

# Battery Suppliers, Automakers To Take Charge As Prices Rise

May 17, 2022

## Key Takeaways

- Battery prices are set to halt their long-running decline and rise in 2022 and remain high in 2023 because of a surge in the cost of raw materials.
- Automakers will likely incur higher spending on battery supply chains, but we don't view this as credit negative now since it allows them to lift production.
- Our rated battery issuers should continue to lead the market and they are taking action to protect profitability.

## PRIMARY CREDIT ANALYSTS

**Stephen Chan**  
Hong Kong  
+ 852 2532 8088  
stephen.chan@spglobal.com

**Minjib Kim**  
Hong Kong  
+ 852 2533 3503  
Minjib.Kim@spglobal.com

**Kei Ishikawa**  
Tokyo  
+ 81 3 4550 8769  
kei.ishikawa@spglobal.com

## SECONDARY CONTACTS

**Vittoria Ferraris**  
Milan  
+ 390272111207  
vittoria.ferraris@spglobal.com

**Nishit K Madlani**  
New York  
+ 1 (212) 438 4070  
nishit.madlani@spglobal.com

**Claire Yuan**  
Hong Kong  
+ 852 2533 3542  
Claire.Yuan@spglobal.com

See complete contact list at end of article.

## Recharge: Battery Prices To Reverse Their Decline In 2022



Prices of cathode materials **more than doubled** in the past 12 months to March 2022

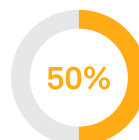
**60%-70%**

The amount that raw materials contribute to the cost of battery packs

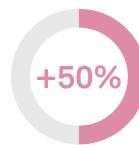


**30%-40%**

CAGR of EV battery demand over 2022-2025



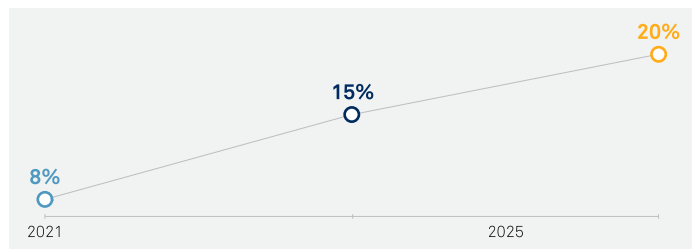
Of the annual sales of big automakers such as Volkswagen and BMW will comprise EVs by 2030



Of market share will be occupied by the top three battery players until 2025, at least

## EV penetration to increase

We project 15%-20% of global auto sales to be EVs by 2025



EV--Electric vehicle. CAGR--Compound annual growth rate. Sources: S&P Global Ratings. Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

## **Battery Suppliers, Automakers To Take Charge As Prices Rise**

The race to electrify the way we get around is about to get more expensive. The price of raw materials used in batteries for electric vehicles (EVs) is rising. Consequently, this is reversing a long-term trend for declining battery prices. Battery suppliers are seeking to shield their profitability from the spike in lithium, cobalt, and nickel. Supply disruptions are set to ease and will help material and battery prices moderate in 2023. However, strong market demand and tight supply will ensure prices remain higher than they were in 2021. In our view, this will change the way automakers do business. On the one hand, they will explore more tie-ups; and the other, they'll seek to widen their supplier networks and potentially cut out the middleman by directly entering the upstream supply chain. And as EVs increase their presence in the market, this effort to control costs will also involve a willingness to explore different technology options over the next two years.

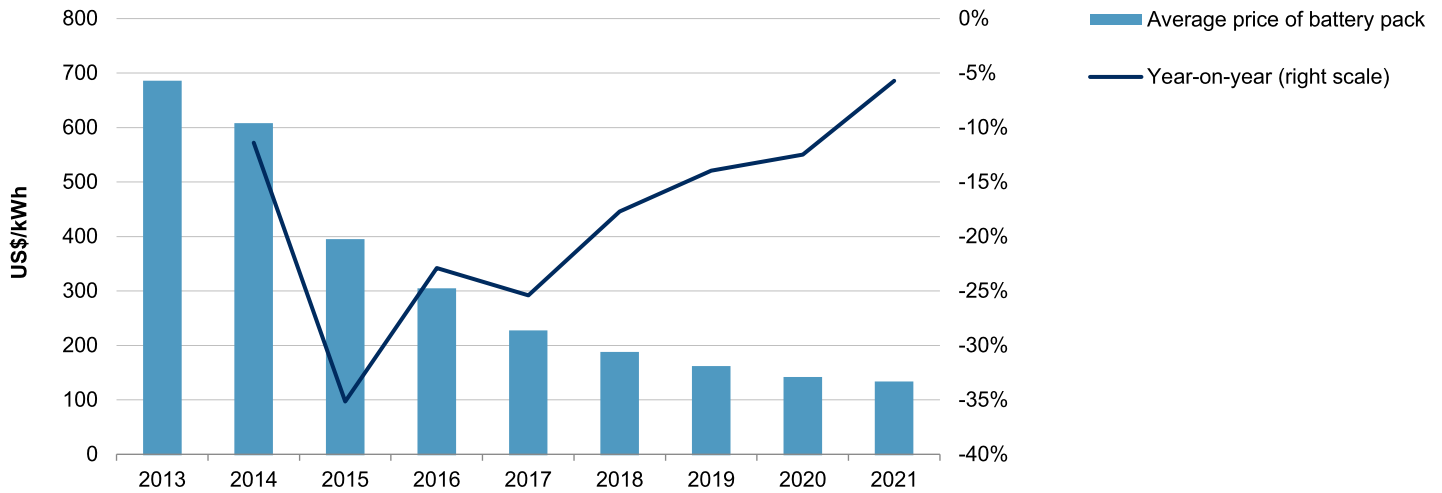
Meanwhile, we anticipate that the battery suppliers we rate--all of whom are recognized global market leaders--will maintain their dominance over the next two to four years, at least. Their battery capacities and technology will continue to be a vital element for automakers and their production of EVs. The cost volatility that has occurred since the second half of 2021 leads us to believe that battery suppliers will seek to alleviate pressure on profitability by taking a stricter stance on passing on costs.

## **High Material Costs Delay EV Cost Parity**

We anticipate 2022 will be the year in which battery prices halt their long-running decline (chart 1). The penetration into the market of EVs has been rapid. And demand for raw materials has consequently surged. The Russia-Ukraine conflict has also exacerbated the existing supply-chain disruptions and materials shortages--and this against the backdrop of COVID-19 outbreaks. Prices of cathode materials, which normally represent at least 30%-40% of battery costs, more than doubled over the past 12 months up to March 2022. This spike in cost has triggered a pass-through mechanism between battery suppliers and automakers, which has contributed to an increase in battery prices of at least 20%-30% between the second half of 2021 and March 2022.

Chart 1

**The Decline Trend On The Price Of Battery Packs Should Reverse In 2022**



kWh--Kilowatt per hour. Source: Bloomberg NEF, S&P Global Ratings.  
 Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

Raw materials contribute to 60%-70% of the costs of battery packs. Material supply should remain tight because of the time it takes for new mining permits to be granted. And in the case of Chinese battery suppliers, the outbreak of COVID-19 has added a layer of uncertainty to existing logistical disruptions. After seeing their gross margin eroded by four to 12 percentage points in the first quarter of 2022, major battery suppliers will seek to apply their pass-through mechanism more stringently and pass on higher input costs to protect their profitability. Material costs and battery prices may moderate in 2023 as supply chain disruptions ease and the impact of the pandemic subsides. However, the combination of supply shortages and accelerating electrification should nevertheless keep the material cost and battery prices at a higher level than we saw in 2021.

We may see a more meaningful price drop in 2024 as increasing economies of scale lead to higher production efficiency. But what becomes highly uncertain is the inflection point of US\$100 per kilowatt hour (kWh) whereby EVs reach cost parity with internal combustion engine (ICE) vehicles. Parity could be thus delayed to the second half of the decade.

**Despite The Cost Surge, Decarbonization Initiatives Will Continue And Drive Demand**

According to S&P Global Mobility, global EV battery installation will reach 1.0-1.1 terawatt hours (TWh) in 2025 (chart 2). This represents a compound annual growth rate of 30%-40% over 2022-2025. The above-average battery capacity should help maintain EV penetration, which S&P Global Ratings projects will reach 15%-20% globally by 2025, up from 8% in 2021. Many countries are using various decarbonization regulations to encourage automakers to electrify their products. Such schemes include carbon taxes in Europe and a dual-credit scheme in China. Regulators in China, Europe, and the U.S. are also using purchase subsidies or tax deduction

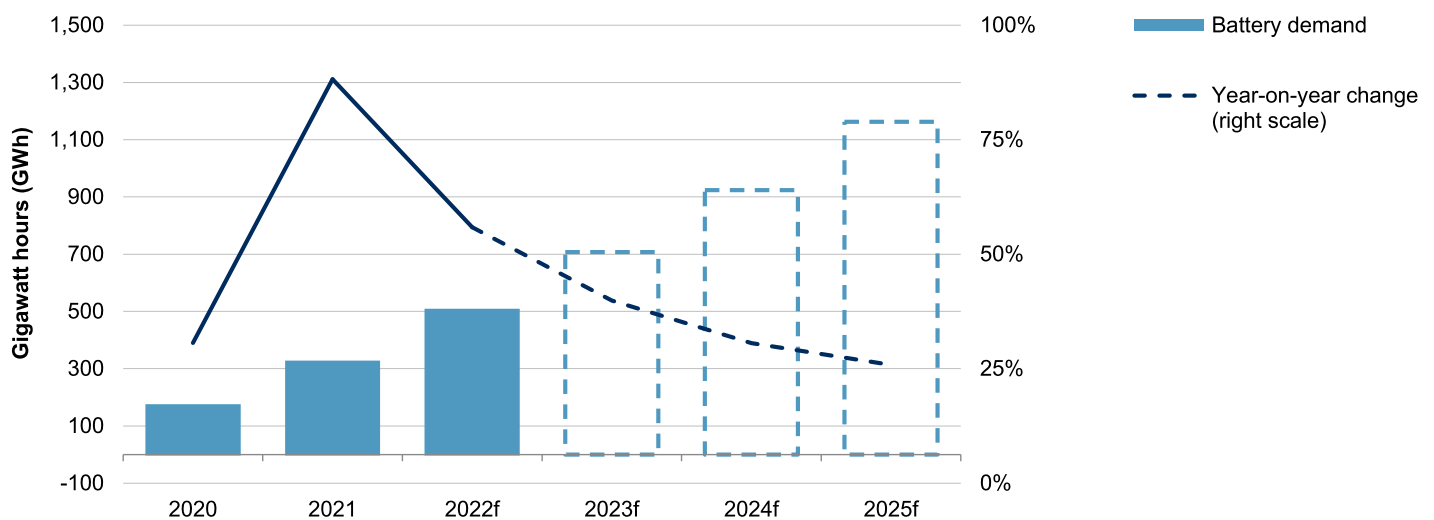
## Battery Suppliers, Automakers To Take Charge As Prices Rise

schemes to woo customers. As such, the global EV market posted sales growth of 108% in 2021. Together with increasing customer acceptance, this growth momentum should continue, albeit at less buoyant rates.

Despite the surge in battery prices, automakers are committing more to their EV investment. This is aimed not only at adhering to regulatory pressure to electrify their fleets but also at increasing their market presence by offering more EV models across different segments. Global automakers such as Volkswagen AG and BMW AG are aiming for 50% of EV sales by 2030. Toyota Motor Corp., has also joined the fray, aiming to achieve annual EV sales of 3.5 million by 2030. These long-term goals (table 1) should help the battery market grow sustainably over the next few years.

Chart 2

### Increasing EV Penetration Should Support Battery Demand Growth



Data under automotive and transport sector. EV--Electric vehicle. f--Forecast. Source: S&P Global Mobility. Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

Table 1

### Big Auto Firms Are Trying To Secure Sufficient Battery Capacity For Their Electrification Race

Automakers	Rating	Capacity needs
Ford Motor Co.	BB+/Positive/B	By 2030, Ford expects its annual battery demand will be up to 140GWh in North America and up to 240GWh globally.
General Motors Co. (GM)	BBB/Stable/--	GM plans to have capacity to build 1 million EVs in North America and it is cooperating with LG Energy Solution to achieve that.
Mercedes-Benz Group AG (Mercedes-Benz)	A-/Stable/A-2	Mercedes-Benz plans to install battery cell capacity of more than 200GWh with partners, plans for eight cell factories.

## Battery Suppliers, Automakers To Take Charge As Prices Rise

Table 1

### Big Auto Firms Are Trying To Secure Sufficient Battery Capacity For Their Electrification Race (cont.)

Automakers	Rating	Capacity needs
Volkswagen AG (VW)	BBB+/Stable/A-2	Volkswagen requires about 300GWh worth of battery cells a year by the end of the decade in Europe.
Toyota Motor Corp.	A+/Stable/A-1+	Toyota wants to secure 200GWh of battery supply by the end of the decade.
Hyundai Motor Co.	BBB+/Stable/--	Hyundai aiming to secure 170GWh of battery capacity for its models by 2030.
Stellantis N.V.	BBB/Stable/A-2	Stellantis aims to source more than 260GWh of battery capacity by 2030.

The information contained in this table is not exhaustive. EV--Electric vehicle. GWh--Gigawatt hours. Source: S&P Global Mobility, Company announcement.

Impeding this is the delay in ICE-EV cost parity. This could weigh on the profitability of automakers, especially if we assume that incentives will taper off with volume growth (as has occurred in China and in the UK). The combination of more EV development and greater substitution of ICE vehicles for EVs before the effect of economies of scale kicks in will erode automakers' margins. The contribution margins from new EV models should remain below the current ICE engine portfolio for at least the next few years. As competition intensifies, the pace at which battery costs decrease (below \$100/kWh) will determine the success of global automakers' EV strategies. As such, we believe more automakers will strive to secure a stronger battery supply chain (including new battery plants and agreements to procure key components; table 2). Battery supply chain stability will have a cost in terms of higher capital needs. However, we don't view this as credit negative at this stage because it could enable automakers to eliminate supply-chain risk and scale-up production over the long term.

Table 2

### Initiatives Between OEMs, Battery Suppliers And Upstream Suppliers

Region	Automakers	Initiatives
Americas	Stellantis N.V.	Stellantis formed joint ventures together with LG Energy Solution and Samsung SDI for battery production since 2024 and 2025, respectively
	GM	Ultium Cells LLC, a joint venture between LG Energy Solution and GM, has announced a plan to build its second battery cell manufacturing plant.
	Honda Motor Co. Ltd. (A-/Stable/A-2)	Honda and LG Energy Solution are planning to set up a battery plant with 40GWh annual capacity for an estimated production of 600,000 EVs.
	Mercedes-Benz	Mercedes-Benz has partnered with Envision AESC to secure battery cell modules for its EQ line up of EVs by 2025.
Europe	Stellantis N.V.	Automotive Cell Company (a joint venture with Saft) was formed for the development and manufacture of EV batteries.
	BMW AG (A/Stable/A-1)	BMW is sourcing its batteries from CATL, Samsung SDI and Northvolt AB for its EV production and it is also directly sourcing cobalt from Glencore.
	VW	VW is cooperating with Northvolt AB on the production of battery cells in Skelleftea, Sweden.
	Mercedes-Benz	Mercedes-Benz acquired 33% stake of ACC to secure battery supplies.

## Battery Suppliers, Automakers To Take Charge As Prices Rise

Table 2

### Initiatives Between OEMs, Battery Suppliers And Upstream Suppliers (cont.)

Region	Automakers	Initiatives
China	VW	Volkswagen acquired a 26% stake of Gotion High-Tech Co Ltd. to expand its battery capacity. It has also announced its intention to form joint ventures with Huayou Cobalt and Tsingshan Group for nickel and cobalt supplies in Indonesia and China.
	China FAW Group Co. Ltd. (A/Stable/--)	BYD and FAW are forming a joint venture for a battery plan with an annual production capacity of 45GWh.
	Geely Automobile Holdings Ltd. (BBB-/Stable/--)	The company has formed a joint venture with LG Energy Solution for enhancing battery production capacities.

The information contained in this table is not exhaustive. OEM--Original equipment manufacturer. EV--Electric vehicle. GWh--Gigawatt hours. CATL--Contemporary Amperex Technology Co. Ltd. Source: S&P Global Mobility, company announcement.

## Widening The Battery Supplier Network To Mitigate Pricing Pressure

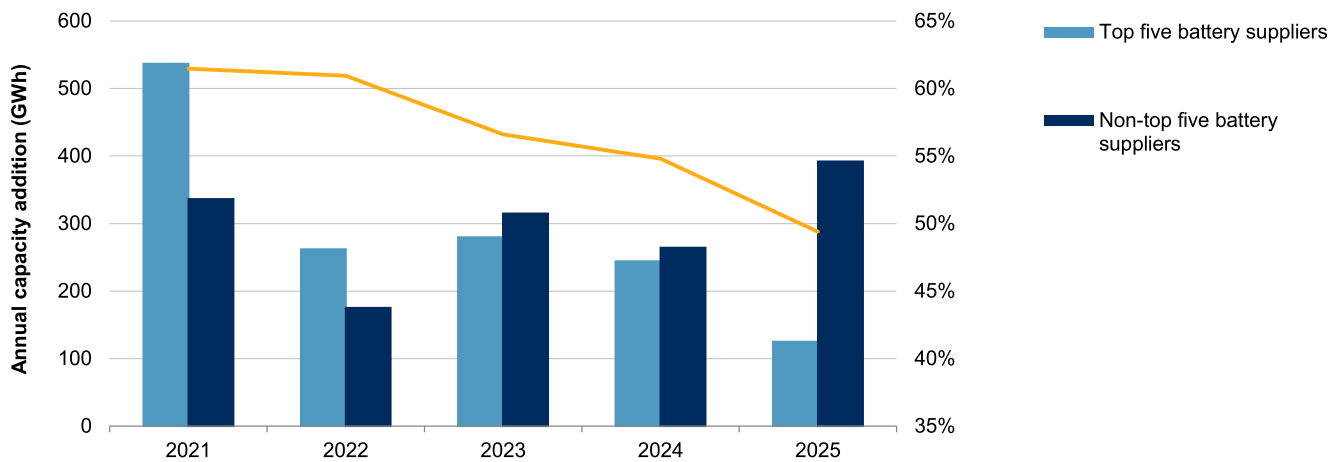
By diversifying their supplier network, automakers could increase their chance of securing sufficient resources and strengthen their bargaining power in the supply chain over the mid- to long-term, in our view. They could increase their pricing power over smaller suppliers by placing big orders on batteries with relatively more mature technology, for example, the NCM523. Over the next two to four years, we expect small-scale battery suppliers to engage in aggressive capacity expansion to capture the emerging growth opportunity (chart 3). According to S&P Global Mobility, smaller players could see meaningful compound annual revenue growth during this period.

Estimates include:

- Envision AESC Group Ltd.: 75%;
- Eve Energy Co Ltd.: 60%;
- Svolt Energy Technology Co., Ltd.: 51%;
- Gotion High-Tech Co Ltd.: 41%

Chart 3

**Lower-Tier Battery Suppliers Could Help OEMs To Diversify Sourcing Channels**



Top five battery suppliers are Contemporary Amperex Technology Co. Ltd., LG Energy Solution, BYD Co. Ltd., Panasonic Holding Corp. and SK Innovation Co. Ltd. OEM--Original equipment manufacturer. GWh--Gigawatt hours. Source: S&P Global Mobility. Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

**Cutting Out The Middleman Will Make A Material Difference**

Faced with the limited supply and increasing cost of raw materials, vertical integration with upstream players will become more common. Global automakers such as Volkswagen, Tesla Inc., and BMW are taking matters into their hands by entering the supply chain to secure what they need for production. By cutting out intermediaries, automakers can better control the stability of material supply and cut costs at the same time. Their exposure to the supply chain may not only be limited to securing long-term procurement contracts. Another option they're resorting to is the formation of joint ventures for vertical integration with upstream suppliers.

Similarly, battery makers are also seeking further cooperation with upstream players. China's Contemporary Amperex Technology Co. Ltd. (CATL) and LG Chem Ltd. (LG Chem)--the world's No. 1 and No. 2 EV battery makers respectively--have both signed billion-dollar deals with Indonesian counterparties for domestic investment to build mines-to-manufacturing supply chains over the next few years.

**Automakers To Unite To Drive Down EV Costs**

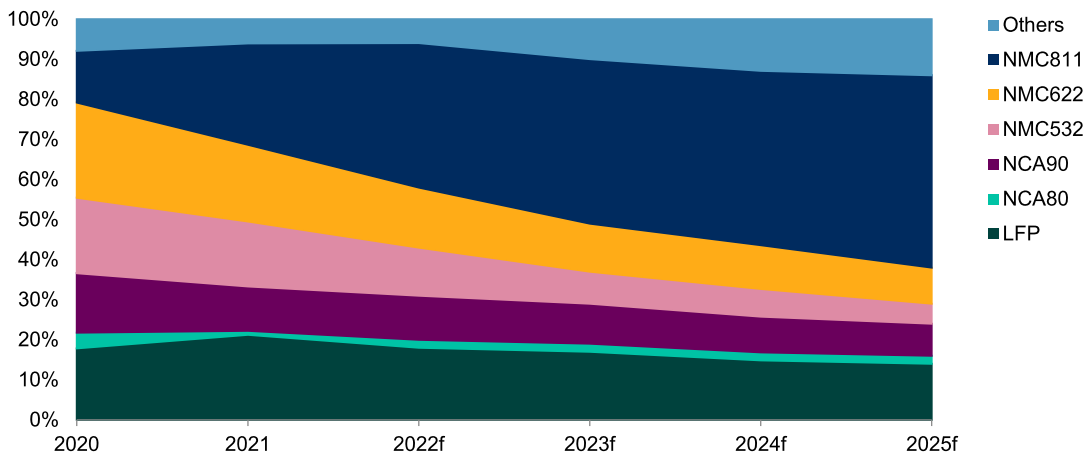
We believe more automakers will opt for EV tie-ups to achieve economies of scale. Small-scale production is a key reason for the low profitability of EV businesses. To improve production efficiency, more automakers are sharing their EV production platforms. Over 2023-2028, Ford Motor Co. plans to produce two EV models, with a projected volume of up to 1.2 million units, for the European market based on Volkswagen's modular electric toolkit platform. General Motors Co. and Honda Motor Co. Ltd. announced in April 2022 to jointly develop affordable compact EVs, which are expected to go on sale in North America from 2027.

## Cheaper Battery Tech On The Charge But Ternary To Prevail

Lithium iron phosphate (LFP) batteries are at least 10%-20% cheaper than ternary batteries and are free of costly materials such as nickel and cobalt. Recent technology breakthroughs at the battery-pack level have increased the driving range of these batteries without compromising on price or safety. The popularity of LFP batteries follows two recent developments: Tesla's announcement in April that almost half of the EVs it manufactured in the first quarter of 2022 used LFP batteries; and the 388% year-on-year EV sales growth in the first four months of 2022 for BYD Co. Ltd.--a major advocate of the technology and the No.1 EV player in China. Volkswagen, Ford, and Mercedes-Benz Group AG have also announced plans to embrace the technology in their entry models. However, its relatively low energy density prevents it from being dominant in the market. Ternary batteries, like the NCA series and the NCM811, which support longer ranges, will likely continue to be the top picks of automakers over the long term (chart 4). The question is which battery type will be able to achieve lower costs, higher energy density, and more stable performance.

Chart 4

### LFP May Emerge But NMC And NCA Batteries Will Continue To Be The Top Picks Of The Market



LFP--Lithium iron phosphate. NMC--Lithium nickel manganese cobalt oxide. NCA--Lithium nickel-cobalt-aluminum oxide. f--Forecast. Source: S&P Global Mobility.

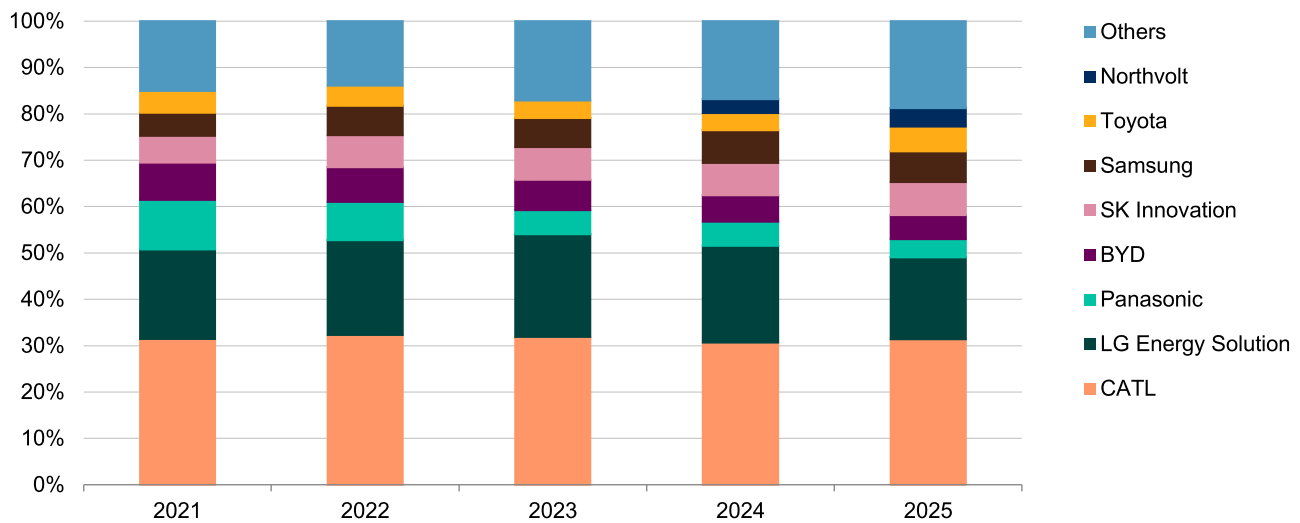
Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.



## Top Battery Suppliers To Maintain Their Dominance

Chart 5

### Major Battery Players Will Be Able To Maintain Market Share Over The Long Term



Market share calculation is based on forecast revenue size; Toyota is the controlling shareholder of Primearth EV Energy Co. Ltd. and Prime Planet Energy & Solutions Inc. CATL--Contemporary Amperex Technology Co. Ltd. Source: S&P Global Mobility. Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

We believe our rated battery issuers, which are among the top industry players, should continue to lead the global battery market over the next two to four years, at least. The top three global players--CATL, LG Chem, and Panasonic Holdings Corp.--should continue to account for more than 50% of market share during this period (chart 5). Although we see increasing competition from smaller players, tight battery supply means automakers will likely have to rely on the extensive battery capacities and reliable products of our rated issuers for EV production. A potential technology shift to solid-state batteries or other emerging technology may disrupt the current market dynamic. However, we believe our rated issuers will likely be able to mitigate such risk with their top-class technological innovation capabilities over the long term. In addition, they will likely take a more cautious approach to profitability management and become more stringent on the execution of cost pass-through mechanism to automakers after seeing profitability deterioration in the first quarter of 2022.

## Where The World's Biggest Battery Makers Stand

### **Contemporary Amperex Technology Co. Ltd. (CATL; BBB+/Stable/--) (primary analyst: Stephen Chan)**

We expect CATL to remain the global No. 1 over the next two to four years, at least. It is the dominant player in China, with just over 50% market share and an expanding international market presence. We believe the company will start mass production outside of China by the end of 2022 with an initial 8 gigawatt-hours (GWh) of annual capacity in Germany. Nonetheless, its adjusted debt-to-EBITDA turned to 0.7x in 2021 from net cash in 2020 because of significant capital expenditure (capex). Higher input costs also caused its EBITDA margin to deteriorate by an estimated 9.0-10.0 percentage points in the first quarter of 2022 from 18.8% in 2021. We estimate its EBITDA margin should return to 14%-18% because of higher battery prices and operating efficiency improvement over the next two years. However, we see its rating buffer as narrowing due to the margin deterioration, versus our rating downgrade trigger of 15%.

### **LG Chem Ltd. (LG Chem; BBB+/Positive/--) (primary analyst: Minjib Kim)**

LG Chem's battery subsidiary, LG Energy Solution, should remain as one of the leading players in the European and North American market. We anticipate it will be able to maintain its regional market share at 30%-50% over the next two to four years. The company will likely incur aggressive investment on its expansion of EV battery production during the period. It should also see potential profitability swings at its petrochemical businesses due to the dynamic market environment in the sector. That said, it has secured sizable proceeds through the initial public offering of LG Energy Solution. This should support LG Chem's overall credit profile improvements over the next two years.

### **Panasonic Holdings Corp. (Panasonic; A-/Stable/A-2) (primary analyst: Kei Ishikawa)**

Panasonic will likely continue to work closely with Tesla in North America. We anticipate its global market share will decline to 3%-8% in 2022-2025 from 11% in 2021 mainly due to its single-customer focus at its battery businesses. That said, auto businesses only represent about 15% of its revenue. We believe Panasonic can generate stable profit because its business portfolio is highly diversified with relatively low correlation to each other, including home appliances, electrical construction materials for housing, business-to-business products and services, electric components and devices as well as automotive products and batteries. Panasonic's prudent financial management should keep its debt-to-EBITDA at about 1.0x in 2022 and 2023.

### **SK Innovation Co. Ltd. (SKI; BBB-/Negative/--) (primary analyst: Minjib Kim)**

SKI has been aggressively expanding its EV battery production business in recent years. We believe it will enhance its competitiveness and capture the growth potential in the battery market. Increasing oil prices and recovering product spreads have helped the company to recover its earnings over the past few quarters. However, the company's significant capex and working capital swings could keep its ratio of debt to EBITDA over our downgrade trigger of 4.0x in

## Battery Suppliers, Automakers To Take Charge As Prices Rise

2022-2023.

### Related Research

- COVID Curbs Are Adding Downside Risk To China's Auto Sales, April 14, 2022
- Global Auto Sales Forecasts: Russia-Ukraine Conflict Imperils Recovery, March 23, 2022
- High-Flying Battery Makers Have Much To Win And Lose, June 20, 2021
- The Hydrogen Economy: For Light Vehicles, Hydrogen Is Not For this Decade, April 22, 2021
- The Future Is Electric: Auto Suppliers And The Emergence Of EVs, Feb. 21, 2019

This report does not constitute a rating action.

Digital design: Halie Mustow; Writing: Lex Hall

## Contact List

### PRIMARY CREDIT ANALYST

**Stephen Chan**  
Hong Kong  
+ 852 2532 8088  
stephen.chan@spglobal.com

### PRIMARY CREDIT ANALYST

**Minjib Kim**  
Hong Kong  
+ 852 2533 3503  
Minjib.Kim@spglobal.com

### PRIMARY CREDIT ANALYST

**Kei Ishikawa**  
Tokyo  
+ 81 3 4550 8769  
kei.ishikawa@spglobal.com

### SECONDARY CONTACT

**Vittoria Ferraris**  
Milan  
+ 390272111207  
vittoria.ferraris@spglobal.com

### SECONDARY CONTACT

**Nishit K Madlani**  
New York  
+ 1 (212) 438 4070  
nishit.madlani@spglobal.com

### SECONDARY CONTACT

**Claire Yuan**  
Hong Kong  
+ 852 2533 3542  
Claire.Yuan@spglobal.com

### SECONDARY CONTACT

**Lukas Paul**  
Frankfurt  
+ 49 693 399 9132  
lukas.paul@spglobal.com

### SECONDARY CONTACT

**Katsuyuki Nakai**  
Tokyo  
+ 81 3 4550 8748  
katsuyuki.nakai@spglobal.com

### SECONDARY CONTACT

**Matthias J Raab, CFA**  
Frankfurt  
+ 49 693 399 9122  
matthias.raab@spglobal.com

### SECONDARY CONTACT

**Danny Huang**  
Hong Kong  
+ 852 2532 8078  
danny.huang@spglobal.com

Copyright © 2022 by Standard & Poor's Financial Services LLC. All rights reserved.

No content (including ratings, credit-related analyses and data, valuations, model, software or other application or output therefrom) or any part thereof (Content) may be modified, reverse engineered, reproduced or distributed in any form by any means, or stored in a database or retrieval system, without the prior written permission of Standard & Poor's Financial Services LLC or its affiliates (collectively, S&P). The Content shall not be used for any unlawful or unauthorized purposes. S&P and any third-party providers, as well as their directors, officers, shareholders, employees or agents (collectively S&P Parties) do not guarantee the accuracy, completeness, timeliness or availability of the Content. S&P Parties are not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, for the results obtained from the use of the Content, or for the security or maintenance of any data input by the user. The Content is provided on an "as is" basis. S&P PARTIES DISCLAIM ANY AND ALL EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, FREEDOM FROM BUGS, SOFTWARE ERRORS OR DEFECTS, THAT THE CONTENT'S FUNCTIONING WILL BE UNINTERRUPTED OR THAT THE CONTENT WILL OPERATE WITH ANY SOFTWARE OR HARDWARE CONFIGURATION. In no event shall S&P Parties be liable to any party for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses, legal fees, or losses (including, without limitation, lost income or lost profits and opportunity costs or losses caused by negligence) in connection with any use of the Content even if advised of the possibility of such damages.

Credit-related and other analyses, including ratings, and statements in the Content are statements of opinion as of the date they are expressed and not statements of fact. S&P's opinions, analyses and rating acknowledgment decisions (described below) are not recommendations to purchase, hold, or sell any securities or to make any investment decisions, and do not address the suitability of any security. S&P assumes no obligation to update the Content following publication in any form or format. The Content should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. S&P does not act as a fiduciary or an investment advisor except where registered as such. While S&P has obtained information from sources it believes to be reliable, S&P does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives. Rating-related publications may be published for a variety of reasons that are not necessarily dependent on action by rating committees, including, but not limited to, the publication of a periodic update on a credit rating and related analyses.

To the extent that regulatory authorities allow a rating agency to acknowledge in one jurisdiction a rating issued in another jurisdiction for certain regulatory purposes, S&P reserves the right to assign, withdraw or suspend such acknowledgment at any time and in its sole discretion. S&P Parties disclaim any duty whatsoever arising out of the assignment, withdrawal or suspension of an acknowledgment as well as any liability for any damage alleged to have been suffered on account thereof.

S&P keeps certain activities of its business units separate from each other in order to preserve the independence and objectivity of their respective activities. As a result, certain business units of S&P may have information that is not available to other S&P business units. S&P has established policies and procedures to maintain the confidentiality of certain non-public information received in connection with each analytical process.

S&P may receive compensation for its ratings and certain analyses, normally from issuers or underwriters of securities or from obligors. S&P reserves the right to disseminate its opinions and analyses. S&P's public ratings and analyses are made available on its Web sites, [www.standardandpoors.com](http://www.standardandpoors.com) (free of charge), and [www.ratingsdirect.com](http://www.ratingsdirect.com) (subscription), and may be distributed through other means, including via S&P publications and third-party redistributors. Additional information about our ratings fees is available at [www.standardandpoors.com/usratingsfees](http://www.standardandpoors.com/usratingsfees).

STANDARD & POOR'S, S&P and RATINGSDIRECT are registered trademarks of Standard & Poor's Financial Services LLC.