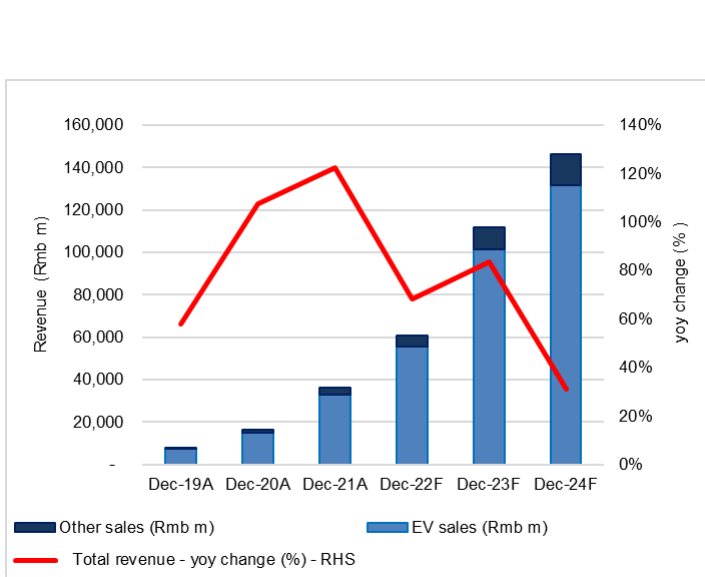
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 25: NIO's EV deliveries and ASP (FY18 to FY24F)



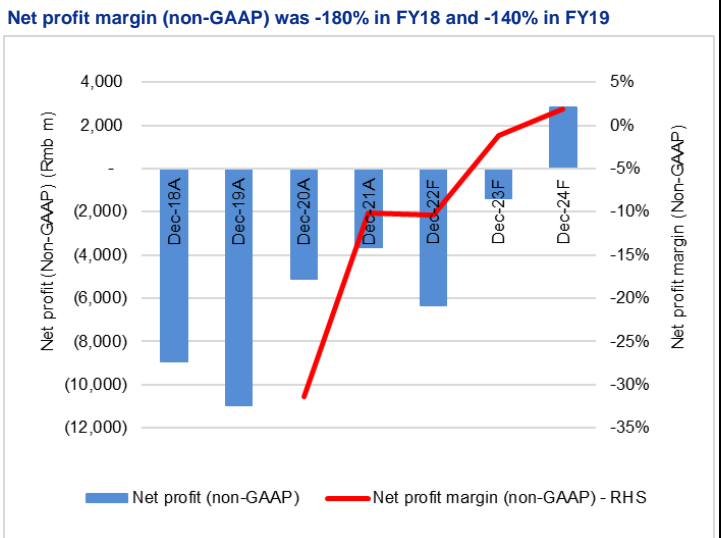
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 26: NIO's revenue and yoy change (FY18 to FY24F)



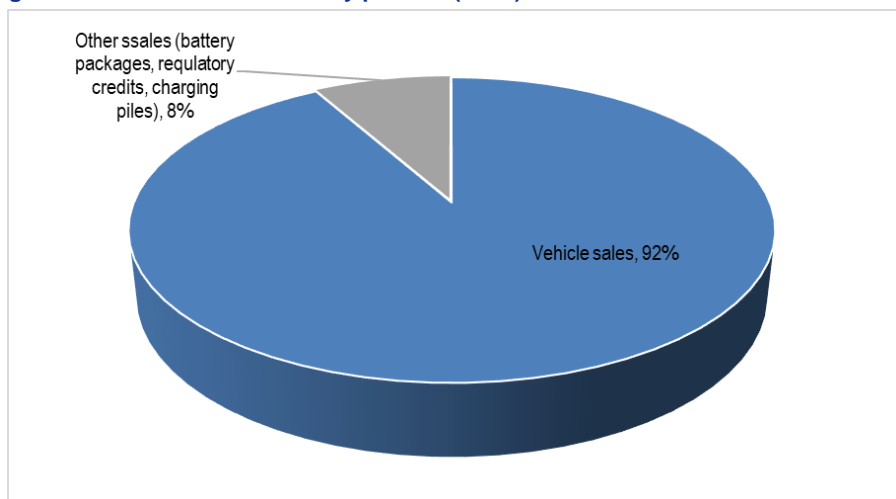
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 27: NIO's net profit (non-GAAP) and net profit margin (non-GAAP) (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 28: Revenue breakdown by product (FY21)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Profit margin trend >

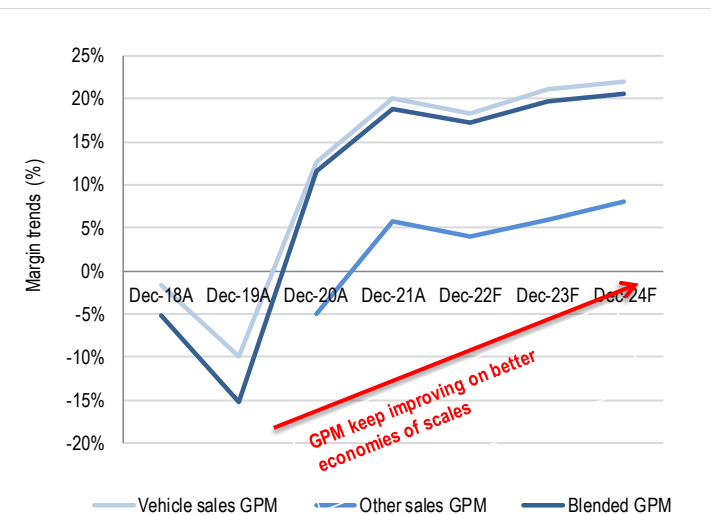
FY21 GPM stood at 18.9%. FY21 gross profit jumped 264% yoy to Rmb6.8bn amid an increase in vehicle delivery volume and improved vehicle margin. Gross profit margin (GPM) significantly expanded from 11.5% in FY20 to 18.9% in FY21, driven by better economies of scales and increase in vehicle ASPs, as well as improvement in the GPM for “others” (from -5.0% in FY20 to +5.7% in FY21).

Vehicle margin improved steadily from FY18 to FY21. NIO’s vehicle margin (GPM for EVs) has been improving since FY18, from -1.6% in FY18 to 20.1% in FY21, driven by significant improvement in its operating leveraging. On the other hand, the GPM for “others” also improved from -181% in FY18 to 5.7% in FY21, thanks to the increase in packages sales, automotive regulatory credits and wider adoption of battery upgrade services.

Vehicle margin to reach 22% in FY24F. We estimate NIO’s vehicle margin will increase from 20.1% in FY21 to 22.0% in FY24F, driven by decreasing battery costs and stable ASPs. We expect blended GPM to increase from 18.9% in FY21 to 20.6% in FY24F due to slight GPM improvement in other sales (Fig 29 & 30).

Figure 29: Gross profit margin (GPM), breakdown by product (FY18 - FY24F)

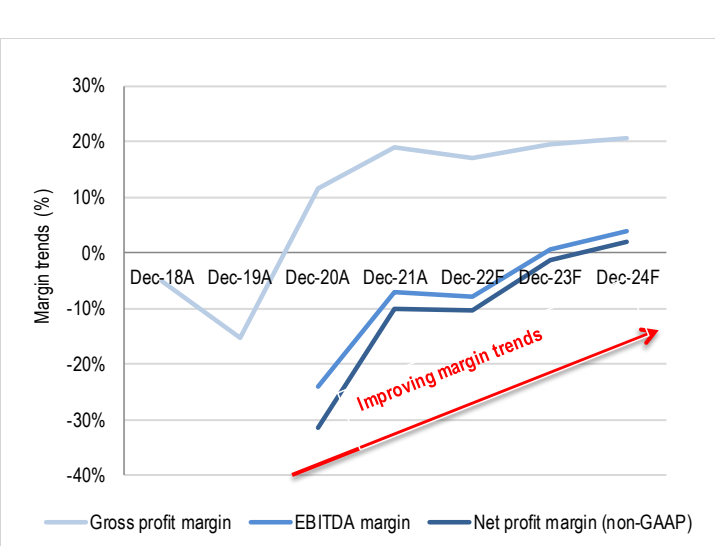
Other sales GPM was -181% in FY18 and -103% in FY19



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 30: Margin trends (FY18 - FY24F)

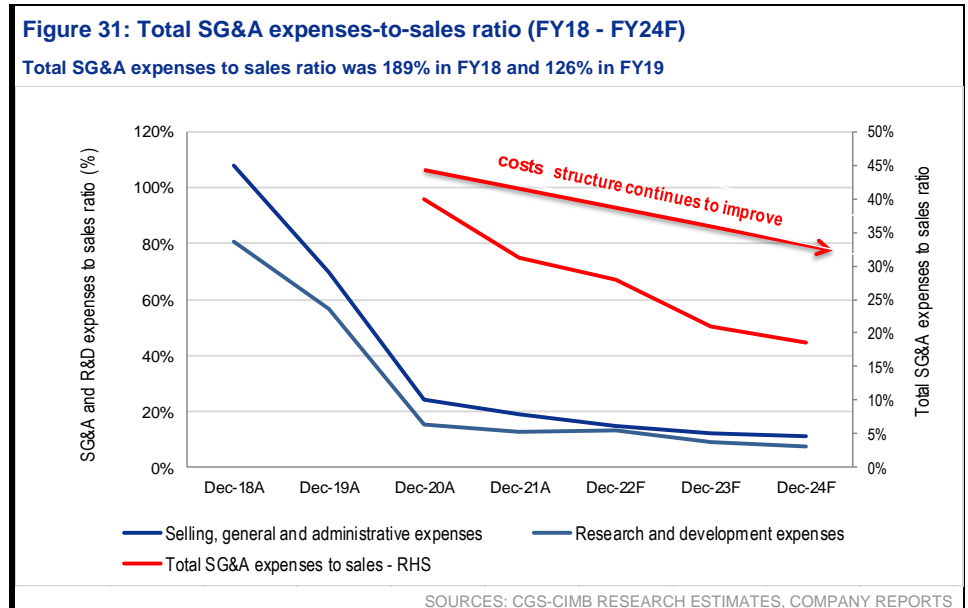
EBITDA margin was -180% in FY18 and -140% in FY19



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Total SG&A expenses-to-sales ratio on a decreasing trend due to better economies of scales. NIO's total SG&A expenses consist mainly of selling, general and administrative expenses and R&D expenses. We believe NIO's total SG&A expenses will continue to improve from c.31% in FY21 to 19% in FY24F due to better economies of scales.

NIO spent approximately Rmb4.0bn p.a. on R&D in FY18 to FY21, except in FY20 where it spent only Rmb2.5bn due to the impact from the Covid-19 pandemic in China. Its R&D expenses-to-sales ratio decreased from c.81% in FY18 to 12.7% in FY21. We expect this ratio to further decrease to 7.5% in FY24F, with R&D expenses of Rmb11.0bn (Fig 31).



Balance sheet and cash flow >

Net cash of Rmb38.3bn as at 31 Dec 2021. As at 31 Dec 2021, NIO had total borrowing of Rmb17.0bn and cash of Rmb55.4bn, translating to net cash of Rm38.3bn. Its long-term borrowings consist of 1) 4.50% convertible senior notes due 2024 (US\$0.58m); 2) convertible senior notes due 2022 (US\$0.20m) issued in Sep 2019 to an affiliate of Tencent Holdings; 3) 0.00% convertible senior notes due 2026 (US\$750m) and 0.50% convertible senior notes due 2027 (US\$750m); and 4) long-term bank borrowings (Rmb5.23bn). NIO also had Rmb7.3bn short-term borrowings.

NIO offers auto financing arrangement to NIO's EV users. As at end-FY21, its total amount of auto financing receivables was Rmb3.97bn.

Net cash balanced to reach Rmb44.2bn in FY24. We estimate NIO will maintain a strong cash position in FY22-24F due to its asset light business model. We expect it to maintain its annual capex at approximately Rmb3.7bn-4.0bn in FY22-24F, mainly to expand its battery-services facilities. We project its cash will continue to grow as it will achieve positive free cash flow in FY23F and FY24F and increase its net cash to Rmb44.2bn in FY24F (Fig 32).

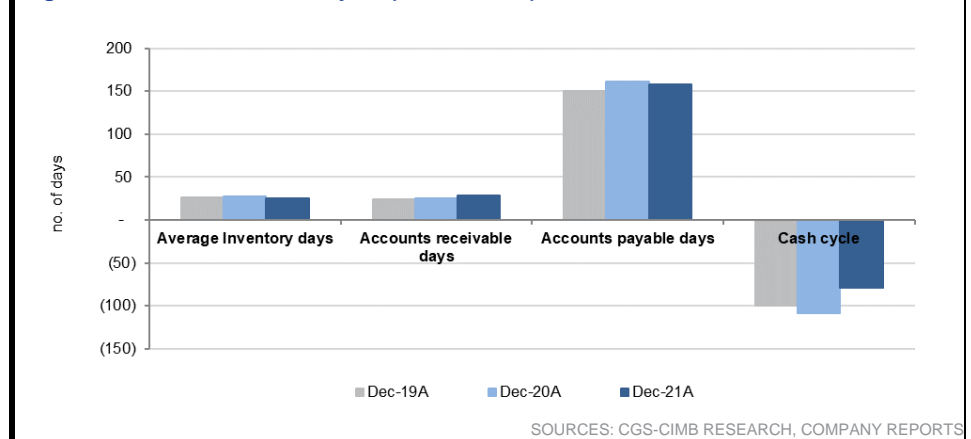
Figure 32: Cash projection (FY20 – FY24F)

FYE Dec (Rmb m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(3,926)	(2,604)	(4,742)	751	5,652
Less : Change in working capital	3,297	3,552	4,677	4,506	3,271
Less : Capital expenditure	(1,128)	(4,079)	(4,000)	(3,700)	(3,700)
Less : Taxation	(6)	(42)	(15)	(30)	(391)
Free cash flow	(1,763)	(3,173)	(4,080)	1,527	4,832
Dividend paid	0	0	0	0	0
Net (debt) / cash	34,585	38,349	35,797	38,396	44,202
Cash and equivalents	42,454	55,386	53,630	58,828	62,340
Total borrowings	(7,869)	(17,037)	(17,833)	(20,432)	(18,138)

SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Positive cash conversion cycle of 80 days in FY21. NIO achieved positive cash conversion cycle of 80 days in FY21 due to its long account payable days of 118 days (Fig 33).

Figure 33: Cash conversion cycle (FY19 – FY21)



Valuation and recommendation

Initiate coverage with an Add and target price of HK\$257.3 ➤

NIO is China's market-leading premium smart EV manufacturer. We believe NIO's EV deliveries to accelerate in 2H22F as it starts to roll out the delivery of its eSUV ES7 and EV ET5. We also expect its EV sales to boost by the supportive government policies (exemption from electric vehicle purchase tax and EV purchase subsidies which cease at end-2022). We expect NIO to maintain strong EV deliveries growth momentum, up 70%/85%/27% yoy to 155.8k/288.3k/365.3k units in FY22F/23F/24F, underpinned by the continuous rollout of innovative new models, improved battery services technologies and network coverage, as well as launches of NIO Autonomous Driving (NAD). The EV ET7, launched in Mar 2022, was the first NIO model to be equipped with NAD.

We believe NIO will turn profitable in FY24F, delivering Rmb2.54bn in net profit. As such, we see NIO as an attractive long-term pick, thanks to its robust EV deliveries, rising contributions from other sales, and high operating leveraging.

Initiate coverage with Add. We initiate coverage on NIO Inc (NIO) with an Add call as we believe NIO is well positioned to continue to gain market share in China's premium SUV and sedan segments amid rising smart EV penetration in China's NEV market due to its industry-leading battery services technology (battery swapping and battery-as-a-services models) and advanced Autonomous Driving technology.

Our DCF valuation for NIO is HK\$257.3 per share. We adopt the discount cash flow (DCF) methodology to value NIO, as we expect it to be profitable only in FY24F. We have estimates until FY40F in our DCF model. We use an average WACC of 8.0% (WACC assumptions: risk free rate:3.5%, beta: 1.50, COE: 12.5%) and terminal growth rate of 5% (based on our estimate of China's EV industry growth rate) and arrive at a DCF per share of HK\$257.3. Our DCF target price is equivalent to 149x P/E and 69x EBITDA in CY24F (Fig 34).

Figure 34: DCF valuation

FYE Dec (RMB m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F	Dec-25F	Dec-30F	Dec-35F	Dec-40F	Terminal
Revenue	16,258	36,136	60,861	111,660	146,405	161,045	247,576	315,976	403,275	514,692
Operating expenses	(20,184)	(38,740)	(65,603)	(110,909)	(140,753)	(154,603)	(227,770)	(290,698)	(371,013)	(473,517)
EBITDA	(3,926)	(2,604)	(4,742)	751	5,652	6,442	19,806	25,278	32,262	41,175
Plus : Depreciation/Amortization	1,046	1,708	1,880	2,274	2,559	3,554	5,029	6,738	8,693	11,121
Less : Change in working capital	3,297	3,552	4,677	4,506	3,271	3,598	5,531	7,059	9,009	11,498
Less : Capital expenditure	(1,128)	(4,079)	(4,000)	(3,700)	(3,700)	(4,070)	(6,257)	(7,985)	(10,192)	(13,008)
Less : Taxation	(6)	(42)	(15)	(30)	(391)	(430)	(661)	(844)	(1,077)	(1,374)
Free cash flow	(717)	(1,465)	(2,200)	3,801	7,391	9,094	23,448	30,246	38,695	1,628,907
Discount factor		1.00	1.00	0.93	0.86	0.79	0.54	0.37	0.25	0.17
PV FCF		(717)	(1,465)	(1,356)	(1,885)	3,014	10,924	10,022	8,730	7,578
Enterprise value (Rmb m)		419,812								
Less : Net debt / (cash)		38,349								
Equity value (Rmb m)		381,464								
Equity value - less minority		378,110								
Equity value per share (Rmb)		223.43								
Equity value per share (HK\$)		257.30								
Key assumptions										
WACC		8.0%								
Terminal growth		5.0%								

SOURCES: CGS-CIMB RESEARCH ESTIMATES

Figure 35: Peers comparison

Company	Bloomberg Code	Recom.	Price (local curr)	Target price (local curr)	Upside (%)	Market Cap (US\$m)	P/E (x) CY2022F	P/E (x) CY2023F	3-year EPS CAGR %	P/BV (x) CY2022F	P/BV (x) CY2023F	ROE (%) CY2022F	ROE (%) CY2023F	EV/EBITDA (x) CY2022F	EV/EBITDA (x) CY2023F	Yield (%) CY2022F	Yield (%) CY2023F
NIO, Li Auto and Xpeng																	
NIO Inc	9866 HK	Add	156.80	257.30	64%	33,368	na	89.9	na	8.4	7.1	-21.9%	-5.6%	na	257.4	0.0%	0.0%
Li Auto	2015 HK	Add	133.10	203.56	53%	35,039	190.9	72.6	na	4.5	4.5	0.1%	2.4%	363.3	80.4	0.0%	0.0%
XPeng Inc	9868 HK	Add	92.45	207.45	124%	20,273	na	88.2	na	4.1	5.4	-16.9%	-16.7%	na	na	0.0%	0.0%
Electric vehicle manufacturers																	
BYD Co.	1211 HK	Not Rated	287.00	N/A	n.a.	127,768	55.9	39.2	65.2%	6.0	5.2	12.1%	14.9%	22.2	17.2	0.2%	0.2%
Tesla Inc	TSLA US	Not Rated	891.83	N/A	n.a.	931,508	51.8	43.2	49.3%	15.3	11.4	33.2%	27.6%	30.8	23.9	0.0%	0.0%
Average							53.8	41.2	57.2%	10.6	8.3	22.7%	21.3%	26.5	20.6	0.1%	0.1%
China Automobile manufacturers																	
Geely Automobile	175 HK	Not Rated	17.00	N/A	n.a.	21,702	15.6	12.1	21.9%	1.8	1.6	11.3%	12.9%	7.8	6.3	2.1%	2.7%
Great Wall Motor	2333 HK	Not Rated	12.70	N/A	n.a.	36,299	9.0	7.3	24.9%	1.3	1.2	15.5%	17.7%	12.7	10.2	5.1%	6.8%
Guangzhou Auto	2238 HK	Not Rated	7.45	N/A	n.a.	19,528	5.7	5.0	23.6%	0.6	0.6	11.3%	11.8%	21.7	18.4	4.7%	5.4%
Average							10.1	8.1	23.4%	1.2	1.1	12.7%	14.1%	14.1	11.6	4.0%	5.0%
Foreign automobile manufacturers																	
Kia Motor	000270 KS	Add	81,200	110,000	35%	25,240	6.0	5.6	6.3%	0.8	0.7	14.7%	13.2%	2.8	2.6	1.5%	1.5%
Hyundai Motor	005380 KS	Hold	196,500	190,000	-3%	32,195	8.0	7.6	12.9%	0.7	0.6	8.3%	8.1%	9.4	9.1	2.0%	2.0%
Toyota	7203 JP	Not Rated	2,154.50	N/A	n.a.	268,264	9.9	8.9	17.9%	1.1	1.0	11.2%	11.4%	12.5	11.4	2.9%	3.3%
BMW	BMW GR	Not Rated	79.53	N/A	n.a.	53,346	5.5	5.3	-2.4%	0.6	0.6	10.5%	10.5%	4.4	3.6	6.2%	6.5%
Mercedes-Benz Group	MBG GR	Not Rated	56.87	N/A	n.a.	62,278	5.0	4.9	-5.6%	0.7	0.7	14.2%	14.1%	0.8	1.0	8.0%	8.2%
Volkswagen	VOW GR	Not Rated	193.90	N/A	n.a.	87,768	5.7	5.1	10.2%	0.6	0.6	10.5%	10.8%	2.4	2.2	4.9%	5.4%
Ford	F US	Not Rated	15.34	N/A	n.a.	61,670	7.5	7.4	4.4%	1.2	1.1	14.1%	12.8%	3.2	2.1	3.5%	3.5%
General Motor	GM US	Not Rated	36.77	N/A	n.a.	53,612	5.7	5.6	-2.1%	0.7	0.6	12.4%	11.4%	2.7	2.3	1.3%	2.0%
Average							6.7	6.3	5.2%	0.8	0.7	12.0%	11.6%	4.8	4.3	3.8%	4.1%
Battery manufacturers																	
CATL	300750 CH	Not Rated	523.87	N/A	n.a.	189,187	35.7	26.3	51.7%	8.5	6.4	25.4%	26.2%	23.0	17.2	0.2%	0.3%
EVE Energy	300014 CH	Not Rated	99.30	N/A	n.a.	27,899	32.5	22.8	39.7%	7.0	5.4	22.8%	25.0%	26.0	18.1	0.4%	0.5%
Gotion High-Tech	002074 CH	Not Rated	38.66	N/A	n.a.	10,176	55.5	38.2	85.7%	3.2	3.1	6.4%	8.9%	24.0	18.1	0.6%	0.7%
Shenzhen Desay Battery	000049 CH	Not Rated	43.34	N/A	n.a.	1,926	13.2	10.4	16.9%	2.8	2.4	23.8%	25.9%	7.9	5.5	1.6%	2.5%
LG Energy Solution	373220 KS	Not Rated	417,000	N/A	n.a.	74,636	66.4	47.5	37.8%	4.8	4.4	7.7%	9.7%	22.0	16.8	0.0%	0.1%
SK On	096770 KS	Not Rated	180,000	N/A	n.a.	12,729	7.7	7.7	43.8%	0.7	0.6	9.9%	8.9%	5.7	5.7	2.3%	2.3%
Samsung SDI	006400 KS	Add	572,000	750,000	31%	30,161	21.2	17.9	23.3%	2.4	2.2	9.7%	10.8%	8.7	7.0	0.2%	0.2%
Average							33.2	24.4	42.7%	4.2	3.5	15.1%	16.5%	16.7	12.6	0.7%	0.9%
Electric vehicle parts manufacturers																	
LK Technology	558 HK	Not Rated	12.64	N/A	n.a.	2,216	21.6	16.2	59.9%	3.9	3.3	19.9%	21.8%	14.8	11.5	0.9%	1.1%
Times Electric	3898 HK	Not Rated	33.25	N/A	n.a.	9,525	15.1	13.2	14.5%	1.1	1.0	7.4%	8.2%	16.6	14.6	1.8%	2.1%
Ningbo Joyson Electronic	600699 CH	Not Rated	20.93	N/A	n.a.	4,237	28.2	21.9	-218.5%	2.2	2.0	8.0%	9.4%	10.0	8.5	0.4%	0.4%
Continental AG	CON GY	Not Rated	67.30	N/A	n.a.	13,778	7.2	5.7	20.0%	1.0	0.9	13.8%	15.0%	3.3	2.8	4.2%	5.4%
Valeo	FR FP	Not Rated	20.85	N/A	n.a.	5,177	9.4	6.5	69.0%	1.2	1.1	13.6%	17.3%	3.3	2.7	3.8%	4.8%
Magna International	MGA US	Not Rated	64.23	N/A	n.a.	18,572	8.9	6.8	22.9%	1.5	1.4	17.5%	20.2%	4.9	4.1	2.9%	3.2%
Average							15.1	11.7	-5.4%	1.8	1.6	13.4%	15.3%	8.8	7.4	2.3%	2.8%

NOTE: ESTIMATES FOR NOT RATED (NR) COMPANIES ARE ALL BASED ON BLOOMBERG CONSENSUS ESTIMATES
SOURCES: CGS-CIMB RESEARCH ESTIMATES, BLOOMBERG (02 AUG 2022)

Share price catalysts ➤

NIO's share price (ADRs) has surged 222% since it listed on the NYSE in Sep 2018.

We believe its key share price catalysts include:

- Favourable policies: the EV promotion policies of the Central and local governments, relaxation of automotive purchasing quota in key cities and EV purchase tax exemption.
- Strong order backlog for new models ES7 eSUV and ET5 EV.
- Robust EV sales and continuous new model rollouts.
- Sustained vehicle margin improvement on better economies of scales.
- Continual share gain in China's EV market, especially in the premium eSUV market.
- Easing of supply chain constraints.
- Change of its primary listing status to HK and delisting of its ADR.

Key risks ▶

Covid-19 impact. Since early 2020, in a bid to contain the spread of Covid-19 in China, the Chinese government implemented a series of prevention measures such as quarantining, asking residents to remain at home and social-distancing measures etc.; these had affected the production and sales of vehicles over the past two years. Although Covid-19 is largely under control in China, a new wave of Covid-19 outbreak in the country could again to affect NIO's vehicle production and sales.

During the new wave of variant Covid-19 outbreak in Mar and Apr 2022, NIO's vehicle production was impacted by supply chain volatilities and other constraints. NIO's vehicle production has not reached its full capacity of operation.

China government policies supporting EV industry. China has been encouraging and providing various favourable policies to support a healthy development of its EV industry. Favourable government incentives and subsidies in China include one-time government subsidies, exemption from vehicle purchase tax, exemption from license plate restriction in some cities, preferential utility rate for charging facilities etc.

Any change in government subsidies, economic incentives and government polices to support NEVs could adversely affect NIO's business performance.

China's automotive market is highly competitive. NIO ranked No.1 in China's premium eSUV market with over 65% market share in Jan-Sep 2021, in terms of sales volume, according to Frost & Sullivan. Nevertheless, NIO faces increasing competition from new players, including domestic traditional internal combustion engine (ICE) automakers and EV makers as well as foreign automakers. Given that its competitors could have greater and stronger financials, technologies, manufacturing and marketing capabilities than it has, NIO could find it challenging to maintain its leadership position in China's premium eSUV segment and grow its EV sales. Meanwhile, NIO has to invest in R&D to maintain its product quality and features, innovative, safety and reliability etc., in order to maintain its competitive in the industry.

Supply chain constraints. Persistent global chip shortages have negatively impacted NIO's vehicle output in FY21 and 1H22. NIO temporarily suspended the vehicle production activity in the JAC-NIO manufacturing plant in Hefei for five working days from 29 Mar 2021 due to semiconductor shortage. In May 2021, its vehicle delivery was adversely impacted for several days due to volatility in its semiconductor supply and certain logistical adjustments. In Aug 2021, supply chain constraints as a result of another wave of Covid-19 outbreak in certain areas in China and Malaysia materially impacted its production activities and volume.

Furthermore, NIO experienced increased costs related to procuring raw materials required to manufacture and assemble its vehicles.

Company background

NIO is China's leading premium smart EV maker >





NIO's mission is to shape a joyful lifestyle. NIO Inc (NIO) founded in Nov 2014 and listed on the NYSE in Sep 2018. NIO's headquarters are located in Shanghai, it aims to build a community of users of its smart electric vehicles (EVs). NIO designs, develops, jointly manufactures and sells premium smart EVs in China. In 2021, NIO started to deliver EVs and provide services in Norway.

NIO is China's leading premium smart EV maker. NIO is a pioneer and leading company in the premium smart EV market in China, driving innovations in autonomous driving, digital technologies, electric powertrains and batteries. The company differentiates itself through continuous technological breakthroughs and innovations, such as its industry-leading battery-swapping technologies, battery as a service (BaaS), as well as its proprietary autonomous driving technologies and autonomous driving as a service (ADaaS).

NIO ranked top in China's premium battery SUV market. NIO's smart EVs have been well-received by Chinese consumers, with its ES6, EC6 and ES8 models among the top best-selling premium electric SUVs by sales volume in China in 2021.

- NIO firstly launched ES8, a seven-seater flagship premium smart electric sport utility vehicle (SUV), in Dec 2017. NIO shipped EV ES8 to customers in Jun 2018 and its variant, the six-seater ES8 in Mar 2019.
- NIO launched the ES6, a five-seater high-performance premium smart electric SUV, in Dec 2018, and began deliveries of the ES6 in Jun 2019.
- NIO launched the EC6, a five-seater premium smart electric coupe SUV, in Dec 2019, and began deliveries of the EC6 in Sep 2020.
- NIO launched the ET7, a flagship premium smart electric sedan, in Jan 2021, and began deliveries of the ET7 in Mar 2022.
- NIO launched the ES7, a mid-large premium smart SUV, in Jun 2022, and expect to deliver to customers in Aug 2022.
- NIO launched the ET5, a mid-size premium smart electric sedan, in Dec 2021, and expect to deliver to customers in Sep 2022 (Fig 36).

Figure 36: NIO's EV models as at 30 Jun 2022

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)
 ES8	Jun-18 (seven-seater) Mar-19 (six-seater) Apr-20 (all-new)	Mid-large SUV	3,010	450/580/850 (with 75/100/150kWh battery pack)	4.9	400	725	NIO Pilot	468,000
 ES6	Jun-19	Mid-size SUV	2,900	465/610/900 (with 75/100/150kWh battery pack)	4.7	400	725	NIO Pilot	358,000
 EC6	Sep-20	Mid-size coupe SUV	2,900	475/615/910 (with 75/100/150kWh battery pack)	4.5	400	725	NIO Pilot	368,000
 ET7	Mar-22	Mid-large sedan	3,060	550/705/1000 (with 75/100/150kWh battery pack)	3.8	480	850	NIO Autonomous Driving	448,000
 ES7	Aug-22	Mid-large SUV	2,960	485/620/930 (with 75/100/150kWh battery pack)	3.9	480	850	NIO Autonomous Driving	468,000
 ET5	Sep-22	Mid-size sedan	2,888	550/700/1000 (with 75/100/150kWh battery pack)	4.3	360	700	NIO Autonomous Driving	328,000

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

NIO set up business cooperation with Hefei strategic investors ➤

Set up business cooperation with Hefei strategic investors. On 29 Apr 2020, NIO has entered into definitive agreements for investments in NIO China with a group of strategic investors (Hefei City Construction and Investment, CMG-SDIC Capital, and Anhui Provincial Emerging Industry Investment). The company also reached an agreement with Hefei Economic and Technological Development Area (HETA) for establishing NIO China's headquarters in Hefei.

Under the definitive agreements, the strategic investors invested an aggregate of Rmb7.0bn into NIO China. Meanwhile, NIO injected its core businesses and assets in China, including vehicle research and development, supply chain and manufacturing, sales and services, and NIO Power, valued at Rmb17.77bn in total, into NIO China. Furthermore, NIO also invested Rmb4.26bn in cash in NIO China. Upon the completion of the investments, NIO holds a 75.9% controlling equity interest in NIO China, while its strategic investors collectively hold the remaining 24.1%.

Pursuant to the definitive agreement between NIO and HETA, NIO will establish its headquarters in HETA for an integrated base of business management, research and development, sales and services, supply chain, and manufacturing functions, and kick off the planning and building of the second manufacturing centre based on NIO's development needs. HETA will also provide comprehensive support to NIO in establishing and building NIO China's headquarters and its subsequent R&D and manufacturing centres.

Company milestones ➤

Figure 37: Company's key milestones (2015 to 2021)

2015	<ul style="list-style-type: none"> NIO established presence in Hong Kong, China, Germany and the U.S.
2016	<ul style="list-style-type: none"> NIO introduced the EP9 supercar, which was then the fastest electric vehicle, setting the Nurburgring Nordschleife all-electric vehicle lap record.
2017	<ul style="list-style-type: none"> In March, NIO showcased EVE at Austin, Texas. In April, NIO further unveiled our first volume manufactured electric vehicle, the ES8, and showcased EP9 at Shanghai. In May, NIO's EP9 supercar broke the record for the fastest lap for an electric vehicle around the Nurburgring in Germany. In December, NIO launched the ES8, a seven-seater flagship premium smart electric SUV, and began taking orders for the ES8.
2018	<ul style="list-style-type: none"> In June, NIO began making deliveries of the seven-seater ES8 in China. On September 12, NIO's ADSs commenced trading on the NYSE. In December, NIO launched the award-winning ES6, a five-seater highperformance premium smart electric SUV.
2019	<ul style="list-style-type: none"> In March, NIO began making deliveries of the six-seater ES8 in China. In June, NIO began making deliveries of the ES6 in China. In December, NIO launched our third volume manufactured electric vehicle, the EC6, a five-seater premium smart electric coupe SUV, and the all-new ES8 with more than 180 product improvements.
2020	<ul style="list-style-type: none"> In April, NIO entered into definitive agreements with Hefei Strategic Investors, pursuant to which the Hefei Strategic Investors would invest an aggregate of RMB7 billion in cash into the legal entity of NIO China. In June, NIO began making deliveries of the ES6 in China. In April, NIO began making deliveries of all-new ES8 in China. In August, NIO introduced the Battery as a Service, or BaaS, which allows users to purchase electric vehicles without batteries and subscribe for the usage of batteries separately. In September, NIO began making deliveries of the EC6 in China.
2021	<ul style="list-style-type: none"> In January, NIO launched ET7, our flagship premium smart electric sedan. In June, we began making deliveries of the ES6 in China. In September, NIO launched and began making deliveries of the ES8 in Norway. In December, NIO launched ET5, our mid-size premium smart electric sedan.

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Research and development ►

NIO specialises in research and development of core technologies for automotives. NIO has filed and obtained over 4,800 patents as of 2021. It has built up a full-fledged in-house R&D system, encompassing electric motors, motor controls, batteries, as well as smart gateway, smart cockpit, and autonomous driving technologies.

NIO currently operates R&D centres in Shanghai, Beijing and Hefei, China, Silicon Valley in the US, and UK and Munich in Europe.

NIO spent approximately Rmb4.0bn for R&D in FY18 to FY21 its six EV models (ES8, ES6, EC6, ET7, ET5 and ES7), except for FY20, its spent only Rmb2.5bn due to the impact from Covid-19 pandemic in China. NIO's R&D expenses to sales ratio gradually decreased from 126% in FY18 to 31% in FY21 due to substantial increase of revenue.

As of 31 Dec 2021, NIO employed over 4,700 engineers for product and software development (4,516 in China, 153 in the US, and 140 in the EU), which made up 31.6% of the company's total employees (Fig 38).

Figure 38: R&D footprint

Country	Focus Area
China	
Shanghai	Vehicle engineering, smart hardware, autonomous driving, digital cockpit, digital system, product planning, NIO app, design, electric powertrain and battery teams
Beijing	Digital cockpit, digital system, digital development and autonomous driving teams
Hefei	Vehicle engineering, manufacturing engineering, test and quality
USA	
Silicon Valley	Innovations in the areas of autonomous driving, smart hardware, digital cockpit, and digital system, including vehicle operating system and digital security
Europe	
Munich	Vehicle interior and exterior design, user interface design, brand design and other product design
United Kingdom	Computer-aided engineering and advanced vehicle engineering

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Innovation in its supply chain ►

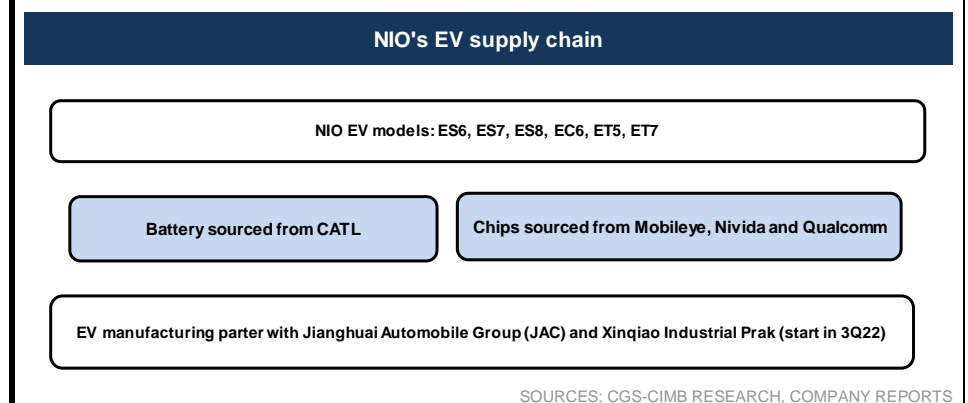
Effective and diverse supply chain system. NIO embraces innovation to create a more effective and diverse supply chain system. The company employs various suppliers and manufacturing sub-contractors for its EV manufacturing.

Key suppliers are industry leaders. NIO prefers to work with the industry-leading key component suppliers to ensure the key components are able to support the most advanced and reliable technologies and provide the best driving experience to its customers. Its key battery supplier is Contemporary Amperex Technology (CATL), while its key semiconductor chip suppliers include Mobileye, Nvidia and Qualcomm (Fig 39).

Manufacturing base in Hefei. NIO manufactures its EVs through a strategic alliance with Jianghuai Automobile Group (JAC) Motors in Hefei, Anhui province, China. The production facilities have a vehicle and component production capacity of 120k units p.a. NIO plans to expand its total vehicle and component production capacity to 240k units p.a. by 2022.

Under the definitive agreements, NIO started to design and construct a second manufacturing base in Hefei in Apr 2021. The designed capacity of the new plant will be 300k units p.a. and is expected to commence production in 3Q2022F.

Figure 39: NIO sticks with the industry's leading suppliers



Capital exercise ►

NIO have a total 1,692.29m issued shares as at 30 Jun 2022. NIO's class A shares are listed on NYSE (NIO US), HKEX (9866 HK) and SGX (NIO SG).

- NIO launched an initial public offering (IPO) on the NYSE on 9 Sep 2018. NIO issued 86.47m American Depositary Shares (ADS) to raise US\$1.0bn (ADS price at US\$6.25). NIO's ADS, each of which represents one Class A ordinary share. NIO's ADS remains primarily listed after the company was listed on the HKEX in Mar 2022 and SGX in May 2022.
- In Nov 2021, NIO raised approximately US\$2.0bn by issuing 53.29m ADSs (priced at US\$37.53 each).
- NIO was listed on the HKEX by way of introduction on 10 Mar 2022 without raising funds. NIO's shares (Class A ordinary shares) on the HKEX will be fully fungible, with its ADS trading on the NYSE.
- NIO debuted on SGX as a secondary listing by way of introduction on 20 May 2022 without raising funds. The shares listed (Class A ordinary shares) on the Main Board of the SGX-ST are fully fungible, with the ADS listed on the NYSE.

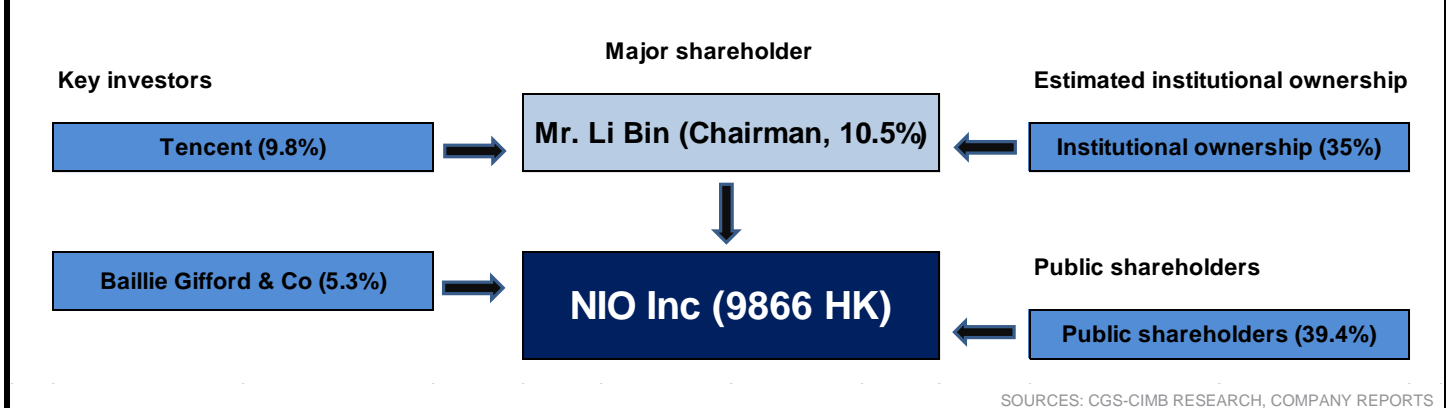
Shareholding structure ►

As of 31 Dec 2021, there were 1,415.33m Class A ordinary shares, 128.29m Class B ordinary shares (all the Class B ordinary shares were converted to Class A ordinary shares on 10 Mar 2022), and 148.50m Class C ordinary shares outstanding.

Mr. Bin Li (chairman) is the major shareholder of NIO, holding 28.968m Class A ordinary shares and 148.5m Class C ordinary shares, respectively, as at 30 Jun 2022. Mr. Bin Lin owns 177.468m shares in total, or 10.5% of the total issued shares, with a voting right of 44.5% (Fig 40).

- Under NIO's Weight voting rights (WVR) structure, NIO's share capital comprises Class A ordinary shares, Class B ordinary shares and Class C ordinary shares. Class A: ordinary shares entitle holders to exercise one vote, while Class C: ordinary shares entitle holder to exercise 8 votes.
- As of 31 Dec 2021, the outstanding share options were 24.46m shares, representing 1.45% of total issued shares. The exercise prices of the options ranged from US\$0.00 to US\$3.61 per share.

Figure 40: Shareholding structure (as at 30 Jun 2022)



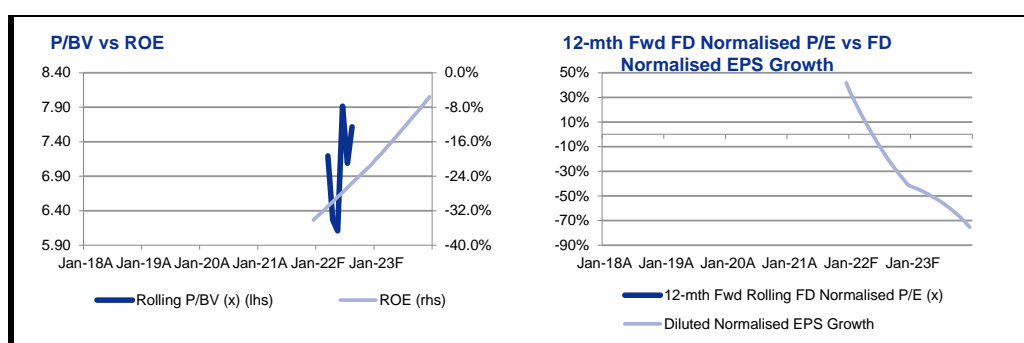
Key management >

- Mr. Bin Li is NIO's founder and has served as chairman** since the company's inception and as chief executive officer since Mar 2018. In 2000, Mr. Li co-founded Beijing Bitauto E-Commerce Co, Ltd. and served as its director and president until 2006. From 2010 to 2020, Mr. Li served as chairman of the board of directors at Bitauto Holdings Limited (previously listed on NYSE with stock code BITA), a former NYSE-listed automobile service company and a leading automobile service provider in China. In 2002, Mr. Li co-founded Beijing Creative & Interactive Digital Technology Co, Ltd. as the chairman of the board of directors and had served as its president and director. Mr. Li received his bachelor's degree in sociology from Peking University.
- Mr. Lihong Qin is NIO's co-founder and has served as director and president** since the company's inception. Prior to joining NIO, Mr. Qin served as chief marketing officer and executive director at Longfor Properties Co, Ltd. (960 HK, Add), a leading company involved in property development and investment in China, from 2008 to 2014. He also served as deputy general manager at Anhui Chery Automobile Sales and Service Company from 2005 to 2008, and as senior consultant and project manager at Roland Berger Strategy Consultants from 2003 to 2005. Mr. Qin received his bachelor's degree and a master's degree in law from Peking University in 1996 and 1999, respectively, and a master's degree in public policy from Harvard University in 2001.
- Mr. Feng Shen joined NIO in December 2017, and currently serves as executive vice president and chairman of the quality management committee.** Mr. Shen worked in several senior executive management roles, such as president of Polestar China and global chief technology officer at Polestar, president at Volvo Cars China R&D Company, vice president of Volvo Cars Asia-Pacific Operation, and chairman at China-Sweden Traffic Safety Research Center from 2010 to 2017. Prior to that, Mr. Shen served in various roles, including powertrain manager and six-sigma quality management master, at Ford Motor Company (F US, Not Rated) from 1999 to 2010 in the US and China. Mr. Shen received a bachelor's degree in mathematics and mechanics and a master's degree in applied mechanics from Fudan University in 1984 and 1987, respectively. He also received a doctoral degree in mechanical engineering from Auburn University in 1996.
- Mr. Xin Zhou joined NIO in Apr 2015 and currently serves as the chairman of the product committee** since 2017, and also serves as executive vice president. Prior to joining NIO, Mr. Zhou served as executive director at Qoros Automotive Co, Ltd. from Sep 2009 to Apr 2015. Prior to that,

he was the engagement manager of McKinsey & Co from Apr 2007 to Aug 2009, and executive director of Lear Corp. (LEA US, Not Rated) from May 1998 to Apr 2007. From 1995 to 1998, Mr. Zhou worked at General Motors China Inc. He received a bachelor's degree in applied science from Fudan University in 1992 and a master's degree in business administration from China Europe International Business School in 2008.

- **Mr. Wei Feng has served as NIO's Chief Financial Officer** since Nov 2019. Prior to joining NIO, Mr. Feng served as managing director and head of the auto and auto parts research team at China International Capital Corporation. Prior to that, Mr. Feng served as an industry analyst at Everbright Securities Co Ltd from 2010 to 2013. Mr. Feng's career also includes more than five years' working experience within the ZF (China) Investment Co, Ltd, where he participated in numerous corporate matters. Mr. Feng received his bachelor's degree in Engineering from the Department of Automotive Engineering at Tsinghua University, and his joint master's degree in Automotive System Engineering from RWTH Aachen University in Germany and Tsinghua University in China.
- **Mr. Ganesh V. Iyer has served as NIO's global chief information officer** since Apr 2016 and managing director of NIO US since Dec 2018. Mr. Iyer has over 32 years of experience delivering results in various industries including autonomous technology, hi-tech, manufacturing and telecom. Mr. Iyer worked as vice president of Information Technology at Tesla Inc. (TSLA US, Not Rated) until 2016. Prior to Tesla, where he served as vice president of Information Technology, Mr. Iyer joined VMWare (VMW US, Not Rated) in 2010 and held senior information technology leadership roles at VMWare. Prior to VMWare, Mr. Iyer served as Director of Information Technology at Juniper Networks (JNPR US, Not Rated) and WebEx and worked in consulting primarily at Electronic Data Systems. Mr. Iyer received a bachelor's degree in chemical engineering from the University of Calicut in India.

BY THE NUMBERS



Profit & Loss

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Net Revenues	16,258	36,136	60,861	111,660	146,405
Gross Profit	1,873	6,821	10,419	21,926	30,178
Operating EBITDA	(3,561)	(2,788)	(4,742)	751	5,652
Depreciation And Amortisation	(1,046)	(1,708)	(1,880)	(2,274)	(2,559)
Operating EBIT	(4,608)	(4,496)	(6,622)	(1,523)	3,093
Financial Income/(Expense)	(259)	274	239	180	165
Pretax Income/(Loss) from Assoc.	(66)	63	0	0	0
Non-Operating Income/(Expense)	(365)	185	0	0	0
Profit Before Tax (pre-EI)	(5,298)	(3,975)	(6,383)	(1,342)	3,258
Exceptional Items	0	0	0	0	0
Pre-tax Profit	(5,298)	(3,975)	(6,383)	(1,342)	3,258
Taxation	(6)	(42)	(15)	(30)	(391)
Exceptional Income - post-tax					
Profit After Tax	(5,304)	(4,017)	(6,398)	(1,372)	2,867
Minority Interests	(306)	(6,555)	(190)	(289)	(326)
Preferred Dividends					
FX Gain/(Loss) - post tax					
Other Adjustments - post-tax					
Preference Dividends (Australia)					
Net Profit	(5,610)	(10,572)	(6,588)	(1,662)	2,541
Normalised Net Profit	(5,304)	(4,017)	(6,398)	(1,372)	2,867
Fully Diluted Normalised Profit	(5,610)	(10,572)	(6,588)	(1,662)	2,541

Cash Flow

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(3,561)	(2,788)	(4,742)	751	5,652
Cash Flow from Inv. & Assoc.	66	(63)	0	0	0
Change In Working Capital	3,297	3,552	4,677	4,506	3,271
(Incr)/Decr in Total Provisions					
Other Non-Cash (Income)/Expense					
Other Operating Cashflow	2,575	1,772	2,361	2,428	2,526
Net Interest (Paid)/Received	(426)	(637)	(647)	(678)	(776)
Tax Paid	0	131	447	(30)	(391)
Cashflow From Operations	1,951	1,966	2,096	6,977	10,282
Capex	(1,128)	(4,079)	(4,000)	(3,700)	(3,700)
Disposals Of FAs/subsidiaries	(3,856)	(33,194)	0	0	0
Acq. Of Subsidiaries/investments	(251)	(593)	0	0	0
Other Investing Cashflow	163	33,246	0	0	0
Cash Flow From Investing	(5,071)	(4,620)	(4,000)	(3,700)	(3,700)
Debt Raised/(repaid)	641	3,680	796	2,599	(2,294)
Proceeds From Issue Of Shares	34,607	12,678	0	0	0
Shares Repurchased	0	0	0	0	0
Dividends Paid	0	0	0	0	0
Preferred Dividends					
Other Financing Cashflow	6,110	1,771	(647)	(678)	(776)
Cash Flow From Financing	41,357	18,129	148	1,922	(3,070)
Total Cash Generated	38,237	15,475	(1,756)	5,199	3,512
Free Cashflow To Equity	(2,480)	1,026	(1,108)	5,876	4,288
Free Cashflow To Firm	(2,694)	(2,016)	(1,257)	3,955	7,358

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

BY THE NUMBERS... cont'd

Balance Sheet

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Cash And Equivalents	42,454	55,386	53,630	58,828	62,340
Total Debtors	2,546	4,677	7,877	14,452	18,950
Inventories	1,082	2,056	3,538	6,295	8,153
Total Other Current Assets	125	1,522	1,522	1,522	1,522
Total Current Assets	46,207	63,641	66,568	81,097	90,965
Fixed Assets	4,996	7,400	9,520	10,946	12,087
Total Investments	300	3,059	3,059	3,059	3,059
Intangible Assets	1	0	0	0	0
Total Other Non-Current Assets	3,138	8,783	8,783	8,783	8,783
Total Non-current Assets	8,435	19,242	21,362	22,788	23,929
Short-term Debt	1,931	7,298	9,833	14,432	15,138
Current Portion of Long-Term Debt					
Total Creditors	6,368	12,639	20,730	31,960	39,804
Other Current Liabilities	5,677	9,261	12,800	10,112	11,591
Total Current Liabilities	13,976	29,198	43,363	56,505	66,533
Total Long-term Debt	5,938	9,739	8,000	6,000	3,000
Hybrid Debt - Debt Component					
Total Other Non-Current Liabilities	2,865	5,858	5,858	5,858	5,858
Total Non-current Liabilities	8,803	15,597	13,858	11,858	8,858
Total Provisions	0	25	25	25	25
Total Liabilities	22,780	44,820	57,246	68,388	75,416
Shareholders' Equity	27,169	34,710	27,331	32,145	36,124
Minority Interests	4,693	3,353	3,353	3,353	3,353
Total Equity	31,862	38,063	30,684	35,498	39,478

Key Ratios

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue Growth	N/A	122%	68%	83%	31%
Operating EBITDA Growth	N/A	(22%)	70%	N/A	652%
Operating EBITDA Margin	(21.9%)	(7.7%)	(7.8%)	0.7%	3.9%
Net Cash Per Share (Rmb)	22.62	23.08	21.15	22.69	26.12
BVPS (Rmb)	17.77	20.89	16.15	18.99	21.35
Gross Interest Cover	(10.82)	(7.05)	(10.23)	(2.25)	3.98
Effective Tax Rate	0.0%	0.0%	0.0%	0.0%	12.0%
Net Dividend Payout Ratio	NA	NA	NA	NA	NA
Accounts Receivables Days	N/A	19.93	22.72	22.03	25.20
Inventory Days	N/A	19.53	20.24	20.00	22.75
Accounts Payables Days	N/A	118.3	120.7	107.2	113.0
ROIC (%)	N/A	2873%	(261%)	68%	(3668%)
ROCE (%)	N/A	(7.6%)	(11.1%)	(1.3%)	7.1%
Return On Average Assets	N/A	(6.25%)	(7.77%)	(1.62%)	2.49%

Key Drivers

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total no. of EV sales ('000 units)	N/A	91.4	155.8	288.3	365.3
Total no. of EV sales (units yoy% chg)	N/A	109.1%	70.4%	85.1%	26.7%
Vehicle sales (Rmb yoy % chg)	N/A	118.5%	68.3%	81.8%	29.9%
Vehicle sales (GPM %)	N/A	5.7%	4.0%	6.0%	8.0%

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Hong Kong

ADD (initiation)

Consensus ratings*: Buy 23 Hold 2 Sell 0

Current price:	HK\$92.45
Target price:	HK\$207.5
Previous target:	HK\$
Up/downside:	124.4%
CGS-CIMB / Consensus:	35.9%
Reuters:	9868.HK
Bloomberg:	9868 HK
Market cap:	US\$20,273m HK\$159,145m
Average daily turnover:	US\$87.04m HK\$681.4m
Current shares o/s:	1,713m
Free float:	76.2%

*Source: Bloomberg

Key changes in this note

N/A



Source: Bloomberg

Price performance	1M	3M	12M
Absolute (%)	-26.9	-10.3	-44
Relative (%)	-17	-3.7	-19

Major shareholders	% held
Xiaopeng He	20.3
Heng Xia	3.6

Analyst

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XPeng Inc

Riding on industry-leading ADAS/OS

- XPeng is set to carve out a larger slice of the EV market with its advanced ADAS, intelligent OS and in-house designed and engineered vehicle system.
- This year, the company is ramping up EV deliveries to the premium segment.
- We initiate coverage with an Add call and DCF-based TP of HK\$207.5.

XPeng to capture more share in EV market with advanced ADAS

We are positive on XPeng's market position in the fast-growing EV market in China as it targets younger buyers looking for sleek and modern vehicles. With its affordable price points and proprietary technology, we believe the company is poised to grow its market share.

Pushing into premium EV market

XPeng's initial proposition was a mass market EV company; its older models (G3i compact eSUV and P5 EV) were priced at Rmb150k to Rmb224k (US\$23k to US\$34k). However, the company has made a pivot and plans to launch a luxury eSUV (G9; selling price of over Rmb400k/US\$62k) in FY22F and a premium EV (P9) and premium eSUV (G5) in FY23F. We expect a commendable EV delivery CAGR of 57% for XPeng in FY21-24F, with 379k units and c.3.8% market share, in term of volume, in China's NEV market in 2024F, underpinned by 1) its broadening EV portfolio (three premium EV models launched in FY22-23F), 2) market share gains, and 3) increase in overseas deliveries.

Self-developed ADAS and intelligent OS to mark differentiation

XPeng set itself apart by introducing a smart mobility experience to the middle-class consumer in China with its self-developed advanced driver assistance system (ADAS) solution (XPILOT), intelligent operating system (Xmart OS) and in-house designed and engineered vehicle system. The company's autonomous driving technology is top of the line, featuring a City Navigation Guide Pilot (NGP) and two Light Detection and Ranging (LiDAR) cameras as well as software programmed with extensive geographical coverage in China, allowing its EVs to assist during lane changes, speeding up or slowing down, overtaking cars, exiting highways, etc., with a high level of safety and reliability. The integration between software (XPILOT and Xmart OS) and hardware (chassis, powertrain and electrical/electronic architecture) in its vehicles provides flexibility in production and enables the company to take full advantage of modern manufacturing.

Initiate with Add and DCF-based target price of HK\$207.5

We initiate coverage on XPeng with an Add and DCF-based TP of HK\$207.5 (WACC: 12.1%, terminal growth rate 5%), which is equivalent to 203x CY24F P/E and 95x CY24F EV/EBITDA. We believe XPeng stands out among new Chinese EV makers with its industry-leading autonomous driving technology and fast EV penetration growth. Potential share price re-rating catalysts include strong order backlog for the G9, P9 and G5, notable vehicle margin improvement and narrowing losses. Downside risks: prolonged Covid-19 outbreak in China, keener competition and sustained supply chain constraints.

Financial Summary

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue (Rmbm)	5,844	20,988	41,975	67,521	113,996
Operating EBITDA (Rmbm)	(4,052)	(6,188)	(6,905)	(4,749)	2,644
Net Profit (Rmbm)	(4,890)	(4,863)	(6,206)	(4,912)	1,524
Normalised EPS (Rmb)	(2.96)	(2.94)	(3.60)	(2.83)	0.91
Normalised EPS Growth		(0.8%)	22.6%	(21.4%)	
FD Normalised P/E (x)	NA	NA	NA	NA	87.88
DPS (Rmb)	-	-	-	-	-
Dividend Yield	0%	0%	0%	0%	0%
EV/EBITDA (x)	NA	NA	NA	NA	45.96
P/FCFE (x)	NA	NA	NA	NA	NA
Net Gearing	(97.4%)	(91.7%)	(77.5%)	(68.0%)	(71.6%)
P/BV (x)	3.80	3.24	4.13	5.40	6.29
ROE	(28.3%)	(12.6%)	(16.4%)	(16.7%)	6.6%
% Change In Normalised EPS Estimates					
Normalised EPS/consensus EPS (x)			0.70	0.91	(7.49)

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Riding on its industry-leading ADAS and OS

XPeng set to gain market share in China's EV market

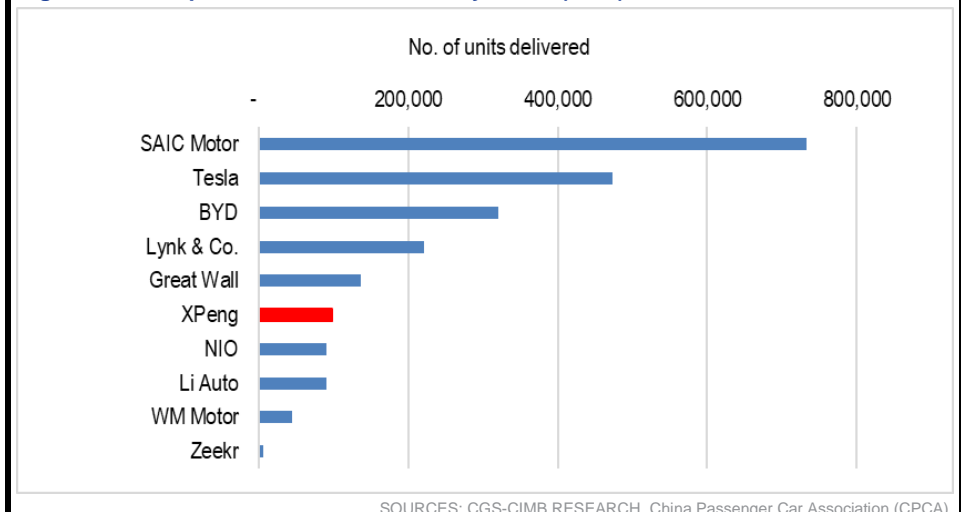
One of China's leading EV makers in the mid- to high-end segment ➤

XPeng's smart EV is preferred by middle-class consumers in China. XPeng's smart electric vehicles (EVs) is preferred by the middle-class consumers in China, in our view, due to its self-developed advanced driver assistance system (ADAS) software (XPILOT), in-car intelligent operating system (Xmart OS), in-house designed and manufactured vehicle (electrical/electronic architecture and powertrain) capabilities, and long driving range (NEDC up to 706km in the P7).

According to the China Passenger Car Association (CPCA), XPeng ranked sixth for pure battery electric vehicle (BEV) sales, in terms of volume by brand, in China in 2021, slightly higher than new domestic EV makers (NIO is seventh and Li Auto is eighth). Nevertheless, XPeng's EV deliveries amounted to 98k units in 2021 in China, substantially fewer than the two major EV players in the country – Tesla (TSLA US, Not Rated) delivered 473k units and BYD (1211 HK, Not Rated) 320k units – as the latter two have stronger production capabilities, rich product portfolios and well-known brand names (Fig 1).

In terms of market share, XPeng holds c.3% in the China new energy vehicle (NEV) market in 2021, c.12% pts and c.7% pts below Tesla and BYD, respectively.

Figure 1: The top 10 BEV sales in China, by brand (2021)

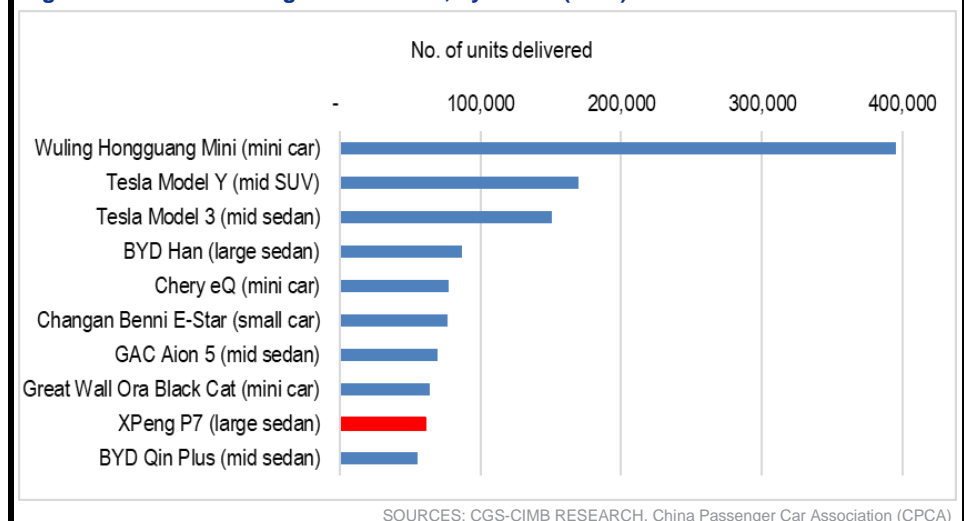


XPeng a serious contender in China's mid- to high-end EV segment since launching its first model. XPeng delivered its first model, the G3, a compact electric sports utility vehicle (price starting at Rmb150k), in Dec 2018. The G3 was the second best-selling battery electric sports utility vehicle (eSUV) in China's mid- to high-end market for more than two years (2019 and 2020), according to IHS Markit Report, an independent global information firm.

P7 among the top 10 best-selling BEV models in China in 2021. XPeng positions its EVs in the mid- to high-end segment in China, the most competitive segment in the China automobile market, with prices ranging from Rmb150k to Rmb300k (US\$23k to US\$46k). The company's second model, the P7, tapped the sedan EV segment with a higher entry selling point of Rmb230k (US\$35k). We believe the P7 has helped XPeng cement its position in China's mid- to high-end segment, thanks to its long driving range (NEDC up to 706km), interactive smart mobility experience and advanced ADAS software.

The P7 started delivery in May 2020, with cumulative delivery reaching 96k units by Jun 2022, of which 60.6k units were delivered in 2021. According to CPCA, the P7 ranked No. 9 for battery electric vehicle (BEV) sales, in terms of volume by model, in China in 2021, with 2.3% market share in China's BEV market (Fig 2).

Figure 2: The best-selling BEV in China, by model (2021)



XPeng offers three EV models: G3i, P7/P7 Wing and P5 ➤

XPeng currently offers three EV models - G3i, P7/P7 Wing and P5 – and targets middle-class consumers in China.

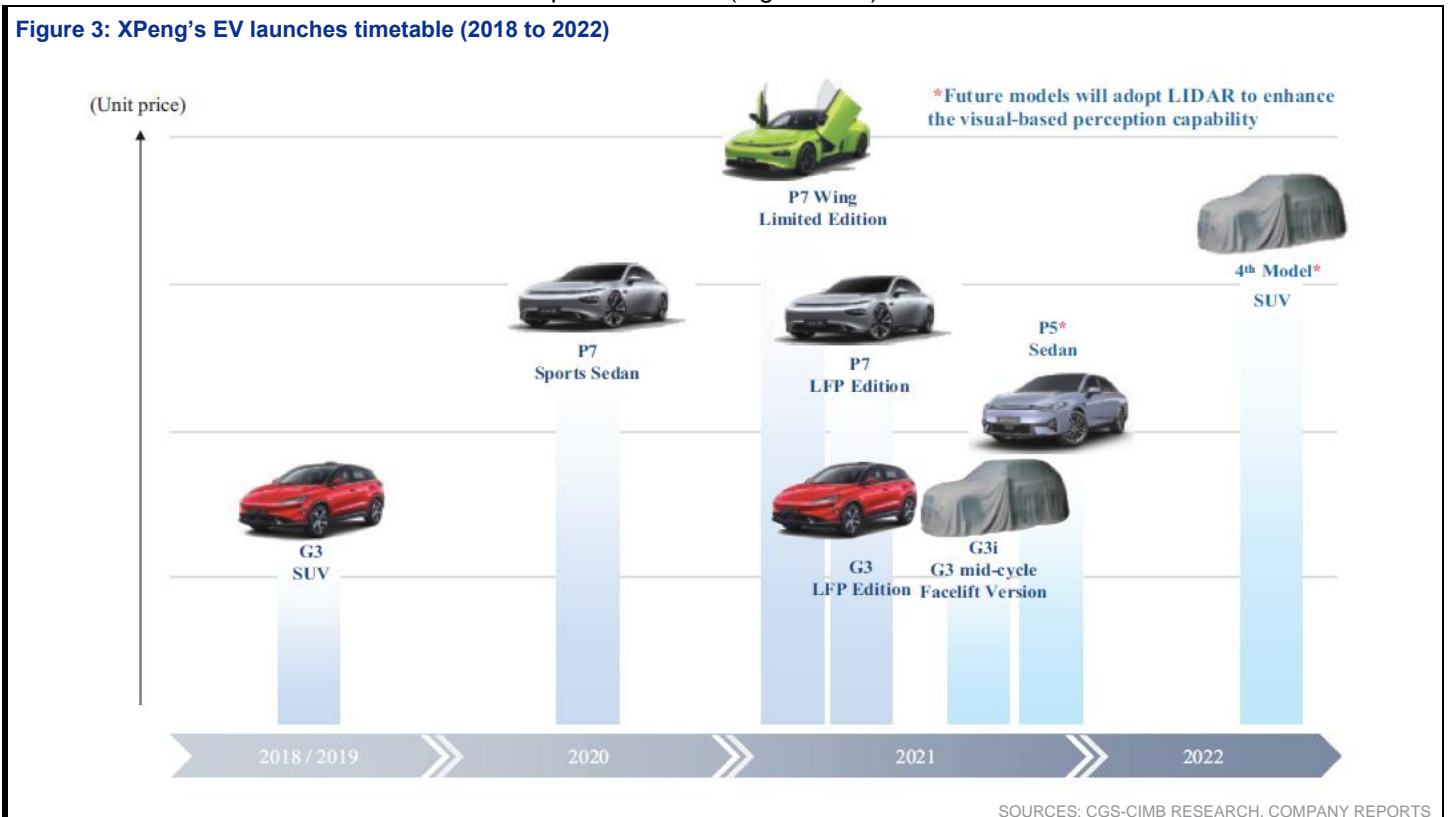
- **G3i** is a compact SUV and a mid-cycle facelift version of the G3 (its first EV model, which started delivery in Dec 2018). G3i started delivery in Aug 2021 and has a wheelbase of 2,625mm and NEDC range of between 460km and 520km. The G3i is priced in the mid- to high-end EV segment in China (Rmb150k to Rmb300k/US\$23k to US\$46k).
- **P7**, its second model, is a four-door sports sedan EV and started delivery in May 2020. With a wheelbase of 2,998mm and NEDC range of between 480km and 706km, the P7 is positioned in the high-end EV segment in China (Rmb230k to Rmb350k/US\$32k to US\$49k).
- **P7 Wing**, the premium version of P7, is a sports sedan EV featuring scissor doors and started delivery in Mar 2021. With a wheelbase of 2,998mm and NEDC range of between 562km and 670km, the P7 Wing is positioned as a luxury sport vehicle, with a selling price range of Rmb367k-409k (US\$56k to US\$62k).
- **P5**, its third smart EV, is a family sedan and started delivery in Sep 2021. The P5 is the world's first mass-produced smart EV to deploy automotive-grade light detection and ranging (LiDAR) technology (source: XPeng website), with ADAS features powered by XPILOT 3.0. The P5 has a wheelbase of 2,768mm and NEDC range of between 460km and 600km. The P5 premium version is equipped with XPILOT 3.5, which will be rolled out through an OTA firmware update in late-2022. The P5 is priced at Rmb158k to Rmb224k (US\$24k to US\$34k) and targets China's mid- to high-end EV segment (Fig 3).

Launching G9 luxury eSUV for global premium EV market ➤

G9, unveiled in Nov 2021, is XPeng's fourth production model. The G9 is a luxury eSUV, conceived and designed from the outset for both the international and domestic Chinese markets. Built according to international safety and environmental protection standards, the G9 meets the requirements for EU 3R certification, an international benchmark for environmental protection requirements. The G9 boasts ultra-high intelligence and adopts the latest XPILOT 4.0 ADAS and the new generation XPower 3.0 powertrain and supercharging system. The model has a driving range of






702km and is equipped with an 800V high-voltage supercharging platform, according to the specifications listed on the company website. Priced at Rmb400k-Rmb500k (US\$62k to US\$77k), the G9 is positioned in the global premium EV segment. XPeng is scheduled to start pre-orders in Aug 2022 and officially launch the G9 in Sep 2022, with deliveries to follow in the fourth quarter in 2022 (Fig 3 and 4).

Figure 3: XPeng's EV launches timetable (2018 to 2022)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 4: XPeng EV models as at 30 Jun 2022

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)
	Dec-18	Compact SUV	2,625	401/520 (with 50.5/65.5kWh battery pack)	8.6	145	300	XPILOT 2.5	149,800 - 199,800
	Jun-20	Mid-size sedan	2,998	480/586/706 (with 60.2/70.8/80.9kWh battery pack)	6.8	196	390	XPILOT 3.0	229,900 - 349,900
	Oct-21	Mid-size sedan	2,768	600 (with 60.2k/80.9Wh battery pack)	7.5	155	310	XPILOT 3.0	157,900 - 223,900
	Sep 2021 (G3 updated facelift version)	Compact SUV	2,625	460/520 (with 60.2/70.8/80.9kWh battery pack)	8.6	170	380	XPILOT 2.5	149,800 - 185,800
	3Q 2022	Mid-size SUV	2,998	702 (with 98kWh battery pack)	5.0	200	551	XPILOT 4.0	400,000 - 450,000

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Exploring European markets ►

XPeng's first EV for Europe delivered in Norway in Dec 2020. XPeng delivered its first batch of the European version of the G3 to customers in Norway in Dec 2020. In Aug 2021, it began deliveries of the P7 to the EU.

Rapidly expanding in the EU. In Feb 2022, XPeng further expanded its presence in EU, signing partnership agreements with local auto dealers in the Netherlands and Sweden. In the Netherlands, XPeng is collaborating with Emil Frey Nederland NV, one of the largest automobile retailers in Europe, to manage a sales and services network in the country. In Mar 2022, XPeng opened its first experience store in the Hague in the Netherlands. For the Swedish market, XPeng is cooperating with Bilja, the largest automobile dealer and distributor there. With these two agreements, XPeng's EVs can reach the third and fourth largest EV markets in the world.

Since Mar 2022, XPeng's P5, a family EV sedan, has been available in the Netherlands, Sweden, Norway and Denmark, via XPeng official websites and experience stores in each country and the XPeng mobile app.

The G9 to accelerate overseas deliveries in FY22-23F. We believe XPeng's overseas deliveries will accelerate in FY22-23F on the back of its rapid sales network expansion. XPeng will start delivery of G9, which is also designed for the international market, in the second half of 2022 or early-2023.

Figure 5: XPeng's experience store in the Hague, Netherlands



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 6: XPeng's experience store in Stockholm, Sweden



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Targeting the premium EV segment in China and globally ►

XPeng's G9 eSUV is its new model in the premium EV segment. XPeng aims to improve its below-industry EV gross profit margin (GPM), which came in at 3.5% and 11.5% in FY20 and FY21, respectively, by moving into the premium segment with the rollout of the G9 luxury eSUV in 2022.

According to XPeng, the G9 eSUV is likely to be priced at around Rmb400k (US\$62k) and will help reposition its EV lineup in the China and global premium EV markets. The P9 eSUV will directly compete with Tesla's Model Y (selling price of Rmb317k to Rmb395k/US\$49k to US\$61k) and German luxury automakers' models, such as Mercedes-Benz E-Class (Rmb437k to Rmb500k/US\$67k to US\$77k) and BMW 5 series (Rmb450k to Rmb664k/US\$69k to US\$102k).

XPeng plans on launching the P9 EV and G5 eSUV, its new premium models in FY23F. Apart from the newly-launched G9, XPeng plans to launch two new premium models in FY23F. The P9 is its new full-size sedan EV, which XPeng expects to retail at around Rmb400k (US\$62k), and the G5 is a small-sized premium eSUV, which the company expects to retail at a Rmb200k to Rmb300k (US\$30k to US\$46k) price point.

We believe the launch of the G9, P9 and G5 will help improve XPeng's GPM as the company expects the new premium models to achieve over 20% GPM due to new manufacturing technology and higher ASP.

XPeng's EV deliveries forecasts ►

In 2019, XPeng delivered a total 12.7k smart EVs, all of which were G3 eSUVs. The company started delivery of P7 in Jun 2020, G3i in Sep 2021 and P5 in Oct 2021.

Cumulative deliveries of XPeng's EVs reached 206,936 units (Dec 2018 to Jun 2022) before surging 124% yoy by 68,983 units in 1H22 due to robust sales performance of the P7 and P5 (Fig 7).

Figure 7: Delivered XPeng's EVs (Dec 2018 to Jun 2022)

Model	Type	Delivered day	2018	2019	2020	2021	2022 (1-6)
G3/G3i	Mid-size SUV	Dec 2018	29	12,728	12,304	29,721	10,239
P7	Mid-size Sedan	Jun 2020	n.a.	n.a.	14,737	60,569	35,410
P5	Mid-size Sedan	Oct 2021	n.a.	n.a.	n.a.	7,865	23,334
Total no. of EV deliveries (units)			29	12,728	27,041	98,155	68,983
Total no. of EV sales (yoy change %)				43790%	112%	263%	124%

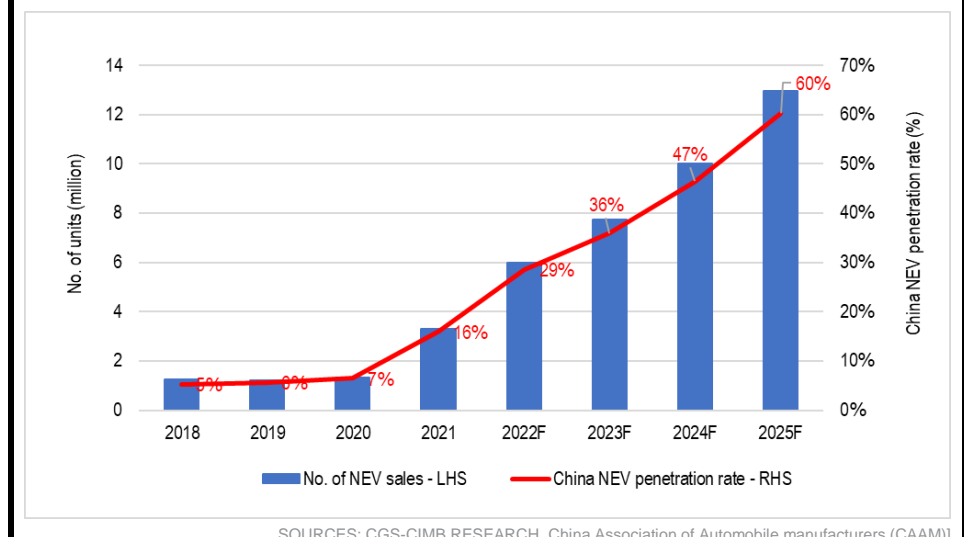
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

China's mid- to high-end EV segment to achieve 38% CAGR in 2020 to 2025F.

According to IHS Markit, in China's EV market, the mid- to high-end segment is the largest, with c.400k units delivered and accounting for c.38% of sales volume in 2020. The research firm forecasts this segment will remain the largest and reach c.1.9m units in 2025G, with a CAGR of 38% from 2020 to 2025F.

NEV penetration rate in China to reach 60% in 2025F. According to China Association of Automobile manufacturers (CAAM), China NEV penetration rate (NEV/total passenger car sales in China) reached 16%, with 3.3m units, in 2021. We estimate China's NEV penetration rate to increase from c.16% in 2021 to c.60% in 2025F or from 3.3m units in 2021 to c.13m units in 2025F. This should be driven by favourable government policies and a significant electrification trend within the automobile industry as well as the rising popularity of smart EVs.

Figure 8: China NEV penetration rate (2018 to 2025F), estimate by CGS-CIMB Research



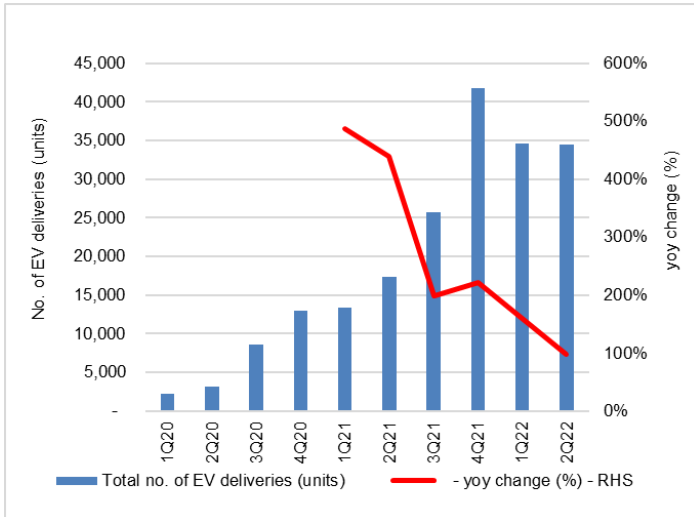
XPeng set to gain market share in China's EV market. Given its expanding product portfolio and enter premium segment (the P9 EV and G5 eSUV, to be delivered in FY23-24F), we believe XPeng is well positioned to capture a slice of the fast-growing demand for smart EVs in China. We pencil in EV delivery growth of 73%/36%/36% yoy in FY22F/FY23F/24F for the company.

XPeng's EV deliveries likely to climb 73% yoy to 170k units in FY22F. We estimate XPeng's EV deliveries will climb 73% yoy to 170k units in FY22F, driven

by higher P5 and P7 models delivery, the launch of G9, overseas contribution as well as recovery in the China EV market.

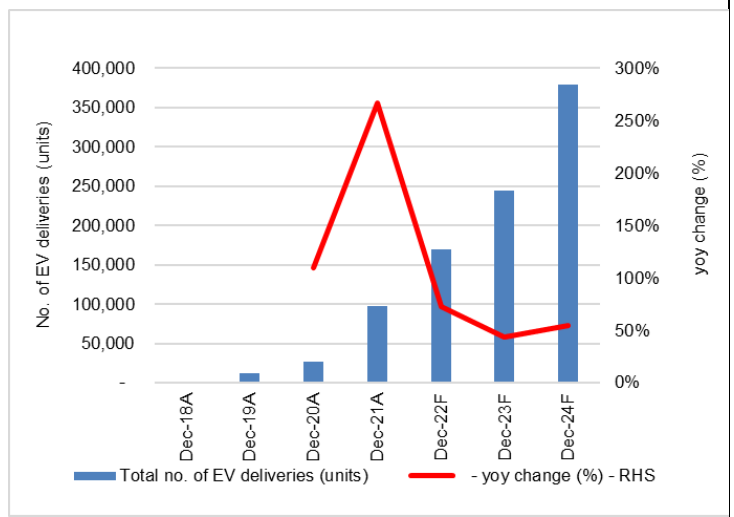
XPeng’s EV deliveries to grow steadily by 44%/55% in FY23F/24F. We expect XPeng’s EV deliveries to grow by 44% yoy in FY23F to 244.7k units and 55% in FY24F to 378.7k units, driven by 1) increasing premium EV sales and continued market share gain in China’s EV segment, 2) EU market contribution and 3) expanding production capacity.

Figure 9: XPeng’s EV deliveries, by quarter (1Q20 to 2Q22)



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 10: XPeng’s EV deliveries (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

XPeng develops own software and hardware technologies

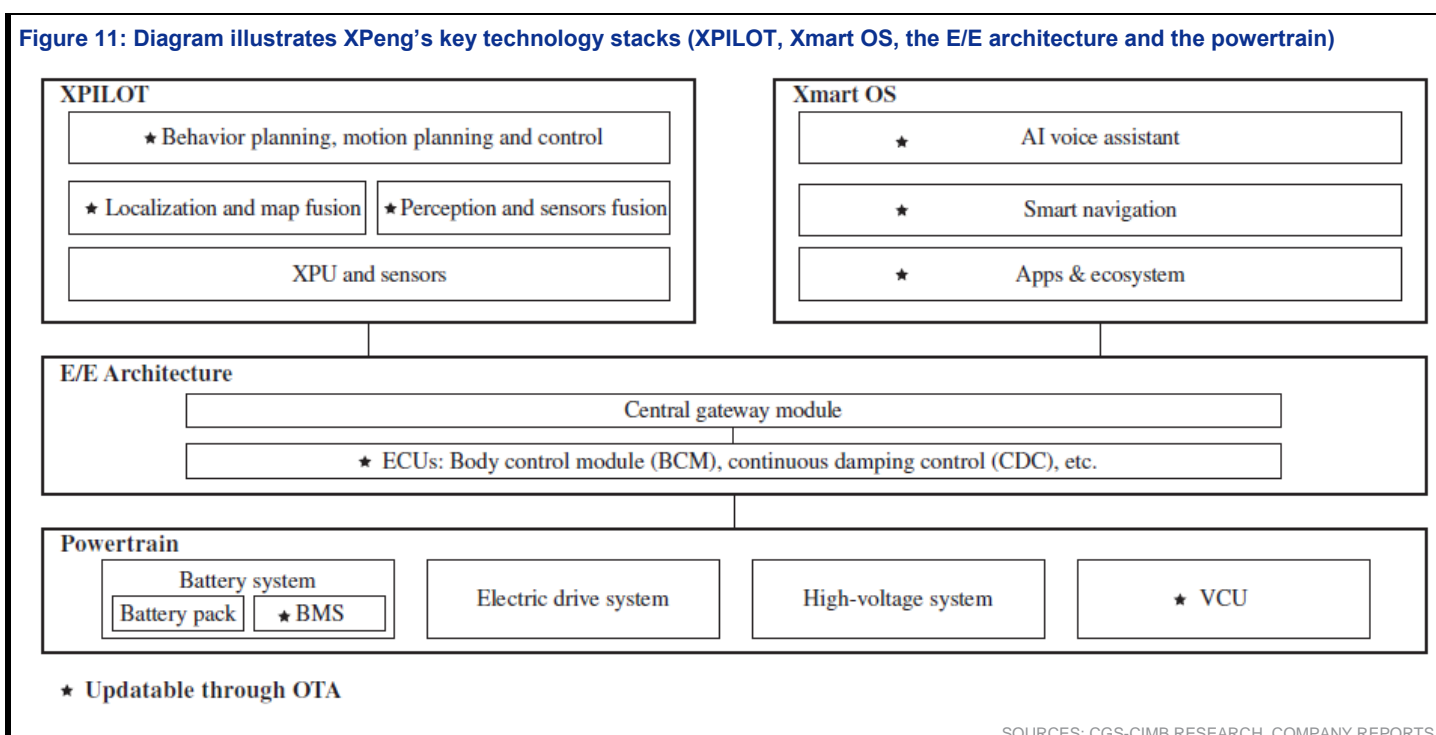
XPeng's self-developed ADAS and OS ►

Self-developed ADAS and OS. We believe XPeng's self-developed Advanced Driver Assistance Systems (ADAS) and in-car intelligent operating systems have led to a huge differentiation from rivals' EV makers in terms of smart mobility experience in its smart EVs. More importantly, the proprietary in-house software platform has strengthened XPeng's brand name among middle-class consumers in China and maintained its solid market position in mid- to high-end EV segment in China.

XPeng's key software technologies include XPILOT – autonomous driving and Xmart OS – mobility operating system. All XPeng's smart EVs can be upgraded through Over-the-Air (OTA) firmware updates for enhancements and new functionalities.

Meanwhile, XPeng also designs, develops and engineers vehicle systems, which include electrical/electronic (E/E) architecture and powertrain for its EVs (Fig 11).

Figure 11: Diagram illustrates XPeng's key technology stacks (XPILOT, Xmart OS, the E/E architecture and the powertrain)



XPILOT – XPeng's autonomous driving technology ►

XPILOT, the proprietary ADAS developed by XPeng. XPeng currently offers advanced ADAS software system, which is customised for driving behaviour and road conditions in China, in its all EV models. XPeng is currently the only automotive company in China that develops in-house a full-stack ADAS software, encompassing localisation and high-definition map fusion, perception algorithm and sensor fusion, behaviour planning, motion planning and control, and has deployed abovementioned software on mass-produced vehicles (firstly adopted in the P5), according to IHS Markit.

XPeng started monetisation from XPILOT 3.0. XPeng launched XPILOT 2.5, the first generation of autonomous driving, in 2019. XPILOT 2.5 only offered adaptive cruise control, adaptive turning control, lane centering control, automated lane changing and automated parking, etc. Subsequently, XPeng launched XPILOT 3.0, the next generation autonomous driving system, in Jan 2021, with new functions including Navigation Guided Pilot (NGP) for highway driving and Valet Parking Assist. XPeng started monetisation from XPILOT 3.0 by

offering customers options to purchase lifetime or annual services. The P5 premium version is equipped with two LiDAR cameras, powered by the XPILOT 3.0 autonomous driving system, which continues to attract young user buyers in the Rmb200k segment, thanks to the advanced ADAS system.

XPeng to launch XPILOT 3.5 in 2022. XPeng’s latest autonomous driving system 3.5 version was introduced in Oct 2021. XPILOT 3.5 features city-driving capabilities called “City NGP” which allows XPeng’s EVs to change lanes, speed up or slow down, or overtakes cars and enter and exit highways. XPeng plans to roll out XPILOT 3.5 in the second half of 2022.

XPILOT 4.0 to be launched in first half 2023. The company is planning to roll out XPILOT 4.0, which will support wider geographical coverage, vehicle switch-on for assisted parking and provide better vehicle interface and improved in-car experience for both drivers and passengers. XPeng plans to roll out XPILOT 4.0 in the first half of 2023 (Fig 12).

XPILOT 4.0

XPILOT 4.0 is designed to deliver full-scenario driver assistance which can support point-to-point driving for customers. XPILOT 4.0 will be built on a comprehensive hardware upgrade, with 508 TOPS ECU computing power supported by two NVIDIA Drive Orin autonomous driving SoC (System-on-the-Chip) units, 8-million-pixel front-view binocular camera and 2.9-million-pixel side-view cameras (covering front, rear, left and right view), and a highly integrated and expandable domain controller.

Figure 12: XPeng Autonomous Driving (XPILOT) contents

XPILOT 2.5 (launched in 2019)	XPILOT 3.0 (launched in Jan 2021)	XPILOT 3.5 (launched in Oct 2021)	XPILOT 4.0 (to be launched in 1H23)
<ul style="list-style-type: none"> - Adaptive cruise control - Adaptive turning control - Lane centering control - Automated lane changing - Automated parking - Active safety features 	<ul style="list-style-type: none"> - Functions of XPILOT 2.5 - NGP for highway driving - Valet Parking Assist - Surrounding Reality (SR) display 	<ul style="list-style-type: none"> - Function of XPILOT 3.0 - NGP for major urban roads (in cities) - change lens, speed up or slow down - overtake cars and enter and exit highways 	<ul style="list-style-type: none"> - Function of XPILOT 3.5 - wider geographical coverage - better Q1 vehicle interface - improved in-car experience for both drivers and passengers

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 13: XPILOT city NGP system supports autonomous navigation in busy cities in China



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 14: XPILOT automated parking feature



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPILOT is autonomous driving software for Chinese consumers. We believe XPILOT showcases XPeng’s advanced ADAS technologies against rival Tesla’s Autopilot, especially since City NGP and XPILOT 3.5 operate using LiDAR sensors rather than pure camera vision. Consumers have been waiting for a long time for an autonomous driving software which is safe, reliable and has good geographical coverage in China. We expect the P5 and the P7, which adopt

XPILOT 3.5, to receive strong customer feedback and achieve robust sales in FY22-23F.

In order to increase the penetration rate of XPILOT, XPeng has made XPILOT a standard feature on the P5 and P7 premium models, while at the same time eliminating free charging services. According to XPeng, its ADAS software system is included in 20% of XPeng's total EVs delivered in 2021 and 2022, of which over 40% penetration in the higher price models.

XPeng's in-car intelligent operating system – Xmart OS ►

XPeng's in-car intelligent operating system – Xmart OS. In order to deliver XPeng's users an easy-to-use and voice-controlled smart mobility experience, XPeng has developed in-car intelligent operating system "Xmart OS", which can support smart cockpit and enable smart connectivity functions such as Artificial Intelligent (AI) voice assistance, smart navigation, ecosystem for third-party apps and services, digital car keys, intelligent recommendations, and remote controls. XPeng rolled out Xmart OS 2.6.0 with the P7 model in May 2020.

XPeng subsequently upgraded the system to OS 3.0, now featuring enhanced interactive cockpit and all-voice interaction, for the P5 in Mar 2021. Meanwhile, the company has started to monetise its software and content offerings in its smart EVs.

Xmart OS's key features

- The AI-empowered voice assistant in Xmart OS is able to engage in continuous driver-vehicle dialogs and execute requests covering a broad range of scenarios.
- Remote App control in Xmart OS manage in-car conditions, locate the car, find a charging pile and control the roof camera via the Xmart mobile App.
- Xmart OS learns to recognise users' music preference and offers a library of over 100,000 songs and several million audio books. X-Sound also comes with multiple sound effects to create your preferred in-car environment.
- Xmart OS can monitor the vehicle surroundings via its roof camera, controlled remotely by the App in the "sentinel" mode, safeguarding your vehicle.
- Xmart OS's in-car app store allows XPeng users to download third-party software, infotainment, in-car gaming and lifestyle apps.

Figure 15: The P5 adopts Xmart OS 3.0



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 16: Xmart OS can monitor the vehicle surroundings via the App



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPeng's OTA upgrades >

OTA software and hardware upgrades via OTA. XPeng currently provides seamless and effective software upgrades for its EV users via OTA firmware. Below are the OTA upgrades by XPeng:

Figure 17: XPeng's OTA content upgrade

Date	OTA Upgrade Content
Jun-21	Rolled out our Xmart OS 2.6.0 through an OTA firmware update to the P7 and introduced new functions and updates, including the Valet Parking Assist, an advanced automated parking function
Mar-21	Completed 15 major OTA firmware updates with 55 new features added to the G3, as well as seven major OTA firmware updates with 73 new features added to the P7
Jan-21	Updated P7 model with 40 new features, including the NGP for highway driving of our autonomus driving system XPILOT 3.0, and our in-car intelligent opearting system Xmart OS 2.5.0
Oct-20	Covered 35 ECUs, including vehicle control unit, battery management system, sensor cotrol unit and autonomus driving unit

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPeng's charging solutions >

XPeng EVs' fast charging solutions. XPeng offers its users a convenient charging and driving experience by offering three charging solutions, including home charging, rapid charging stations, and third-party charging piles.

XPeng currently operates over 800 XPeng-branded super charging stations, covering over 300 cities in China. Each XPeng-branded super charging station has six to seven super charges (peak power output of 120kW). Thanks to the industry-leading fast charging technology, according to XPeng, the P7 battery pack can be charged from 30% to 80% of battery capacity in less than 30 minutes (Fig 18 and 19).

In Sep 2020, XPeng launched a free charging programme for its EV customers at XPeng-branded super charging stations and certain third-party charging stations. Currently, this programme is available in over 140 cities across China.

Apart from super charging stations, users can choose to charge their smart EVs using home chargers or at third-party charging piles.

Figure 18: XPeng-branded indoor super charging station



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Figure 19: XPeng-branded outdoor super charging station



SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

In-house powertrain and E/E architecture capabilities ➤

XPeng designs and engineers its own vehicle systems for its EVs, including the chassis, powertrain and electrical/electronic (E/E) architecture.

In-house powertrain capabilities. XPeng owns in-house research and development capabilities for its EVs' powertrains, focusing on battery safety, range, noise, drivability and digitisation. Its self-developed powertrain electronic control units (ECUs) are amenable to OTA firmware updates, which allow it to upgrade the powertrain's functions and customer driving experience after delivery.

XPeng EE2.0 (domain architecture). XPeng's E/E architecture technologies have achieved the centralised domain stage. Key features are in the table below (Fig 20).

Figure 20: Xpeng EE2.0 (domain architecture)

Features of hardware architecture	Features of software architecture	Features of communication architecture
<ul style="list-style-type: none"> - Most body functions can be migrated to the so-called domain controllers - The hardware foundation of SOA can basically realised 	<ul style="list-style-type: none"> - The SOA architecture (transition phase) is a three-tier interactive automotive software architecture which includes body function layer, application layer, and interaction layer 	<ul style="list-style-type: none"> - The backbone network covers the data of "Ethernet + CANFD", the CPU and serveral other domain controllers are basically based on Ethernet interaction, with the additional CANFD


SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

SWOT analysis ➤

Figure 21: SWOT analysis need to replaced

Strengths	Opportunities
<p>XPeng is one of the leading mid- to high-end EV makers in China due to its self-developed ADAS technologies and its in-house designs, manufacturing and vehicle system capabilities.</p>	<p>XPeng should benefit from rising EV penetration rate in China and continue to gain market share on continuous new model launches.</p>
<p>NIO has successfully launched four models, including the G3/G3i, the P7/P7 Wing, P5 and G9 to capture the large and growing base of middle-class consumers in China.</p>	<p>XPeng's new flagship eSUV, the G9 helped it to expand into the premium EV segment and international markets.</p>
<p>XPeng owns self-developed ADAS and in-car intelligent operating systems that have led to a huge differentiation from domestic EV makers in terms of smart mobility experience in its smart EVs.</p>	<p>XPeng will continue to expand its international market presence to capture the rising global EV demand. The P5 started selling in Denmark, the Netherlands, Norway and Sweden in Mar 2022.</p>
Weaknesses	Threats
<p>XPeng sources majority of its manufacturing materials such as battery packs, ADAS components, cockpit components and various semiconductor chips from different suppliers. Hence, XPeng faces difficulty in controlling manufacturing costs.</p>	<p>NIO faces keen competition in the mid- to high-end EV segment in China from new players, including domestic traditional ICE automakers and EV makers as well as foreign automakers.</p>
	<p>If the Chinese government changes subsidies, economic incentives and other supportive polices for the NEV industry, it could adversely affect XPeng's EV sales.</p>

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

		Refinitiv ESG Scores					
		C+	A-	C+	B-	C+	D+
		ESG Score	ESG Controversies Score	ESG Combined Score	ESG Environment Pillar Score	ESG Social Pillar Score	ESG Government Pillar Score
<p>ESG in a nutshell</p> <p>In 2021, XPeng’s ESG initiatives included conducting internal environmental audits and strengthening its control of sudden environmental pollution accidents. It was also actively involved in community services and targeted labour management as its primary ESG issue following a thorough analysis with its stakeholders.</p> <p>In our view, XPeng is not involved in any environmentally-detrimental industry practices and takes the effort to minimise the environmental impact of its operations.</p>							
Keep your eye on	Implications	<p>In FY21, XPeng’s energy and water consumption and GHG emission increased yoy but energy consumption density fell.</p> <p>In FY21, total energy consumption rose c.99% yoy to 88,717 1,000 kWh while the energy consumption density decreased from 0.008 1,000 kWh/Rmb1,000 in FY20 to 0.004 in FY21. Total water consumption rose c.67% yoy to 424,275m3 while water consumption density stayed at 0.02 m3/Rmb1,000 in FY21. Total greenhouse gas (GHG) emission rose c.48% yoy to 42,484 tonnes while GHG emission density stayed at 0.002 tonnes of CO2/Rmb1,000 in FY21. Hazardous waste generated was 1,071 tonnes and non-hazardous waste generated was 11,995 tonnes. Refinitiv gave XPeng’s environmental pillar a B- score and ranked it 82nd of 225 companies in the global automobile and auto parts sector.</p>					
ESG highlights	Implications	<p>XPeng is actively involved in community services to support the development of public welfare.</p> <p>XPeng donated nearly Rmb17m to charity in FY21. It set up Green Home Fund and provided education about how to live a low-carbon lifestyle and cultivating a rich social environment for green habits. The company also launched the “21-day Empty Plate” campaign, calling on all XPeng employees to reject food waste by using green tableware and clearing their plates during meals. This encouraged employees to bring their own food boxes to reduce the use of disposable tableware. Refinitiv gave XPeng a social pillar score of C+ and ranked it 113rd of 225 companies in the global automobile and auto parts sector. We believe its social pillar rank will rise due to its active support of the community.</p>					
Trends	Implications	<p>XPeng has identified three important ESG issues following analysis with its stakeholders via a four-step materiality assessment.</p> <p>XPeng gathered feedback from various stakeholders and identified key material issues: Labour Management, Product Quality and Safety, and Business Ethics. We expect XPeng to channel more resources to these areas to improve its ESG performance and ratings. Refinitiv ranked XPeng’s governance pillar 215th of 225 companies in the global automobile and auto parts sector. We believe the ranking will improve as XPeng matures in its handling of ESG issues.</p>					

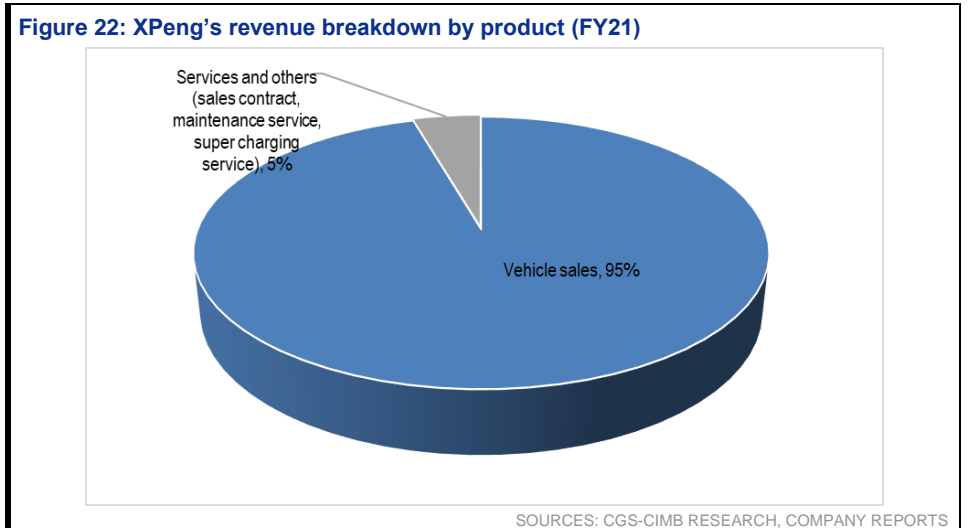
SOURCES: CGS-CIMB RESEARCH, REFINITIV

Financials

FY24F set to turn profitable on robust EV deliveries with improving cost structure ➤

Big jump in FY19-FY21 revenue. XPeng started deliveries of EVs to customers in FY19, which helped grow its revenue rapidly from Rmb2.32bn in FY19 to Rmb5.84bn (+152% yoy) in FY20, and surged to Rmb21.0bn (+259% yoy) in FY21. Services and other revenue, which increased from Rmb0.15bn in FY19 to Rmb0.95bn in FY21, accounted for just 5-7% of FY19-FY21 revenue (Fig 22).

Figure 22: XPeng's revenue breakdown by product (FY21)



Increased net loss in FY21. FY21 net loss (non-GAAP) was Rmb4.48bn, increased from a net loss (non-GAAP) of Rmb1.74bn in FY20, due to significantly increased EV deliveries (+267% yoy), with vehicle GPM of 11.5% (vs. tier-1 auto makers average at 15-20%). However, its net profit margin (non-GAAP) improved to -21.4% in FY21 from -29.7% in FY20 on the back of an improving SG&A expenses to sales ratio, which decreased from 80% in FY20 to 45% in FY21.

XPeng delivered its first EV to a customer in Dec 2018 and only delivered 16.6k units in FY19, but ramped up EV deliveries in FY20 and FY21. EV deliveries jumped 110% yoy to 26.7k units in FY20 and surged 267% yoy to 98.2k units in FY21 (Fig 23).

Figure 23: XPeng's EV deliveries and yoy change, by quarter (1Q20 to 2Q22)

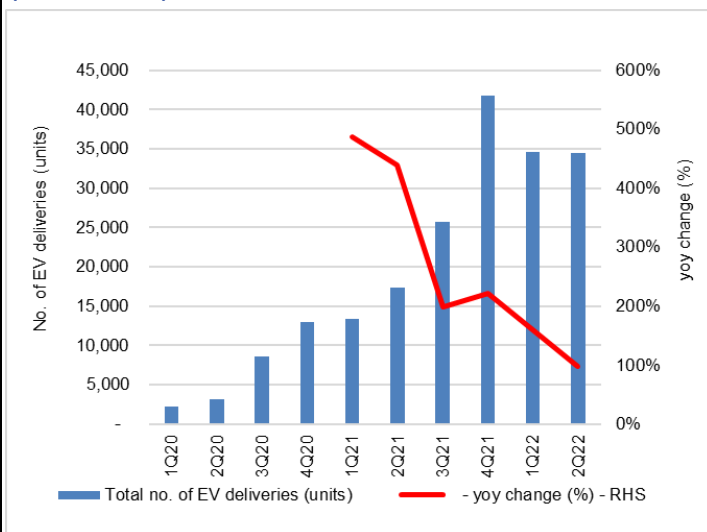
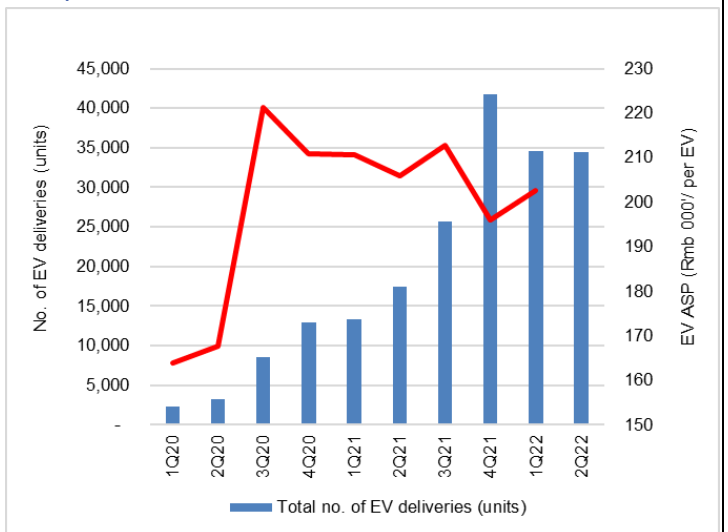


Figure 24: XPeng's EV deliveries vs. ASP, by quarter (1Q20 to 2Q22)

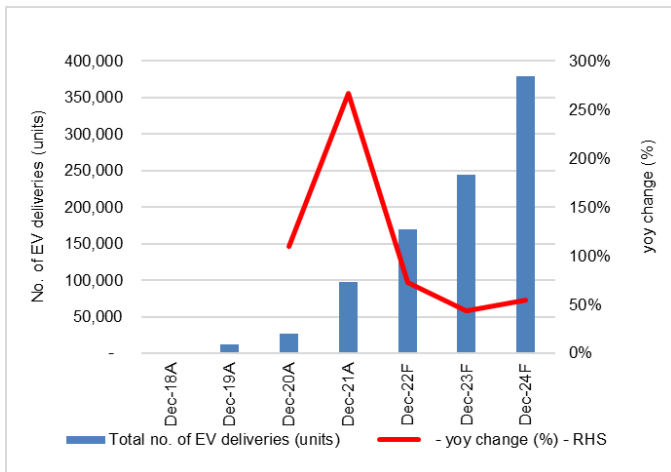


EV deliveries to remain robust in FY22F. EV deliveries were at 69k units, growing 124% yoy in 1H22, despite production halts in Apr 2022 on the back of logistics disruptions and components shortages during the Covid-19 pandemic in China. We estimate 2H22F EVs deliveries to reach 100.8k units, up 50% yoy, thanks to resumed production at its Zhaoqing plant and strong deliveries of the P5 and the P7, as well as the start of deliveries for its new model G9, as well as supportive government policy (exemption from electric vehicle purchase tax and subsidies ceasing at end-2022).

Strong revenue growth in FY22-24F on robust EV deliveries outlook. We project XPeng to deliver revenue CAGR of 76% in FY21-24F on the back of strong growth in EV deliveries (57% CAGR, from 98k units in FY21 to 379k in FY24F and rising ASP (13% CAGR, from Rmb204/per unit in FY21 to Rmb291/per unit in FY24F) (Fig 25 and 26).

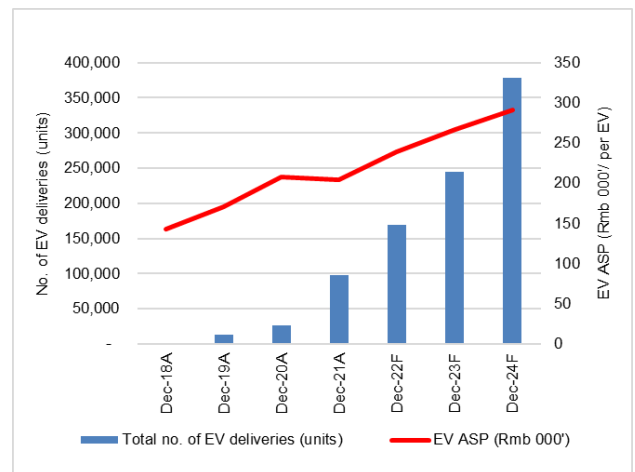
We project XPeng to turn profitable in FY24F. We project Xpeng to post net profit (non-GAAP) of Rmb2.36bn in FY24F, driven by 1) strong EV deliveries of 315k units, with increased ASP of Rmb292/per unit, thanks to deliveries of the new G9, P9 and G5 models and improved GPM and expenses ratio in SG&A. We estimate GPM will significantly expand from 12.5% in FY21 to 20.7% in FY24F and SG&A expenses-to-sales ratio will decrease from 45% in FY21 to 20% in FY24F, thanks to lower production costs/per unit, and rising ASP from premium new model launches (Fig 27 and 28).

Figure 25: XPeng's EV deliveries and yoy change (FY18 to FY24F)



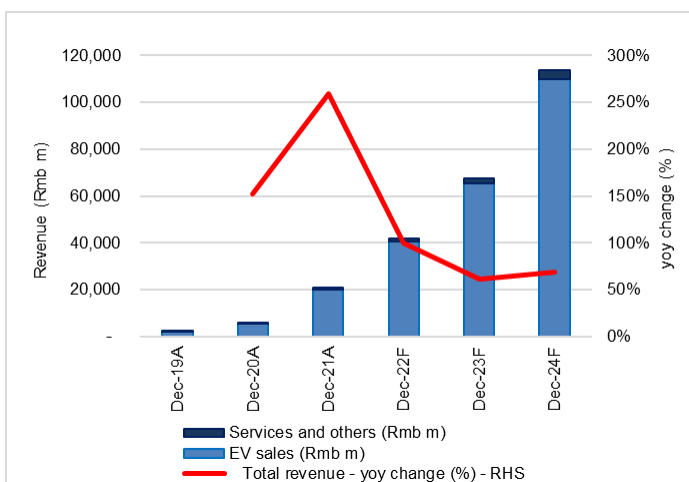
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 26: XPeng's EV deliveries and ASP (FY18 to FY24F)



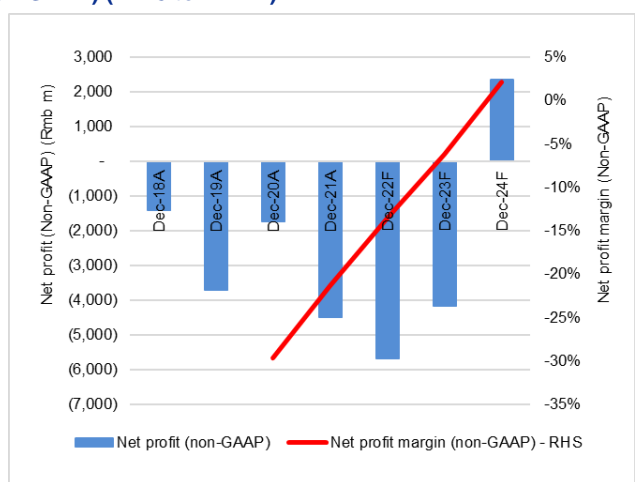
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 27: XPeng's revenue and yoy change (FY18 to FY24F)



SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 28: Xpeng's net profit (non-GAAP) and net profit margin (non-GAAP) (FY18 to FY24F)



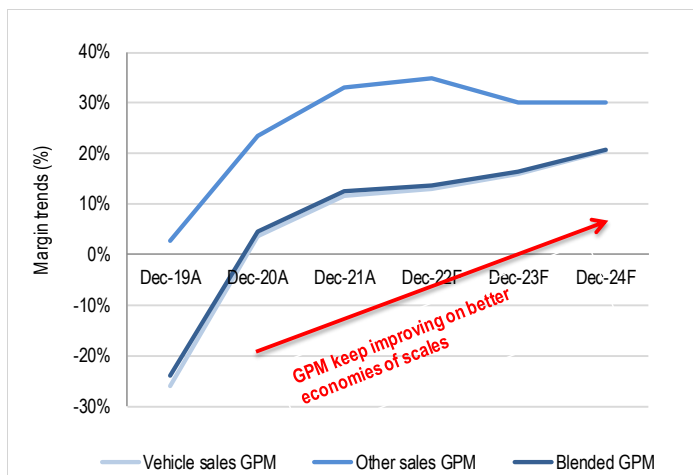
SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Profit margin trend ➤

Vehicle GPM could reach 20.2% in FY24F. XPeng's vehicle FY20 and FY21 GPM was impacted by lower margins for its older models, the G3i and P5, which are targeted towards the most competitive mid- to high-end segment in China (Rmb150k to Rmb300k, or US\$23k to US\$46k), while GPM for the G3i is at c.5% on increased materials and production costs in FY20-FY21. Vehicle GPM was relatively low at 3.5% in FY20 and 11.5% in FY21. However, we expect GPM to gradually improve in FY22-24F, underpinned by 1) increase in EV deliveries, 2) change in product mix (launch of G9 eSUV premium model in FY22F, and P9 EV and G5 eSUV models in FY23F) and 3) new manufacturing process for new premium models, as well as improving operating leverage.

We estimate its vehicle GPM would reach 13.0% in FY22F, 15.9% in FY23F and 20.2% in FY24F, on the back of a higher proportion of premium EV deliveries and three new manufacturing process in the new models. (Fig 29 & 30).

Figure 29: Gross profit margin (GPM), breakdown by product (FY19 to FY24F)

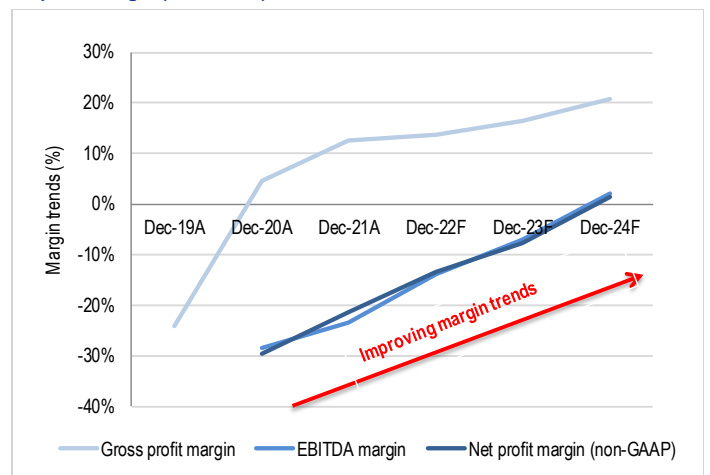


SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 30: Margin trends (FY19 to FY24F)

EBITDA margin was -162% in FY19

Net profit margin (non-GAAP) was -160% in FY19

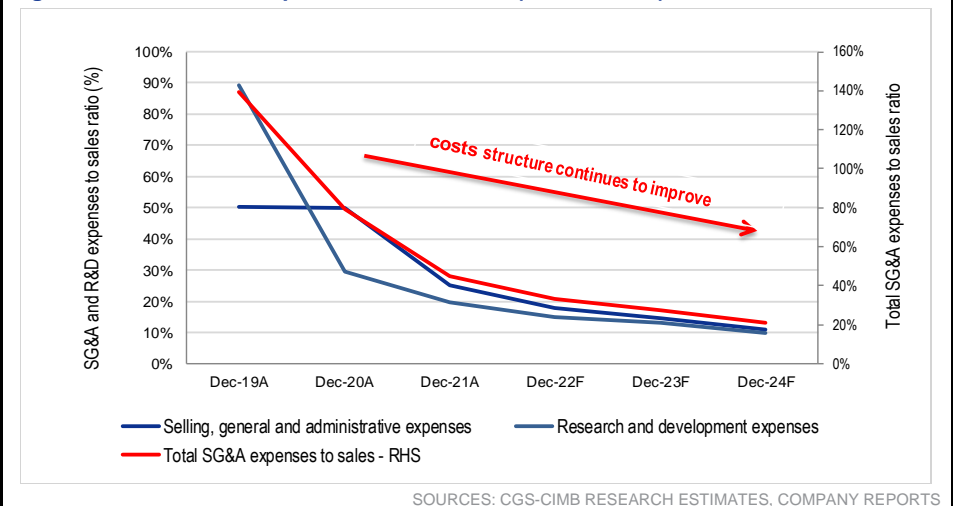


SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Total SG&A expenses-to-sales ratio remained high at 45% in FY21. XPeng's total SG&A expenses consist of selling, general and administrative expense and R&D expenses. As the company heavily invested in R&D for its XPiLOT and Xmart OS technologies, its R&D expenses ratio remained high at c.20% of FY21 revenue. Total SG&A expenses to sales ratio stood at c.25% in FY21 due to its growing sales network and overseas expansion.

Although we believe XPeng's R&D expenses will remain high at around Rmb6.3bn in FY22F to Rmb12.0bn in FY24F as it continues to develop new features in its XPiLOT and Xmart OS, we expect XPeng's SG&A expenses-to-sales ratio to substantially improve from 44.9% in FY21 to 20.0% in FY24F due to stronger revenue, lower manufacturing costs and better economies of scale (Fig 31).

Figure 31: Total SG&A expenses-to-sales ratio (FY19–FY24F)



Balance sheet and cashflow ➤

Net cash of Rmb35.5bn as at end-FY21. As at 31 Dec 2021, XPeng has long-term bank borrowings of Rmb1.68bn, with no short-term bank borrowing, and cash of Rmb45.0bn, translating into net cash of Rmb43.4bn.

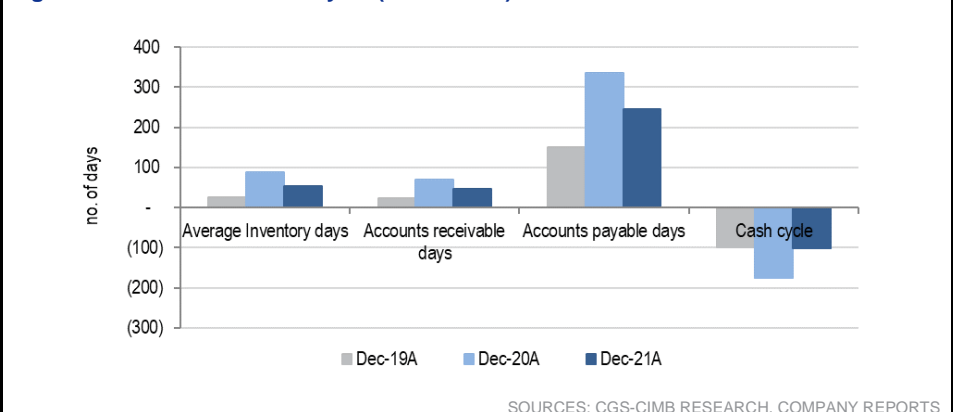
Remain in net cash in FY22-24F. We believe capex will peak at Rmb4.38bn in FY22F due to production expansion at its Xiaoqing plant. We expect XPeng’s net cash to decrease to Rmb30.5bn in FY22F and Rmb22.0bn in FY23F due to negative EBITDA of Rmb5.8bn in FY22F and Rmb3.8bn in FY23F, respectively. We estimate XPeng will achieve positive EBITDA of Rmb3.2bn but net cash will further decrease to Rmb20.0bn in FY24F (Fig 32).

Figure 32: Cash projection (FY20-FY24F)

FYE Dec (Rmb m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(2,538)	(4,952)	(5,817)	(3,833)	3,235
Less : Change in working capital	2,502	3,662	(3,225)	(1,378)	(3,430)
Less : Capital expenditure	(806)	(2,300)	(4,380)	(4,000)	(2,000)
Less : Taxation	(1)	(26)	0	0	(269)
Free cash flow	(843)	(3,615)	(13,422)	(9,211)	(2,464)
Dividend paid	0	0	0	0	0
Net (debt) / cash	33,526	43,418	30,501	22,022	20,366
Cash and equivalents	35,344	45,093	32,176	23,697	22,042
Total borrowings	(1,818)	(1,675)	(1,675)	(1,675)	(1,675)

SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 33: Cash conversion cycle (FY19–FY21)



Valuation and recommendation

Initiate coverage with Add and target price of HK\$207.5 ➤

Riding on its industry-leading autonomous driving and intelligent operating system. We estimate XPeng's EV deliveries to achieve 48% CAGR in FY21-24F, with 315k units and c.3.3% market share in China's NEV market, on the back of 1) its broadening EV portfolio (new models entering premium EV segment), 2) market share gains along with growing EV penetration in China, 3) increase in overseas deliveries, thanks to its advanced autonomous driving technology (XPiLOT with industry-leading City Navigation Guide Pilot features) and its smart cockpit and in-car infotainment system.

On the back of improving vehicle GPM in FY22-24F, driven by changes in product mix, rising ASP and a new manufacturing platform, we estimate XPeng to turn profitable (non-GAAP) with Rmb2.36bn net profit in FY24F.

Initiate coverage with Add. We initiate coverage on XPeng Inc (XPeng) with an Add as we are positive on its position in the broad and fast-growing EV market in China as its targets younger buyers looking for a sleek and modern vehicle that is affordably priced.

Our DCF valuation for XPeng is HK\$207.5 per share. We use the discount cash flow (DCF) methodology to value XPeng as we expect it to be profitable only in FY24F and onwards. Our forecasts in our DCF model are until FY40F. We use an average WACC of 12.1% (WACC assumptions: risk free rate:3.5%, beta:1.50, COE:12.5%) and terminal growth rate of 5% (based on our estimates for China EV industry growth) and arrive at DCF per share of HK\$207.5. Our DCF target is equivalent to 203x CY24F P/E and 95x CY24F EV/EBITDA (Fig 34).

Figure 34: DCF valuation

FYE Dec (RMB m)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F	Dec-25F	Dec-30F	Dec-35F	Dec-40F	Terminal
Revenue	5,844	20,988	41,975	67,521	113,996	147,055	427,591	545,726	696,501	888,931
Operating expenses	(8,383)	(25,940)	(47,792)	(71,355)	(110,761)	(138,232)	(363,452)	(463,867)	(592,025)	(755,591)
EBITDA	(2,538)	(4,952)	(5,817)	(3,833)	3,235	8,823	64,139	81,859	104,475	133,340
Plus : Depreciation/Amortization	328	609	1,178	1,635	1,845	2,019	3,711	5,852	7,964	10,383
Less : Change in working capital	2,502	3,662	(3,225)	(1,378)	(3,430)	1,471	4,276	5,457	6,965	8,889
Less : Capital expenditure	(806)	(2,300)	(4,380)	(4,000)	(2,000)	(2,206)	(6,414)	(8,186)	(10,448)	(13,334)
Less : Taxation	(1)	(26)	0	0	(269)	(347)	(1,009)	(1,288)	(1,644)	(2,098)
Free cash flow	(515)	(3,006)	(12,245)	(7,577)	(619)	9,760	64,702	83,694	107,313	1,921,364
Discount factor		1.00	1.00	0.89	0.80	0.71	0.40	0.23	0.13	0.07
PV FCF		(515)	(3,006)	(2,681)	(9,737)	(5,373)	15,311	17,056	12,363	8,920
Enterprise value (Rmb m)		353,531								
Less : Net debt / (cash)		43,418								
Equity value (Rmb m)		310,113								
Equity value - less minority		310,113								
Equity value per share (Rmb)		180.15								
Equity value per share (HK\$)		207.45								
Key assumptions										
WACC		12.1%								
Terminal growth		5.0%								

SOURCES: CGS-CIMB RESEARCH ESTIMATES, COMPANY REPORTS

Figure 35: Peers comparison

Company	Bloomberg Code	Price Target price (local curr)	Target price (local curr)	Upside (%)	Market Cap (US\$m)	P/E (x)		3-year EPS CAGR %	P/BV (x)		ROE (%)		EV/EBITDA (x)		Yield (%)		
						CY2022F	CY2023F		CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F	CY2022F	CY2023F	
NIO, Li Auto and Xpeng																	
NIO Inc	9866 HK	Add	156.80	257.30	64%	33,368	na	89.9	na	8.4	7.1	-21.9%	-5.6%	na	257.4	0.0%	0.0%
Li Auto	2015 HK	Add	133.10	203.56	53%	35,039	190.9	72.6	na	4.5	4.5	0.1%	2.4%	363.3	80.4	0.0%	0.0%
XPeng Inc	9868 HK	Add	92.45	207.45	124%	20,273	na	88.2	na	4.1	5.4	-16.9%	-16.7%	na	na	0.0%	0.0%
Electric vehicle manufacturers																	
BYD Co.	1211 HK	Not Rated	287.00	N/A	n.a.	127,768	55.9	39.2	65.2%	6.0	5.2	12.1%	14.9%	22.2	17.2	0.2%	0.2%
Tesla Inc	TSLA US	Not Rated	891.83	N/A	n.a.	931,508	51.8	43.2	49.3%	15.3	11.4	33.2%	27.6%	30.8	23.9	0.0%	0.0%
Average							53.8	41.2	57.2%	10.6	8.3	22.7%	21.3%	26.5	20.6	0.1%	0.1%
China Automobile manufacturers																	
Geely Automobile	175 HK	Not Rated	17.00	N/A	n.a.	21,702	15.6	12.1	21.9%	1.8	1.6	11.3%	12.9%	7.8	6.3	2.1%	2.7%
Great Wall Motor	2333 HK	Not Rated	12.70	N/A	n.a.	36,299	9.0	7.3	24.9%	1.3	1.2	15.5%	17.7%	12.7	10.2	5.1%	6.8%
Guangzhou Auto	2238 HK	Not Rated	7.45	N/A	n.a.	19,528	5.7	5.0	23.6%	0.6	0.6	11.3%	11.8%	21.7	18.4	4.7%	5.4%
Average							10.1	8.1	23.4%	1.2	1.1	12.7%	14.1%	14.1	11.6	4.0%	5.0%
Foreign automobile manufacturers																	
Kia Motor	000270 KS	Add	81,200	110,000	35%	25,240	6.0	5.6	6.3%	0.8	0.7	14.7%	13.2%	2.8	2.6	1.5%	1.5%
Hyundai Motor	005380 KS	Hold	196,500	190,000	-3%	32,195	8.0	7.6	12.9%	0.7	0.6	8.3%	8.1%	9.4	9.1	2.0%	2.0%
Toyota	7203 JP	Not Rated	2,154.50	N/A	n.a.	268,264	9.9	8.9	17.9%	1.1	1.0	11.2%	11.4%	12.5	11.4	2.9%	3.3%
BMW	BMW GR	Not Rated	79.53	N/A	n.a.	53,346	5.5	5.3	-2.4%	0.6	0.6	10.5%	10.5%	4.4	3.6	6.2%	6.5%
Mercedes-Benz Group	MBG GR	Not Rated	56.87	N/A	n.a.	62,278	5.0	4.9	-5.6%	0.7	0.7	14.2%	14.1%	0.8	1.0	8.0%	8.2%
Volkswagen	VOW GR	Not Rated	193.90	N/A	n.a.	87,768	5.7	5.1	10.2%	0.6	0.6	10.5%	10.8%	2.4	2.2	4.9%	5.4%
Ford	F US	Not Rated	15.34	N/A	n.a.	61,670	7.5	7.4	4.4%	1.2	1.1	14.1%	12.8%	3.2	2.1	3.5%	3.5%
General Motor	GM US	Not Rated	36.77	N/A	n.a.	53,612	5.7	5.6	-2.1%	0.7	0.6	12.4%	11.4%	2.7	2.3	1.3%	2.0%
Average							6.7	6.3	5.2%	0.8	0.7	12.0%	11.6%	4.8	4.3	3.8%	4.1%
Battery manufacturers																	
CATL	300750 CH	Not Rated	523.87	N/A	n.a.	189,187	35.7	26.3	51.7%	8.5	6.4	25.4%	26.2%	23.0	17.2	0.2%	0.3%
EVE Energy	300014 CH	Not Rated	99.30	N/A	n.a.	27,899	32.5	22.8	39.7%	7.0	5.4	22.8%	25.0%	26.0	18.1	0.4%	0.5%
Gotion High-Tech	002074 CH	Not Rated	38.66	N/A	n.a.	10,176	55.5	38.2	85.7%	3.2	3.1	6.4%	8.9%	24.0	18.1	0.6%	0.7%
Shenzhen Desay Battery	000049 CH	Not Rated	43.34	N/A	n.a.	1,926	13.2	10.4	16.9%	2.8	2.4	23.8%	25.9%	7.9	5.5	1.6%	2.5%
LG Energy Solution	373220 KS	Not Rated	417,000	N/A	n.a.	74,636	66.4	47.5	37.8%	4.8	4.4	7.7%	9.7%	22.0	16.8	0.0%	0.1%
SK On	096770 KS	Not Rated	180,000	N/A	n.a.	12,729	7.7	7.7	43.8%	0.7	0.6	9.9%	8.9%	5.7	5.7	2.3%	2.3%
Samsung SDI	006400 KS	Add	572,000	750,000	31%	30,161	21.2	17.9	23.3%	2.4	2.2	9.7%	10.8%	8.7	7.0	0.2%	0.2%
Average							33.2	24.4	42.7%	4.2	3.5	15.1%	16.5%	16.7	12.6	0.7%	0.9%
Electric vehicle parts manufacturers																	
LK Technology	558 HK	Not Rated	12.64	N/A	n.a.	2,216	21.6	16.2	59.9%	3.9	3.3	19.9%	21.8%	14.8	11.5	0.9%	1.1%
Times Electric	3898 HK	Not Rated	33.25	N/A	n.a.	9,525	15.1	13.2	14.5%	1.1	1.0	7.4%	8.2%	16.6	14.6	1.8%	2.1%
Ningbo Joyson Electronic	600699 CH	Not Rated	20.93	N/A	n.a.	4,237	28.2	21.9	-218.5%	2.2	2.0	8.0%	9.4%	10.0	8.5	0.4%	0.4%
Continental AG	CON GY	Not Rated	67.30	N/A	n.a.	13,778	7.2	5.7	20.0%	1.0	0.9	13.8%	15.0%	3.3	2.8	4.2%	5.4%
Valeo	FR FP	Not Rated	20.85	N/A	n.a.	5,177	9.4	6.5	69.0%	1.2	1.1	13.6%	17.3%	3.3	2.7	3.8%	4.8%
Magna International	MGA US	Not Rated	64.23	N/A	n.a.	18,572	8.9	6.8	22.9%	1.5	1.4	17.5%	20.2%	4.9	4.1	2.9%	3.2%
Average							15.1	11.7	-5.4%	1.8	1.6	13.4%	15.3%	8.8	7.4	2.3%	2.8%

NOTE: ESTIMATES FOR NOT RATED (NR) COMPANIES ARE ALL BASED ON BLOOMBERG CONSENSUS ESTIMATES
SOURCES: CGS-CIMB RESEARCH ESTIMATES, BLOOMBERG (PRICE AS AT 02 AUG 2022)

Share price re-rating catalysts ►

XPeng's share price (ADRs) has appreciated 63% since it was listed on the NYSE in 27 Aug 2020.

We believe key potential share price re-rating catalysts include:

- Favourable policies: policies promoting the purchase of EVs from the central and local governments, relaxation of automotive purchasing quota in key cities and EV purchase tax exemption.
- Strong order backlog for new models, i.e. luxury eSUV G9, premium EV P9 and premium eSUV G5.
- Notable vehicle margin improvement from higher proportion of premium EV deliveries and improved manufacturing process.
- Narrowing of net loss and turning profitable.
- XPILOT ADAS software system iteration.
- XPILOT's City NGP feature iteration.
- Change of its primary listing status to HK and delisting of its ADRs.

Key risks >

China's automotive market is highly competitive. XPeng directly competes with other battery EV companies, especially those targeting the mid- to high-end segment, domestic traditional internal combustion engine (ICE) automakers as well as foreign automakers. As traditional automakers have stronger brand recognition, greater financial resources, more sophisticated engineering capabilities and established distribution channels, XPeng could find it challenging to maintain its leadership position in China's mid- to high-end EV segment and grow its EV sales. Meanwhile, XPeng has to consistently invest in R&D to maintain its competitive edge in ADAS and OS as well as in product quality, safety and reliability, etc., in the China EV industry.

China government policies supporting EV industry. China has been encouraging and providing various favourable policies to support a healthy development of its EV industry. Favourable government incentives and subsidies in China include one-time government subsidies, exemption from vehicle purchase tax, exemption from license plate restriction in some cities, preferential utility rate for charging facilities etc.

Any change in government subsidies, economic incentives and government policies to support NEVs could adversely affect XPeng's business performance.

Covid-19 impact. Since early 2020, in a bid to contain the spread of Covid-19 in China, the Chinese government implemented a series of prevention measures such as quarantining, asking residents to remain at home and social-distancing measures etc.; these had affected the production and sales of vehicles over the past two years. Although Covid-19 is largely under control in China, a new wave of Covid-19 outbreak in the country could again affect XPeng's vehicle production and sales.

Amid an outbreak of a new Covid-19 variant in Mar and Apr 2022, XPeng's vehicle production was affected by supply chain volatilities. XPeng's key suppliers located in Jilin, Shanghai, Jiangsu and many other locations shut down production, causing its Zhaoqing plant to run out of components and operate at below 50% of its full capacity. Nevertheless, the Zhaoqing plant has resumed operations and has been on double-shift production since mid-May 2022.

Supply chain constraints. Persistent global chip shortages have negatively affected XPeng's vehicle output in FY21 and 1H22. The company delayed deliveries of the P5 and P7 during Dec 2021 to May 2022 on the back of extreme tightness in the supply of some key components, such as lithium iron phosphate batteries, on the back of global automotive components shortages and logistics issues as a result of Covid-19-induced restrictions in China. Furthermore, XPeng experienced increased costs related to procuring raw materials required to manufacture and assemble its vehicles.

Company background

XPeng is the leading smart EV manufacturer in China >

XPeng founded in 2015. XPeng Inc (XPeng) is a fast-growing smart electric vehicle (EV) manufacturer based in China that was founded in 2015. The company was listed on the NYSE in Aug 2020 and on the HKEX in Jul 2021.

XPeng designs, develops, manufactures and sells EVs, mainly in China. XPeng develops in-house its full-stack advanced driver-assistance system (ADAS) technology and in-car intelligent operating system, as well as core vehicle systems including powertrain and the electrical and electronic (E/E) architecture.

XPeng is headquartered in Guangzhou, China, with main offices in Beijing, Shanghai, Silicon Valley, San Diego and Amsterdam. XPeng manufactures its EVs at its plant in Zhaoqing, Guangdong province, China.

Company milestones >

Figure 36: XPeng's milestones






2015	<ul style="list-style-type: none"> Chengxing Zhidong was founded.
2017	<ul style="list-style-type: none"> Entered into our Series A, Series A1 and Series A2 financing arrangements, with an aggregate amount of Rmb1.23bn.
2018	<ul style="list-style-type: none"> Entered into our Series B, Series B1 and Series B2 financing arrangements, with an aggregate amount of Rmb6.2bn. XPeng was founded as a part of the reorganization to facilitate an initial public offering (IPO) in the United States.
2019 - 2020	<ul style="list-style-type: none"> Entered into our Series C and Series C+ financing arrangements for an aggregate amount of more than US\$1.30bn.
2020	<ul style="list-style-type: none"> Commenced delivery of the Company's second Smart EV model, the P7. Completed the initial public offering and listing on the NYSE as well as a follow on offering.
2021	<ul style="list-style-type: none"> Rolled out navigation guided pilot (NGP) for highway driving, a function of XPiLOT 3.0 which is the Company's latest proprietary autonomous driving system released in January, via OTA firmware update. Completed the initial public offering and listing on HKEX as well as a follow on offering.

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPeng targets middle-class consumers in China. XPeng's EVs target the large and growing base of middle-class consumers in China. XPeng's EV prices range from Rmb150k to Rmb400k (US\$23k to US\$62k) for four models, namely G3, P7, P7 Wing and G5. XPeng also launched premium eSUV G9 with sell price over Rmb400k (US\$62k) which XPeng expects to deliver to customers in the fourth quarter 2022.

- XPeng's first model was the G3, a compact SUV targeting China's mid- to high-end market. The delivery of the G3 to customers began in Dec 2018.
- XPeng started delivery of the P7 in May 2020. P7 is a sedan battery EV targeted at China's mid- to high-end EV segment.
- In Mar 2021, XPeng started delivery of the P7 Wing, a limited edition EV designed to accentuate the sporty and dynamic styling of the sport sedan with scissor-style front door.
- XPeng started delivery of the third model P5, a premium mid-size sedan EV, in Sep 2021.
- XPeng introduced G3i, the mid-cycle facelift version of the G3, in Dec 2021. It started delivery in Aug 2021.
- XPeng launched its fourth model G9 in Nov 2021, G9 will be XPeng's flagship smart eSUV which it conceived and developed from the ground up for both the international and China markets. XPeng plans to commence mass production and start delivery in the fourth quarter of 2022 (Fig 37).

Figure 37: XPeng EV models as at 30 Jun 2022

Model	Delivery Date	Segment	Wheelbase (mm)	Driving range (km)	Acceleration time (0 to 100km/h) (s)	Peak Power (kW)	Maximum Torque (NM)	Autonomous driving package	MSRP starting from (RMB)
 G3	Dec-18 Sept-21 (Updated version)	Mid-size SUV	2,625	401/520 (with 50.5/65.5kWh battery pack)	8.6	145	300	XPILOT	149,800 - 199,800
 P7	Jun-20	Mid-size sedan	2,998	480/586/706 (with 60.2/70.8/80.9kWh battery pack)	6.8	196	390	XPILOT	229,900 - 349,900
 P5	Oct-21	Mid-size sedan	2,998	385 (with 66.2kWh battery pack)	7.5	155	310	XPILOT	157,900 - 223,900
 G3i	Dec-21	Compact SUV	2,625	460/520 (with 60.2/70.8/80.9kWh battery pack)	8.6	170	380	XPILOT	149,800 - 185,800
 G9	3Q 2022	Mid-size SUV	2,998	702 (with 98kWh battery pack)	5.0	200	551	XPILOT 4.0	400,000 - 450,000

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

XPeng sells its EVs online and offline ►

XPeng sells EVs via an omni-channel sales model. XPeng employs an omni-channel sales model to sell its EVs – online as well as via a physical sales and services network. As at end-2021, XPeng operated a network of 357 physical sales and service outlets (mainly located in shopping malls) and 117 service centres, covering over 140 cities in China. XPeng also cooperates with various online platforms to enhance its brand awareness and acquire new customers.

Supply chain ►

XPeng develops own software and hardware technologies. Unlike its key competitors, who are highly dependent on third-party software and hardware suppliers, XPeng develops most of its core technologies in-house to achieve a rapid pace of innovation for continuous new EV model rollouts and to ensure it maintains its competitive as future vehicle systems become increasingly complex (Fig 38).

XPeng's key software technologies include XPILOT, its autonomous driving assistance system (ADAS), and the Xmart operating system (OS). The company also designs, develops and engineers vehicle systems for its EVs. XPeng's core technologies in vehicle system include powertrain and electrical/electronic (E/E) architecture.

XPeng's R&D team comprises over 2,000 skilled employees, of which around 1,000 are focused on ADAS, intelligent network, intelligent electric and various new intelligent systems. The company have R&D centres in Guangzhou, Shanghai and Beijing in China, and in the US Silicon Valley.

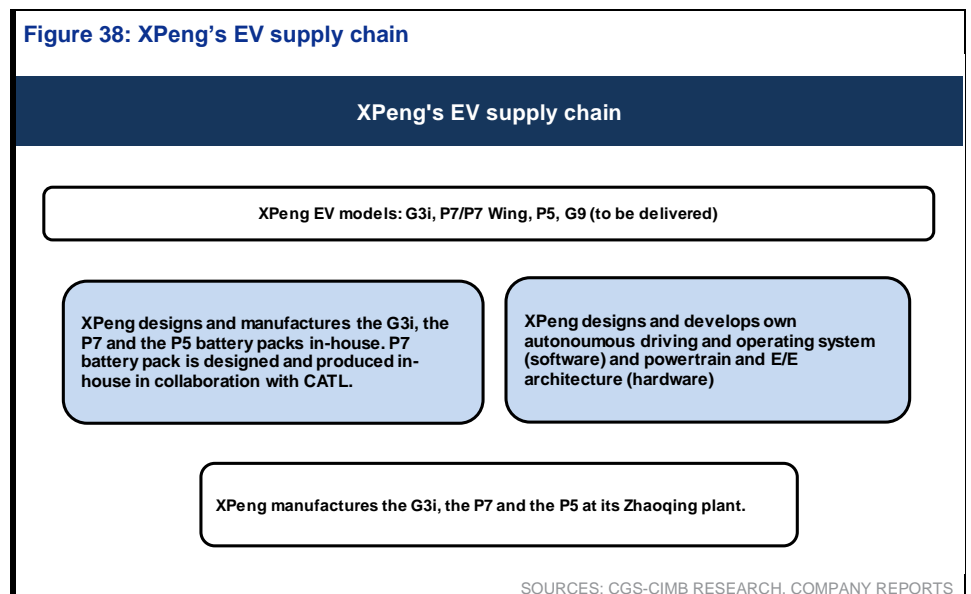
In-house EV production capability. XPeng's smart EVs are mainly manufactured at its plant in Zhaoqing, Guangdong province, China. The company started to produce the P7 in its Zhaoqing plant in May 2020 and it currently manufactures the G3, P7 and P5 there too. Zhaoqing plant has an annual production capacity of 100,000 units.

XPeng plans to further expand its production capacity to meet the growing demand. The company is currently constructing new smart EV manufacturing bases, one each in Guangzhou and Wuhan, with a designed annual production capacity of up to 100,000 units per plant. Upon these two plants' completion, XPeng will have a total in-house production capacity of 300,000 units p.a.

EV batteries designed and produced in-house. XPeng utilises Lithium Nickel Manganese Cobalt Oxide (NCM) cells and Lithium Iron Phosphate (LFP) cells for its EV batteries. The G3 battery pack was designed in-house and is being produced both in-house and via contract manufacturing. Meanwhile, its P7 battery pack is designed and produced in-house in collaboration with Contemporary Amperex Technology (CATL, 300750 CH, Not Rated), which allows it to improve product quality and reduce cost.

Since 2021, XPeng has been expanding its battery suppliers to reduce the risk of concentration of suppliers.

Figure 38: XPeng's EV supply chain



Capital exercise ➤

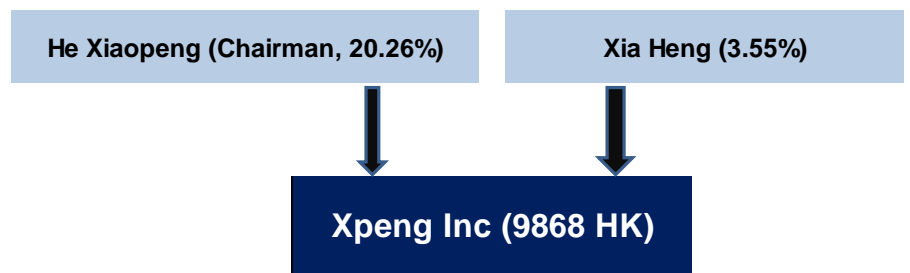
- XPeng completed its listing on NYSE on 27 Aug 2020. The IPO offered and sold 114.69m American Depository Shares (ADS), representing 229.39m Class A shares (1 ADS = 2 Class A share), at an offer price of US\$15.0 per share, raising approximately US\$1.66bn.
- XPeng completed its listing on the HKEX on 7 Jul 2021. It issued 97.08m Class A shares for the HKEX IPO at an offer price of HK\$165 per share and raised approximately HK\$15.82bn (US\$2.04bn).

Shareholding structure ➤

XPeng has adopted a weighted voting rights structure. Under this structure, the company's share capital comprises Class A ordinary shares and Class B ordinary shares. Each Class A ordinary share is entitled to one vote, while each Class B ordinary share is entitled to 10 votes.

- Mr He Xiaopeng, XPeng's largest shareholder, holds 348.7m Class B ordinary shares, or 20.26% of total issued shares (Class A and Class B). As Class B holders have 10 times more votes than Class A, this gives him 64.6% of the voting rights in the company.
- Mr Xia Heng holds 61.14m Class B ordinary shares and 0.0126m Class A ordinary shares, equivalent to 3.55% of total issued shares and 11.32% of the voting rights in the company (Fig 39).

Figure 39: Shareholding structure (as at 30 Jun 2022)



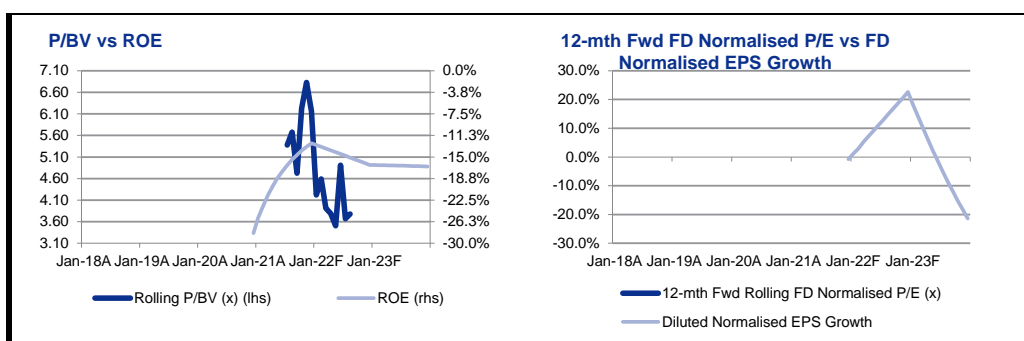
SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

Key management >

XPeng was established by two founders, including Mr Xiaopeng He and Mr Heng Xia.

- Mr He Xiaopeng (何小鹏)**, aged 44, is XPeng's co-founder, executive Director, chairman of the Board and chief executive officer. Mr He currently holds directorships in other members of the group. Prior to serving as chairman and chief executive officer of XPeng, he served at Alibaba Group (9988 HK, Not Rate), from Jun 2014 to Aug 2017, including serving as the president of Alibaba mobile business group, chairman of Alibaba Games and president of Tudou.com. In 2004, Mr He co-founded UCWeb Inc, a Chinese mobile internet company that provides mobile internet software technology and services, and served as its president of product from Jan 2005 to Jun 2014. In Jun 2014, UCWeb Inc was acquired by Alibaba Group. Mr He served as an independent director and a member of the audit committee of HUYA Inc, a game live streaming platform company in China listed on the NYSE (HUYA US, Not Rated) from May 2018 to May 2020. Mr He received his bachelor's degree in computer science from South China University of Technology in Jul 1999, and obtained the qualification certificate of senior economist (technology entrepreneur) in business administration issued by the Human Resources and Social Security Department of Guangdong Province (廣東省人力資源和社會保障廳) in Jan 2020.
- Mr Xia Heng (夏珩)**, aged 38, is XPeng's co-founder, executive Director and president. Mr Xia currently holds various positions in other members of the group, including director, legal representative and senior manager. Prior to founding in XPeng, Mr Xia worked at the research and development centre of Guangzhou Automobile Group Co Ltd (GAC, 2238 HK, Not Rated) from 2008 to 2014, where he was responsible for the development of control systems for NEVs and smart vehicles. Mr Xia received his master's degree in mechanical engineering and bachelor's degree in automotive engineering from Tsinghua University in Jun 2008 and Jul 2006 respectively. Mr Xia obtained the qualification certificate of senior engineer (technology entrepreneur) in mechanical engineering issued by the Human Resources and Social Security Department of Guangdong Province (廣東省人力資源和社會保障廳) in Jan 2020.

BY THE NUMBERS



Profit & Loss

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Net Revenues	5,844	20,988	41,975	67,521	113,996
Gross Profit	266	2,623	5,769	11,172	23,598
Operating EBITDA	(4,052)	(6,188)	(6,905)	(4,749)	2,644
Depreciation And Amortisation	(328)	(609)	(1,178)	(1,635)	(1,845)
Operating EBIT	(4,381)	(6,797)	(8,083)	(6,384)	799
Financial Income/(Expense)	111	688	753	521	368
Pretax Income/(Loss) from Assoc.	0	0	0	0	0
Non-Operating Income/(Expense)	1,539	1,272	1,124	951	627
Profit Before Tax (pre-EI)	(2,705)	(4,802)	(6,171)	(4,877)	1,829
Exceptional Items	0	0	0	0	0
Pre-tax Profit	(2,731)	(4,837)	(6,206)	(4,912)	1,793
Taxation	(1)	(26)	0	0	(269)
Exceptional Income - post-tax					
Profit After Tax	(2,732)	(4,863)	(6,206)	(4,912)	1,524
Minority Interests	(2,158)	0	0	0	0
Preferred Dividends					
FX Gain/(Loss) - post tax					
Other Adjustments - post-tax					
Preference Dividends (Australia)					
Net Profit	(4,890)	(4,863)	(6,206)	(4,912)	1,524
Normalised Net Profit	(2,706)	(4,828)	(6,171)	(4,877)	1,560
Fully Diluted Normalised Profit	(4,864)	(4,828)	(6,171)	(4,877)	1,560

Cash Flow

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
EBITDA	(4,052)	(6,188)	(6,905)	(4,749)	2,644
Cash Flow from Inv. & Assoc.					
Change In Working Capital	2,502	3,662	(3,225)	(1,378)	(3,430)
(Incr)/Decr in Total Provisions					
Other Non-Cash (Income)/Expense					
Other Operating Cashflow	423	2,283	10,130	6,127	787
Net Interest (Paid)/Received	(22)	(55)	(59)	(59)	(59)
Tax Paid	1	22	0	0	(269)
Cashflow From Operations	(1,148)	(276)	(59)	(59)	(328)
Capex	(806)	(2,300)	(4,380)	(4,000)	(2,000)
Disposals Of FAs/subsidiaries	25	24	0	0	0
Acq. Of Subsidiaries/investments	(426)	(288)	0	0	0
Other Investing Cashflow	(4,566)	(2,393)	0	0	0
Cash Flow From Investing	(5,773)	(4,956)	(4,380)	(4,000)	(2,000)
Debt Raised/(repaid)	(352)	(143)	0	0	0
Proceeds From Issue Of Shares	27,399	13,147	0	0	0
Shares Repurchased	0	0	0	0	0
Dividends Paid	0	0	0	0	0
Preferred Dividends					
Other Financing Cashflow	7,283	1,623	(59)	(59)	(59)
Cash Flow From Financing	34,330	14,627	(59)	(59)	(59)
Total Cash Generated	27,408	9,394	(4,497)	(4,117)	(2,386)
Free Cashflow To Equity	(7,274)	(5,375)	(4,439)	(4,059)	(2,328)
Free Cashflow To Firm	(6,899)	(5,177)	(4,380)	(4,000)	(2,269)

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

BY THE NUMBERS... cont'd

Balance Sheet

(Rmbm)	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total Cash And Equivalents	35,342	40,327	27,409	18,931	17,275
Total Debtors	2,837	4,922	10,586	17,029	28,751
Inventories	1,343	2,662	5,248	8,167	13,102
Total Other Current Assets	157	920	920	920	920
Total Current Assets	39,679	48,831	44,163	45,047	60,048
Fixed Assets	3,082	5,425	8,663	11,063	11,254
Total Investments	2	4,766	4,766	4,766	4,766
Intangible Assets	608	879	879	879	879
Total Other Non-Current Assets	1,336	5,751	5,751	5,751	5,751
Total Non-current Assets	5,028	16,821	20,058	22,459	22,649
Short-term Debt	173	0	0	0	0
Current Portion of Long-Term Debt					
Total Creditors	5,124	12,387	19,947	31,045	49,804
Other Current Liabilities	2,541	5,626	5,577	5,603	5,603
Total Current Liabilities	7,837	18,013	25,524	36,648	55,407
Total Long-term Debt	1,645	1,675	1,675	1,675	1,675
Hybrid Debt - Debt Component					
Total Other Non-Current Liabilities	795	3,817	3,817	3,817	3,817
Total Non-current Liabilities	2,440	5,492	5,492	5,492	5,492
Total Provisions	0	0	0	0	0
Total Liabilities	10,277	23,505	31,016	42,140	60,899
Shareholders' Equity	34,430	42,147	33,206	25,366	21,799
Minority Interests	0	0	0	0	0
Total Equity	34,430	42,147	33,206	25,366	21,799

Key Ratios

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Revenue Growth	N/A	259%	100%	61%	69%
Operating EBITDA Growth	N/A	52.7%	11.6%	(31.2%)	N/A
Operating EBITDA Margin	(69.3%)	(29.5%)	(16.5%)	(7.0%)	2.3%
Net Cash Per Share (Rmb)	20.41	22.57	14.95	10.02	9.06
BVPS (Rmb)	20.96	24.61	19.29	14.74	12.66
Gross Interest Cover	(194.0)	(122.2)	(137.3)	(108.3)	14.2
Effective Tax Rate	0.0%	0.0%	0.0%	0.0%	15.0%
Net Dividend Payout Ratio	NA	NA	NA	NA	NA
Accounts Receivables Days	35.35	33.06	36.62	40.54	39.92
Inventory Days	44.06	39.80	39.87	43.45	43.06
Accounts Payables Days	167.7	173.6	162.7	164.8	163.3
ROIC (%)	N/A	(338%)	(269%)	(83%)	10%
ROCE (%)	(23.3%)	(15.0%)	(18.4%)	(18.6%)	5.0%
Return On Average Assets	(12.5%)	(9.8%)	(10.5%)	(8.1%)	1.7%

Key Drivers

	Dec-20A	Dec-21A	Dec-22F	Dec-23F	Dec-24F
Total no. of EV sales ('000 units)	26.7	98.2	169.8	244.7	378.7
Total no. of EV sales (units yoy% chg)	109.9%	267.4%	73.0%	44.1%	54.8%
Vehicle sales (Rmb yoy % chg)	155.5%	261.3%	102.4%	60.9%	68.8%
Vehicle sales (GPM %)	3.5%	11.5%	13.0%	15.9%	20.2%

SOURCES: CGS-CIMB RESEARCH, COMPANY REPORTS

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643 companies under coverage for quarter ended on 30 June 2022		
	Rating Distribution (%)	Investment Banking clients (%)
Add	68.4%	0.8%
Hold	24.6%	0.0%
Reduce	7.0%	0.2%

Corporate Governance Report of Thai Listed Companies (CGR). CG Rating by the Thai Institute of Directors Association (Thai IOD) in 2021, Anti-Corruption 2021

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- CG Score 2021 from Thai Institute of Directors Association (IOD)

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- Add** The stock's total return is expected to exceed 10% over the next 12 months.
- Hold** The stock's total return is expected to be between 0% and positive 10% over the next 12 months.
- Reduce** The stock's total return is expected to fall below 0% or more over the next 12 months.

The total expected return of a stock is defined as the sum of the: (i) percentage difference between the target price and the current price and (ii) the forward net dividend yields of the stock. Stock price targets have an investment horizon of 12 months.

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- Neutral** A Neutral rating means stocks in the sector have, on a market cap-weighted basis, a neutral absolute recommendation.
- Underweight** An Underweight rating means stocks in the sector have, on a market cap-weighted basis, a negative absolute recommendation.

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