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CBAK Energy Technology (CBAT-NASDAQ)

CBAT: Recharging its batteries for future growth?

Utilizing estimates that assume capacity expansion targets are met and multiples for other battery manufacturers, we believe CBAT could be worth $1.80 per share but upside exists if new products are successful or if outside investments in subsidiaries materialize.

Current Price (08/10/23)	$1.09
Valuation	$1.80

OUTLOOK

CBAK Energy Technology is embarking on an ambitious growth plan to expand its production capacity by more than 10x over the 4.5 years. If the expansion is successful the company will be a major lithium-ion battery supplier.

Demand for lithium-ion batteries remains strong and the launching a large-scale sodium-ion battery production facility offers upside for CBAK investors.

Additional investment in North American and European production of lithium-ion batteries could impact the global market in the long run but we think the near-term impact on CBAK will be limited.

SUMMARY DATA

52-Week High	**$1.70**
52-Week Low	**$0.74**
One-Year Return (%)	**-21.6%**
Beta	**2.66**
Average Daily Volume (sh)	**272,141**
Shares Outstanding (mil)	**89**
Market Capitalization ($mil)	**$97**
Short Interest Ratio (days)	**N/A**
Institutional Ownership (%)	**1**
Insider Ownership (%)	**13**
Annual Cash Dividend	**$0.00**
Dividend Yield (%)	**0.00**
5-Yr. Historical Growth Rates	
Sales (%)	**54.1**
Earnings Per Share (%)	**N/A**
Dividend (%)	**N/A**
P/E using TTM EPS	**N/A**
P/E using 2023 Estimate	**N/A**
P/E using 2024 Estimate	**N/A**
Zacks Rank	**N/A**

Risk Level	**Above Avg.,**
Type of Stock	**Speculative**
Industry	**Energy storage**

ZACKS ESTIMATES

Revenue
(in millions of $)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2021	9 A	6 A	10 A	28 A	53 A
2022	80 A	56 A	58 A	54 A	249 A
2023	42 A	42.4 A	48.6 E	53.5 E	186.9 E
2024	44.1 E	54.5 E	61.0 E	67.8 E	227.4 E

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2021	$0.02 A	-$0.02 A	-$0.03 A	$0.05 A	$0.02 A
2022	-$0.01 A	-$0.02 A	$0.00 A	-$0.06 A	-$0.10 A
2023	-$0.02 A	-$0.03 A	-$0.03 E	-$0.02 E	-$0.11 E
2024	-$0.02 E	-$0.02E	-$0.02E	-$0.01E	-$0.07 E

Zacks Projected EPS Growth Rate - Next 5 Years % **N/A**

*Quarterly EPS may not equal full year estimates due to rounding

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KEY POINTS

➢ CBAK Energy Technology (NASDAQ: CBAT) is an integrated lithium-ion battery company with manufacturing and raw materials divisions in China. The company operates manufacturing facilities in Dalian (a port city in Liaoning Province) and Nanjing (the capital of Jiangsu Province) with ambitious plans to expand production through 2027.

➢ Demand for energy storage has ramped significantly in recent years and as industrial and grid storage needs emerge demand should accelerate further. The company's Dalian facility has 1 GW of current annual manufacturing capacity with plans to expand to 16 GWh by 2027 (mostly for larger cylindrical cells including 46-series cells). The majority of the cells produced at this plant today are 26650/26700 cells for the energy storage market. The company's Nanjing facility is expected to reach 2 GWh of capacity by the end of 2023 with plans in place to expand to 20 GWh by 2027. The majority of the cells produced in Nanjing are 32140 sold to the LEV and EV market today but we expect many energy storage customers will also convert to these cells.

➢ The company has reached the prototyping stage with its new 46-series lithium-ion batteries of various lengths (most likely initial models are the 46115 or 46157) and mass production could begin by the end of 2023. We believe the company remains in conversations with several potential customers regarding the possibility of bringing a 46800 cylindrical cell to market in 2024. The company also recently announced plans to begin large-scale production of sodium-ion cells which would make CBAK one of the first companies to commercialize this technology. We believe the company is exploring strategic partnerships to speed up the process of bringing these cells to the market. Valuations of sodium-ion startups are elevated right now and we think there is a good deal of untapped value potentially in the company's new sodium-ion business.

➢ The lithium-ion battery market is almost entirely dominated by large Asian (principally Chinese) manufacturers today. Most of these companies are focused on providing battery packs to the EV market which creates an opportunity for cylindrical cells in the energy storage market where CBAK is focusing its efforts.

➢The company acquired Zhejiang Hitrans, a battery raw materials supplier, in 2021 when a dispute among Hitrans shareholders created an opportunity. Including Hitrans's results for all of 2022 (versus just 1 month of results in 2021) and soaring prices for raw materials boosted the company's top line significantly in 2022. Pricing has returned to more normal levels in 2023 and sales at Hitrans have fallen as a result which appears to have negatively impacted the company's valuation (down 66% vs the first half of 2022). While the company remains committed to a long-term vision of operating an integrated battery manufacturing company, we noted that CBAK's most recent conference call focused almost exclusively on the company's battery business so we think the company may choose to explore strategic options to unlock the value of Hitrans.

➢ As of June 30, 2023, the company has $3.4 million in cash and equivalents on the balance sheet and total debt of $26.8 million. The company will likely require additional capital infusions, will need to sell a stake in a subsidiary, and/or receive government grants to fund its aggressive expansion plans for the Nanjing and Dalian facilities. We believe that the majority of the company's short-term debt will be converted to more traditional long-term debt when this phase of construction is completed.

➢ The company has a long history as a public company and frankly, it has overpromised and underdelivered too often during that period. We believe that is why the market is taking a "wait and see" attitude regarding the announced capacity expansions, the new 46-series cells, and the sodium-ion cell commercialization. Converting press releases into tangible results will be critical to convincing investors that this time is indeed different for CBAK.

➢ The company has already presold the bulk of its 2023 capacity (and likely a significant portion of 2024 capacity) to customers and continues to announce customer wins with industry leaders in the energy storage market. Adding production capacity will be the key to increasing revenues and achieving profitability.

➢ We are establishing a target of $1.80/share (65% above the current price) for CBAK based on a blended valuation of our 2024 revenue forecast for the battery business and Hitrans. We believe this could prove to be conservative if the company successfully it unlocks value in the sodium-ion business through strategic investments or if capacity expansion occurs faster than anticipated.

OVERVIEW

Source: CBAK Energy Technology

CBAK Energy Technology is an integrated lithium-ion battery company based in China focused on manufacturing cylindrical lithium-ion cells and battery packs. As a result of an acquisition in 2021, the company is also now a significant producer of raw materials that are sold to other battery manufacturers for the production of battery cells. The company's cells are used in a variety of end products but energy storage has become its focus over the past few years. The company's acquisition of Zhejiang Hitrans (referred to in this report as Hitrans) in 2021 capitalized on a shareholder dispute at Hitrans that allowed CBAK to acquire Hitrans at a reasonable valuation. While Hitrans represented the bulk of the company's revenue in 2022 as a result of strong demand and very strong market prices, it remains a low-margin, volatile commodity business and we believe that has impacted investors' view of CBAK. We believe that the market is missing the big picture at CBAK as the company plans to increase production capacity more than tenfold in the next four-five years. We believe that it is likely that the company will see an improved valuation when the market recognizes it as a major battery manufacturer.

In addition, to the substantial expansion of production capacity that is planned, the company is targeting higher value-added battery cells that offer improved performance at a better cost with greater energy density and launching a new sodium-ion battery which holds a great deal of promise.

CBAK has a long and checkered past as a stock on the NASDAQ exchange with several false starts targeting emerging markets like EVs and that past has limited its ability to appeal to large institutional investors.

After exiting the EV market for the most part when subsidy rules sharply lowered demand for batteries that were not made with prismatic cells (having higher energy density), the company has refocused its battery offerings to include EV battery packs again in China. The company's new larger, cylindrical cells have a higher energy density and thus, market interest in cylindrical cells seems to have returned. In the first half of 2023, 3.8% of total battery sales were EV battery sales. However, this business continues to be very lumpy for CBAK (EV battery sales fell over 90% from Q1 to Q2 2023) and we don't believe investors will focus on EV sales in the near term for the company.

In November 2021 the company acquired a majority stake in Zhejiang Hitrans for $24.5 million. Hitrans has an annual production capacity today of 13,000 tons of NCM precursors and 13,000 tons of cathode materials that are used by battery manufacturers including two CBAK-related entities. The company acquired Hitrans because it felt the valuation was reasonable and the growth opportunities for battery raw materials remain significant.

The timing of the acquisition (2021 results only included 1 month of Hitrans), explosive demand for raw materials, and several market-related price shocks in the raw materials market boosted revenues for Hitrans and made comparisons with historical results challenging. The company reported that revenue at Hitrans jumped from $17.9 million in 2021 (again just one month of results) to over $154 million in 2022. We estimate that if the company had reported proforma revenues for Hitrans in 2021 total revenues in that division would have been roughly $125 million and thus, the growth in 2022 would have seemed more realistic to investors. Hitrans is difficult for investors to value relative to the battery business given

the limited number of public companies operating in the space. We will discuss the issue of valuing Hitrans in further detail in our valuation section.

Figure 1: Manufacturing Facilities

Dalian Facility

Nanjing Facility

Source: CBAK Investor Relations Production Walk Thru https://www.youtube.com/watch?v=U2VMim5tg5U

Manufacturing Capacity Expansion

In 2020, the company (through a subsidiary - BAK Asia) announced an agreement with a local economic development zone to expand the capacity of its lithium battery projects to a total of 20 GWh per year.

As of 12/31/22, the company had received subsidies of just over $7 million towards this initial expansion of battery production for the light electric vehicle, electric vehicle, and energy storage markets. The company has indicated that it anticipates completing the first phase of this expansion and reaching 2 GWh of production capacity at Nanjing by the end of 2023 with the second phase wrapping up in 2027 when total capacity should reach 20 GWh at Nanjing. The second phase of this expansion – adding 18 GWh – will be completed in three stages which will each add roughly 6 GWh. We believe the company is in stage 1 of the second expansion. Given that this stage will roughly triple the existing capacity of the Nanjing facility (and is more than double the current capacity), this is a major expansion with significant financial implications for revenues and the company's valuation.

When combined with the 1 GWh of capacity at the Dalian facility at the end of 2023, it is projected that the company will have roughly 3 GWh capacity with additional capacity under construction. We anticipate 2 GWh of additional capacity will be added by the end of 2024 bringing the total completed construction to 5 GWh by the end of 2024.

The company expects to add 15 GWh of capacity at their Dalian Facility mostly focused on 46 series cells and being completed in two stages with 5.6 GWh finished by 2025 and another 9 GWh completed by 2027.

If the company achieves these very aggressive growth targets it would have 36 GWh of installed capacity at the end of 2027 which would make CBAK a top battery manufacturer globally based on 2022 manufacturing capacity. We think investors are correct to be cautious at this stage of the expansion given the company's history and the company's financial situation. We have been more conservative in our estimates, assuming the company only completes roughly 8 GWh of capacity by the end of 2025. If the company exceeds these expectations, it would be a positive for the company and the stock.

Current products from CBAK

The company is a manufacturer of cylindrical lithium-ion batteries in China (see page 15 for a comparison of cylindrical versus prismatic and pouch cells).

Figure 2: 26650 cylindrical cells

Source: CBAK Energy Technology

26650/26700 cells

The company's most mature product is the model 26650/26700 lithium-ion cell – the model number is derived from the battery's dimensions. In this case, the 26650 is 26mm wide (roughly 1 inch) by 65 mm tall (roughly 2.5 inches) and the 26700 is 26mm by 70mm. For reference, you can think of the 26650 cylindrical cells as being just slightly longer than a standard C-sized battery.

We estimate that 26650/26700 cells represent the largest share of the company's 2022 battery sales (roughly 50%-60%). Over time we believe that many of the company's customers will migrate to the more efficient 32140 cells described below but for the near future, the 26650/26700 cells will represent the majority of battery sales. These 26650 and 26700 cells are primarily manufactured at the company's Dalian facility which is the company's longest operating plant.

The principal application of these cells in end products is for home energy storage, emergency energy storage, and off-grid energy storage. In recent years there has been very strong demand for these cells in the EU tied to additional solar installations and battery backups. The company's largest customers use the batteries as part of their uninterruptible power supply ("UPS") systems.

Most of the end uses of 26650 cells require 10-30 cells in a battery pack and the end uses of these cells have migrated over time toward energy storage units. We will discuss this market in further detail below but in general, these are products used as power back-up alternatives to traditional generators, accessories for solar systems, and used as mobile power sources. In the future, we believe battery backup may migrate toward more industrial applications related to large-scale energy storage.

Cylindrical cells offer advanced safety versus pouch cell alternatives (a lower likelihood of a puncture resulting in a fire) and the significant number of charging cycles - up to 2,000 charges at 100% depth of discharge - make these batteries well suited to energy storage applications.

In 2021, CBAK announced a new 26650 lithium-ion battery that was designed specifically for working in extremely low temperatures. One of the limitations of lithium-ion batteries in general is that they cannot be charged when the air temperature reaches 0 degrees Celsius (32 degrees Fahrenheit) and most battery manufacturers do not recommend discharging a lithium-ion battery below -20 degrees Celsius (-4

degrees Fahrenheit). While these extreme temperatures are avoidable for many applications there are use cases where recharging and discharging have to occur at extremely low temperatures. Batteries needed to power scientific equipment in polar regions, cold weather rescue, robots or drones operating at altitude, cold storage monitoring, and security systems are all examples that sometimes need to work in extreme temperatures. While we feel this is a relatively small market relative to home energy storage, battery backup, or the EV/LEV markets, offering these advanced cells indicates that CBAK is capable of research and development in new product areas.

32140 Cells

The company has also begun production of 32140 cells at its Nanjing manufacturing center.

Figure 3: A 32140 cylindrical cell

Source: CBAK Energy Technology

The 32140 cells are 32mm by 140mm (1.25 inches by 5.5 inches) and have roughly 25% greater energy density than the company's 26550 batteries. The large capacity and strength of the cylindrical design of these batteries have made them among the safest and most cost-effective solutions for the light electric vehicle market (principally, electric scooters and electric bikes). In the future, we anticipate many current energy storage customers will redesign their products to use 32140 cells. The larger battery cell size reduces the overall number of cells required in each battery pack and lowers the overall cost of the cells by roughly 20% according to the company.

We believe that the majority of the company's increased capacity over the next three to four years will be geared toward 32140 cell production as the company attempts to expand from 2 GWh of capacity at the Nanjing facility to 20 GWh.

21700 Cells

The company does not manufacture 21700 cells but as a result of a long-standing customer relationship, the company has an agreement in place to purchase these cells from a former related entity – Zhengzhou BAK (spun off in 2017) – and sell them to the customer. While we appreciate that the company wanted to maintain a good relationship with this customer, we feel like investors may have discounted these sales because they were not core to the business and offered a very thin margin. Ultimately, this customer is expected to transition to a more current design like the 26650, 26700, or 32140 that can be manufactured by CBAK. There is some evidence of this transition occurring as the 21700 cells were over 30% of total battery sales in 2022 but the value of these cells sold in Q2 2023 was just 1.5% of total battery sales. We will discuss this relationship later in the "Related Party Transactions" section.

Future products:

46mm Cells

While details are limited at this point, we believe that the company is prototyping its 46 series cells which will be 46mm wide. The exact final format is yet to be determined because it is likely to rely on the demand from customers and the end-use cases. In initial tests, the company believed that these cells could have up to 15% greater energy density than the company's base 26650 models at up to 12% lower cost. The company has indicated that the initial production run for the 46 series cells will be either 46115 or 46157 with the prospect of launching a 46800 battery in 2024.

Cells with 46mm diameters gained market attention when Tesla indicated that they would be using cylindrical cells (in this case, 46800 or 46mm by 80mm) for their batteries from Panasonic. Since the Tesla announcement additional car manufacturers like GM and BMW have indicated that they may also make the shift to 46800 cylindrical cells as a result of the safety and performance factors that are offered by these cells. We have not learned of any Chinese auto manufacturers shifting to 46mm cylindrical cells officially. In 2021, the company did indicate that it had signed an agreement with JAC Motors to develop a 46800 battery. However, there have been no public updates on this agreement which was set to run for three years (likely ends early 2024). We think 46mm cells may begin production in 2023 but the initial applications will likely be for the energy storage market. When production does begin, we expect that this production will take place at the company's Dalian facility.

Sodium-Ion Batteries

The company has also recently announced several initiatives related to the launch of the first commercial production line of cylindrical sodium-ion batteries (see: Recent News below). Sodium Ion batteries have become an area of interest for many companies as the cost of lithium has soared in recent years. Sodium-Ion batteries are estimated to have a 20-35% cost advantage over comparable lithium models depending on the market price of lithium.

Another advantage of sodium-ion batteries is the availability of sodium around the globe. Lithium deposits are generally concentrated in just a few geographies (Bolivia, Argentina, Chile, and Australia) that are far from battery production sites in China, thus the carbon footprint of lithium-ion batteries is higher than most would like to admit (when one considers the environmental impact of shipping lithium around the globe). As we noted, sodium is plentiful, relatively low cost, and dispersed around the globe so accessing the raw material is more environmentally friendly. Given the relatively low energy density of sodium-ion batteries compared to lithium-ion batteries and the partners that the company has announced to date, we believe that the initial applications of these cells will be in the home and industrial energy storage markets.

We believe that investors will likely take a wait-and-see approach with regard to the commercial launch of sodium-ion batteries given CBAK's history. However, the potential to bring a cylindrical sodium battery with better performance and lower cost to the market shouldn't be overlooked. We think this presents a multi-million dollar opportunity for CBAK. Both BYD and CATL have announced plans to manufacture sodium-ion batteries in 2023, so we believe the company is well positioned in this emerging market.

The company has announced relationships with two leading players in the sodium-ion market (HiNa) and portable energy storage market (Hello Tech) for the commercialization of these sodium-ion cells but we believe investors are waiting for these announcements to turn into real commercial contracts. The company has a history of announcing relationships that never reached their potential so investors are a bit gun-shy when it comes to large potential deals announced in press releases.

End uses of the company's battery cells:

Uninterruptable supplies

The largest market for the company's cells today is for use in the uninterruptable power supply market (over 90% of battery sales in the latest quarter). To date, the company has worked with a fairly small number of clients who have sharply increased their order rate with CBAK.

Figure 4: Cells Manufactured in Dalian

Source: CBAK Investor Relations Walk Through Video (https://www.youtube.com/watch?v=U2VMim5tg5U)

Uninterruptable power supplies (UPS) are effectively a battery pack that sits connected to a power supply and a device that requires constant power. Power failures for some devices can result in permanent damage to the device, failure of a critical operation, or corruption of data stored on a device so power must be supplied continuously. There are several use cases for this type of energy storage but principally, it falls into protection/safety (for example, backup power systems to run a boiler or data center during a power outage) and mobile power applications (delivering onsite power on demand for off-grid camping for example).

The growth that the company has experienced in this market is primarily due to new customer wins, customers increasing their order sizes, and the expansion of production which continues to be absorbed by the market.

In the long run, we believe there are significant opportunities for the company to target industrial energy storage as utilities and governments look for ways to ensure grid stability while pursuing clean energy goals.

EVs

While the company historically sold battery packs to some Chinese EV manufacturers including Dongfeng Autos, Dayun Motor, and Yema Auto between 2017-2019 changes in China's EV subsidy policies to prioritize extended-range vehicles (principally using prismatic cells) significantly reduced demand for the company's EV battery offerings after 2019. However, as a result of new designs from CBAK, EV battery sales picked back up in the first quarter of 2023 where they totaled $1.8 million or 6.2% of total battery sales. Unfortunately, the company was unable to maintain that momentum in the second quarter of 2023 as EV battery sales were just $136 thousand. We feel that the lumpiness of this business has led investors to ignore the potential of EV sales.

The company has not disclosed customers of their EV battery packs but based on past announcements we suspect at least one of the customers is Jiangsu Jemmel a company that makes a small, economy EV and a company which is related to the Jinpeng Group (a major LEV manufacturer with capacity above 3 million units per year). CBAK offers a wide range of battery packs from 0-10KWh for very small EVs and 10-300KWh packs for much larger applications (though the company has not sold all of the

combinations to date). We estimate that CBAK charges roughly $110-$210 USD per kWh in the battery pack

Depending on the customers' needs and the battery pack configuration, large battery packs can contain 6,000 to 9,000 cylindrical cells resulting in 50-75 KWh of power output but we do not believe that the company has a presence in this market yet. More likely we believe the company's most popular EV battery packs contain 1,000 to 1,500 cells and have 15-20 KWh capacity meaning the average battery pack is being priced at somewhere between $2,000-$3,000.

Having battery production capacity is a competitive advantage in the market for EV batteries and it is anticipated that over the next 30-54 months, CBAK will add significant capacity at its manufacturing facilities including capacity to produce 46-series cells that are increasingly popular with EV manufacturers. We anticipate that many manufacturers will be reviewing the growing capacity at CBAK in the coming years as they look to meet soaring EV demand. We are not forecasting that EV battery sales become a meaningful contributor to revenues by 2025 but we will revise that assumption if new customers absorb CBAK's capacity for use in EV battery packs.

Figure 5: EV Battery Packs

Source: CBAK Investor Relations Walk Through Video (https://www.youtube.com/watch?v=U2VMim5tg5U)

LEVs

The company's cells have been sold into the "light" electric vehicle market since 2022 but sales jumped to 6% of total battery sales in the first half of 2023 as the improved energy profile of the company's 32140 cells helped the company gain market share.

For this market (think principally electric scooters and electric bikes) the number of cells is significantly smaller in each battery pack than in the EV market (using just 10-40 cells per pack) and we believe the price point ranges from $20-$80. Global demand has soared for LEV battery packs in recent years but the market continues to face some safety concerns as a result of poorly manufactured cells and improper charging techniques that have resulted in several high-profile fires recently. We think that cylindrical cells offer a better safety profile than the alternative battery formats for LEVs and thus, continue to forecast robust demand for CBAK's cells in this market.

Raw materials:

In July 2021, CBAK Power (a wholly owned subsidiary of CBAK Energy Technologies) announced an agreement to acquire 81.5% of Zhejiang Hitrans Lithium Battery Technology Co ("Hitrans"). The company ultimately closed this transaction in November 2021 for total consideration of roughly $24.5 million

Hitrans sells:

Precursors	Cathode
NCM precursor	Lithium nickel cobalt manganate
Nickel cobalt aluminum precursor	lithium nickel cobalt aluminate
Nickel cobalt precursor	

Current customers include – Brunp Recycling (a subsidiary of CATL), Beijing Easpring, Farasis, and Wanhua.

The principal motivation for this acquisition was to capitalize on the growing market demand for battery materials. At the time of the acquisition, a number of the Hitrans shareholders were engaged in various lawsuits against one another and it presented an opportunity for CBAK to acquire the company at a relatively low valuation.

The purchase of Hitrans created a battery supplier with exposure to the raw material market, cell manufacturing, and finished battery packs. However, the extreme volatility of pricing in raw materials has led to wild swings in revenues derived from Hitrans. Many of the company's customers have been electing to hold off on purchases in 2023 as prices have fallen sharply (down 40% from the 2022 peak). These purchase delays have significantly impacted results at Hitrans where revenues were down 66% in the first half of 2023 to just $33 million and a significant portion of those sales were to a former related entity (see "related party transactions").

The company has sold off some interests in Hitrans over the last 2 years and today they hold roughly 67% of the company. We believe that the low-profit margins in this business (just over a 2% gross margin in the second quarter of 2023), high revenues relative to the value-added battery business, and the volatile nature of commodity pricing, make it difficult for investors to value CBAK as a pure battery manufacturer. The current plans from the company include a substantial increase in production capacity at Hitrans – including more than tripling annual production capacity to 50,000 tons of precursor by early 2024. The company also expects to expand its cathode production capacity to 50,000 tons by 2025 (from 13,000/year in 2023). At this level of production, the company would be likely considered one of the largest raw material suppliers in the world. However, we think investors should take note that in the most recent quarterly conference call, there were barely any references to the Hitrans business. It's not clear if this is simply because the business is weak currently or if CBAK has changed its vision for this division, but we will be watching for developments on this front.

We believe that if the company was able to sell off enough of Hitrans that they become a minority holder, the CBAK financial statements would solely reflect the battery operations again which will allow for better comparisons with large battery manufacturers in China. We also believe that by selling off some or all of the Hitrans business, the company could unlock significant shareholder value.

HISTORY

The company was incorporated over two decades ago in 1999 and the shares of its common stock were first listed on the Nasdaq Global Market in 2006 trading under the symbol "CBAK." In 2014, a subsidiary defaulted on a loan to a major shareholder which resulted in the shareholder seizing subsidiary assets to satisfy the majority of these loan obligations. As a result of losing control of these operating assets, the company's revenues fell sharply in 2015 from over $120 million to just $13.9 million in 2015. In 2018, the trading symbol for CBAK Energy Technology, Inc. changed from CBAK to "CBAT."

The company currently conducts business through:

(i) **three wholly owned operating subsidiaries** owned by BAK Asia
(ii) **CBAK Nanjing**
(iii) Nanjing CBAK
(iv) **Nanjing BFD and**
(v) **Hitrans**, a subsidiary of CBAK Power, where CBAK Power owns 67.33% equity interests.

1) The three wholly owned operating subsidiaries in China owned through BAK Asia

- *CBAK Trading* located in Dalian, China - wholesales lithium batteries and battery materials
- *CBAK Power* located in Dalian, China - high-power lithium batteries.
- *CBAK Suzhou* 90% owned by CBAK Power is expected to be dissolved in 2023.

2) CBAK Nanjing
Incorporated in July 2020, CBAK Nanjing operates the company's newest facility producing mostly 32140 lithium battery cells.

3) Nanjing CBAK
Incorporated in August 2020.

4) Nanjing BFD
Incorporated in 2020, focuses on the development and manufacture of electric bicycles, motorcycle and automotive spare parts.

5) Hitrans
Hitrans, 67.33% owned by CBAK Power and included in the financial results since December 2021 is principally engaged in the business of research and development, production, and sales of cathode materials and precursors for lithium batteries.

Guangdong Hitrans, 80% owned by Hitrans, located in Dongguan, Guangdong, China, incorporated on July 6, 2018, principally engaged in the business of waste recycling.

CAPABILITIES AND COMPETITIVE ADVANTAGE

The reality is that in the lithium-ion battery market, the products are fairly standardized, and as long as the cells produced are matched with like cells in a battery pack, the result will be a high-quality battery. Ultimately, securing business in this market is more often tied to a manufacturer's ability to offer manufacturing capacity and manufacturing cells that fit within a customer's product design. The demand for lithium-ion battery cells has been so substantial in recent years that additional capacity has always been absorbed by market demand. We believe that companies in need of battery cells tend to find a manufacturer and work with that provider to ensure adequate supply at a reasonable price.

The large order from Viessmann announced in June 2023 is a good example of the state of the battery cell manufacturing market. The relationship between Viessmann and CBAK only began with a small-scale order in 2018 for testing and due diligence, followed by the first official orders in 2020. Just two years later Viessmann placed an order for the majority of the company's capacity in 2022 and Viessmann increased that order size again in 2023 to $125 million (see recent news below).

Today, CBAK is a fairly small player in the lithium-ion battery market (with an anticipated capacity of 3 GWh at the end of 2023) but as the next phase of the expansion begins the company's capacity should grow to 5 GWh (roughly a 67% increase in capacity) at the end of 2024 and potentially growing to 14-15 GWh by 2025. The company has a stated goal of reaching 36 GWh of capacity by 2027 but we believe those goals will be challenging to achieve. However, even at 14 GWh, the company's production capacity would be up over 8x from 2022. We believe that this new capacity will give the company a competitive advantage in the market in the near term (though we do have long-term concerns about the risk of additional capacity coming online in the US and the EU).

The company's early research into sodium-ion batteries could be a real point of differentiation in a commoditized market. Sodium-Ion batteries offer the promise of better performance, lower costs, and a wider range of optimal operating conditions. However, cylindrical sodium-ion batteries have not come to market yet from CBAK (or any other manufacturers) at scale, so we believe the market is reserving judgment until they can see tangible results from CBAK and their partners that sodium-ion technology is ready for commercial deployments.

STRATEGY AND OBJECTIVES

The company's end markets are each unique and require specialized strategies to be successful.

Energy storage
CBAK is a strong player in the energy storage market where they have secured relationships with 3 of the 4 largest companies in the portable energy storage market. The company's current growth strategy in this market appears to be to become a trusted supplier to their customers in growing markets and expand along with their customers as demand increases**.** The company's strong relationship with industry leaders should give it ample room to grow in the energy storage and portable energy storage market.

There are likely to be additional opportunities in the market for energy storage as large-scale energy storage becomes more widely adopted.

EV/LEV
The EV market has significantly more suppliers and customers than the energy storage market, so the company's growth strategy is likely to be a bit more nuanced. Demand for battery packs to power EVs is going to continue to grow but we believe CBAK's limited history in this market will make it difficult to secure major overseas customers. We anticipate that the company may attempt to develop relationships with domestic Chinese auto manufacturers as the larger battery companies (CATL, BYD, etc.) focus on opportunities in North America and the EU. We believe that recent domestic wins in the energy storage market and advances in new technology like sodium-ion batteries have improved the company's domestic profile but until large new orders from a major EV manufacturer in China are announced this will remain a bit of an unknown.

Raw materials
This business is effectively a commodity model with revenue growth (or contraction) being almost entirely due to pricing in the market. Raw material prices have been incredibly volatile in the past 2 years which has had a significant impact on the operating performance of this segment. In 2023, falling prices (that would normally spur demand) have caused some buyers to pause their purchases hoping to catch the very bottom of the market. While it would be nice to imagine that the company could market its products

to drive greater volumes and revenue, the reality is that revenues are a function of battery demand and global raw material pricing.

BATTERY FORMATS AND INDUSTRY OUTLOOK

Lithium-Ion Battery formats

There are three basic lithium-ion cell formats that are used in end products – prismatic, pouch, and cylindrical. The need to secure an adequate supply of batteries and design preferences has led to each format having its supporters and there is no clear consensus regarding the "best" battery format.

Prismatic cells:
Compact prismatic cells that allow for easier battery pack formation (due to the rectangular shape of the cells) have been favored by many German EV manufacturers like BMW, Volkswagen, and Mercedes Benz, as well as several Chinese manufacturers. These compact cells are valued for their relatively low cost of manufacturing, their small footprint, their rectangular shape, and the ease with which they can dissipate heat. Unfortunately, as is the case with all of the current battery cell formats certain compromises must be made. Historically, there have been some challenges with the number of charging cycles that these batteries can withstand before they begin to degrade. Charging cycles are estimated to be about 2,000 for a prismatic cell battery pack which would be a little over 5 years if a car battery was charged daily.

Pouch cells:
Pouch cells have electrodes and separators in a flexible casing and are often used in small electronics (laptops and cell phones) because they are small and lightweight. Like prismatic cells, pouch cells are limited to roughly 2,000 cycles. Pouch cells have been selected by manufacturers like General Motors and Geely because of their small size and powerful energy profile. Again, trade-offs must be considered and the two biggest drawbacks to the pouch cells are their cost relative to the alternatives and the risk of catastrophic failure if the thin membrane around the cell is punctured. If you've ever heard the safety announcement on a plane about not reaching for your cell phone if you drop it in between your seats that is a direct result of fires that have been caused by the movement of passengers adjusting their seats to look for a phone and the motion of the seat hinge penetrating the battery cell membrane.
Pouch cells can be difficult to cool as well, but despite these challenges pouch cells remain the most popular design used by car manufacturers today.

Cylindrical cells:
Lastly, we arrive at the type of cell manufactured by CBAK – cylindrical cells. Cylindrical cells have remained a viable option in the EV market largely due to Tesla's insistence on using them (and Rivian and Lucid following suit). To date, Tesla has been using principally 18650 and 21700 cells in their batteries but there has been great anticipation of their shift to 46800 cells since they announced those plans in 2020. Based on their latest update in April 2023, it appears as though Tesla was getting close to large-scale production of these cells at its Texas plant.

Tesla CEO Elon Musk has long favored the cylindrical cell format because of its rigid design and strong casing which makes cylindrical cells arguably a safer option for the end user. However, an equally important driver for auto manufacturers is that cylindrical cells have been manufactured for years and can be manufactured efficiently lowering overall costs.

The main drawbacks to cylindrical cells are that their shape makes it difficult to assemble packs and the large number of cells used means a larger number of welds required which increases the odds of a system failure.

Cylindrical cells make an ideal solution in stationary power systems like home energy systems or uninterruptible power supplies that have been a strong suit of CBAK. We anticipate further expansion into industrial and grid storage which should offer substantial growth opportunities for the CBAK.

The push to 46mm

While Tesla remained on a relatively small island initially with their use of cylindrical cells, increasingly other manufacturers have started to embrace the format. Rivian and Lucid are also now using the format in their battery packs, but the real shift came in 2022 when BMW announced that it would be moving to cylindrical cells beginning with the 2025 model year. It is believed that at least one of the formats to be adopted by BMW will be 46800 cells like those contemplated by Tesla.

Shortly after the BMW news, it was reported that General Motors was considering a shift to cylindrical cells for at least some of their future vehicles. Additional manufacturers (including Stellantis and Volvo) have indicated that they may also consider cylindrical cells.

Why is this relevant for CBAK?

- The company has a long operating history manufacturing cylindrical cells.

- The company is prototyping a 46mm battery which it claims will have 15% higher energy density and up to 12% lower cost.

Given CBAK's strength in the energy storage markets, it is likely that the initial 46 series battery that they bring to market will be designed for the energy storage providers and may be longer than the Tesla preferred 46800 (46mm x 80mm or 1.8 inches by 3.1 inches) as the company has referred to prototyping a 46157 battery (46mm x 157mm or roughly 1.8 inches by 6.2 inches)

While it is early in the development of the market for larger, energy-dense cylindrical batteries we believe that the market is moving toward a solution like that offered by CBAK. If the company can demonstrate expertise in manufacturing batteries of this diameter, we think the additional demand for 46mm cells could present a significant opportunity for CBAK in the energy storage market.

Overview of The Global Lithium-Ion Battery Market

The global lithium-ion battery market is still dominated by Chinese manufacturers despite significant plans put forth by several Western governments and companies to expand manufacturing capacity around the globe. Within the lithium-ion battery market, the EV battery market is the highest profile, but increasingly the focus is shifting toward energy storage

Figure 6: Global EV Battery Market Share

Country	Share of Global EV Battery Production	EV Production Capacity in GWh
China	76%	655
Korea	5%	41
US	7%	57
Japan	4%	36
EU	7%	60
Rest of the World	1%	8.5
Total	100%	858

IEA (2022), Global Supply Chains of EV Batteries, IEA, Paris https://www.iea.org/reports/global-supply-chains-of-ev-batteries, License: CC BY 4.0

The production of lithium-ion batteries for EVs is a multi-stage process from the mining of materials, processing raw materials, manufacturing of cells, and assembling of the cells into battery packs.

China's strength in the EV Battery markets begins with a deep portfolio of properties that provide the raw materials necessary for battery production, like the CBAK subsidiary Hitrans. Over half of all raw material

processing of key components like lithium, cobalt, and graphite occurs in China even though most of these materials (other than graphite) are mined outside of China.

Demand for EV batteries in developed and emerging markets coupled with pushes to onshore battery manufacturing will likely lead to substantial increases in global battery supply in the next decade (installed capacity is predicted to grow globally at 23.5% CAGR through 2027)[1]. Demand for EV batteries in China has weakened a bit along with the Chinese economy but with continued government support for EVs and a significant push for industrial and grid storage, battery demand should remain robust in China. While it will be important to monitor global EV battery supply to look for signs of excess production, we believe that at least for the balance of the decade, demand trends in large-scale energy storage will ensure adequate battery demand, particularly for a company with significant new available capacity like CBAK.

Another trend that is emerging in EV battery manufacturing industry is partnerships between cell manufacturers (like CBAK) and manufacturers (auto or solar companies) to ensure an adequate supply of high-quality batteries. While these partnerships accounted for just 5% of all shipments in 2021, they are expected to grow to over 20% of all shipments by 2027.

We believe that the increasing popularity of cylindrical cells, CBAK's experience manufacturing cylindrical cells, and the fact that CBAK is likely to have available capacity as a result of its expansion means CBAK will make an attractive potential partner for domestic Chinese manufacturers.

Figure 7: Position in the lithium battery market/Competition

Company	2022 Installed Battery Capacity in GWh	Global Market Share
CATL	191.6	37.0%
LG Energy Solution	70.4	13.6%
BYD	70.4	13.6%
Panasonic	37.8	7.3%
SK	27.8	5.4%
Samsung SDI	24.3	4.7%
CALB	20.0	3.9%
Gotion High-tech	14.1	2.7%
Sunwoda	9.2	1.8%
Farasis Energy	7.4	1.4%
CBAK	1.7	0.3%
CBAK end of 2023	3.0	0.6%
CBAK end of 2024	5.0	1.0%
CBAK end of 2027	36.0	7.0%

Source: https://cnevpost.com/2023/02/08/global-ev-battery-market-share-2022-catl-37-byd-13-6/ and Zacks Small Cap Research

The market for lithium-ion batteries is dominated by the largest players, with more than 75% of global capacity residing with CATL, LG, BYD, Panasonic, and SK.

While the concentration of market share is expected to slowly decline over time as new capacity is brought online around the globe, the largest players will likely continue to dominate the market for the foreseeable future.

However, we believe that CBAK's experience with cylindrical cells, strength in the energy storage market and substantial capacity to be added in the next 4 years that has yet to be committed to any buyer makes it probable that CBAK will be able to compete effectively with their much larger competitors.

ADDRESSING THE J CAPITAL RESEARCH REPORT

In December 2020, J Capital Research issued a negative report on CBAK that raised several issues relating to the company's past operations and claims. We believe that this report properly pointed out some areas of concern at the time and may have misinterpreted some other information. While this report is nearly three years old, it is still cited by potential investors as a reason to avoid CBAK.

Below are some of the most significant critiques of CBAK and our interpretation of those claims:

1) The company appointed Xiangyu Pei to the role of Interim CFO in 2019 and this was cited as evidence of financial mismanagement. While Ms. Pei still holds the "interim" title nearly four years later, we believe the company is actively attempting to recruit a permanent CFO. A complete management team would be welcome and a permanent CFO would be a step in that direction. We do not feel that this appointment was a sign of fraud but we feel investors will remain cautious until a permanent CFO is hired that can address some of the financial reporting deficiencies cited in the 10k.

2) The report said that in 2019, CBAK was attempting to present itself as an electric vehicle company. We agree that the company overemphasized some early EV battery sales in its marketing literature in 2019, but we do not believe the company "claimed to be an EV company". There also appears to have been some confusion around the company name at this time as it operated under the name China BAK before switching to CBAK. We believe that when J Capital conducted customer due diligence calls, the relationship was not always clear because the company's operating name was changing.

3) In 2019 and 2020, CBAK was in the early stages of developing both of its main operating facilities in Dalian and Nanjing. J Capital Research hired a local investigator to visit both locations and we applaud that level of due diligence. At that time, both plants were at various stages of construction and certainly did not appear to be complete. The company's facility at Dalian in particular was mostly unoccupied plant shells that was awaiting equipment to be installed. From the outside and using satellite imagery it would give the appearance that these facilities were not complete but we believe that this is part of the company's larger strategy to slowly expand production as demand dictates. While we have not had the opportunity to visit the facilities in person, we have seen footage from the interior of the buildings, the warehouses, and the production lines in Nanjing and Dalian which appear to be home to modern battery manufacturing technology today.

4) We believe that one of the most significant flaws in this report was the focus on the company's cells as being single cells sold for flashlights. As we've noted, the company does manufacture 26650, 26700, and 32140 cells that are typically packaged together in much larger battery packs – using 10s to 100s of cells. The overwhelming majority of the company's sales are battery packs to customers who produce uninterruptible power supplies. We do not feel that it was an accurate representation of the company's offerings to describe them as $2 flashlight batteries.

5) In 2020, the company was just beginning to market its 32140 cells and the J Capital report was skeptical of the prospects for these cells and even quoted a battery expert who stated, "High-end cars don't dare use cylindrical batteries," but three years later, Tesla's commitment to the format has made cylindrical batteries mainstream and leading manufacturers like BMW and GM are switching to cylindrical batteries in future model years.

6) The company has for several years supplied batteries to a customer that requires 21700 battery cells that the company does not produce. To meet this customer's needs, CBAK buys these batteries from Zhengzhou Bak – a previously related entity – and passes them through at a small markup. While

you could argue that the sales could be excluded since the margin is negligible, as we note below (see *related party transactions* below) these sales were $26.8 million in 2022 but in the second quarter of 2023 these sales were just $342 thousand dollars (1.5% of battery sales) so we believe the company has transitioned this customer to other cell sizes that CBAK produces.

7) The final point that is worth discussing is the issue of two very large "orders". The first of these was a $122 million order for battery packs from Kandi Technologies. Kandi has been associated with some questionable practices and we do not believe that this order ever materialized for CBAK. In the same year, the company also announced a 300 million RMB order (roughly $40 mil USD) from Simpliphi (now a subsidiary of Briggs & Stratton Energy) for battery storage systems over three years. We understand the skepticism given past announcements, however, since CBAK recorded over $110 million in revenue during the period of this contract it is possible that this contract was valid.

In general, we feel that J Capital Research raised some valid concerns at the time of their report (December 2020), especially given that the stock of CBAK jumped 1000% in the three months before the J Capital report on no material change in the business. However, we do feel as though the company has made substantial progress toward becoming a serious battery manufacturing firm since the time of this report (while the stock has fallen more than 80%) so we feel comfortable that many of the issues highlighted in this report are behind the company or priced in at the current levels.

Related Party Transactions

The company has significant related party transactions that were disclosed in the latest 10k and investors may want to consider these transactions when evaluating the company's long-term prospects.

The company purchased $26.8 million of batteries from Zhengzhou BAK Battery, a former subsidiary. We believe that these batteries are an older form factor (21700 cells) that the company no longer manufactures but its clients have requested. To maintain the client relationship, the company purchases these batteries from the former related party and then sells them to the end customer. Over time we believe that these sales should decline as the customer switches to newer models. We estimate that these cells accounted for roughly 30% of total battery sales in 2022 which is substantial. However, in second quarter of 2023 these sales fell to just $342 thousand or just 1.5% of total battery sales.

The company also realized an enormous jump in the sales of cathode materials to two related parties – Zhengzhou BAK Battery and Shenzhen BAK Power Battery – from $8.3 million in 2021 to $61.9 million in 2022. This increase was driven by the sharp increase in raw material prices in 2022 and additional volume. The raw materials business is less significant to the total valuation of CBAK but since these sales to related parties accounted for roughly 25% of total sales (and 40% of raw material sales) in 2022 it could be argued that they should be excluded from any valuation calculation. In 2023, the relationship with Shenzhen BAK Power Battery has effectively gone to $0, but the sales to Zhengzhou BAK Battery have declined but increased as a percentage of total Hitrans sales. In the first half of 2023, sales to Zhengzhou BAK Battery totaled $17 million or 51% of total Hitrans sales.

Announcements

The company has over the past 5 years made several announcements that have either not become material or failed to materialize. It is worth mentioning this issue because it is contributing to investor caution.

In January 2021, the company announced a three-year agreement with Anhui Jianghuai Motors Group Co (JAC Motors) to jointly develop cylindrical lithium-ion batteries and battery packs, including the 46800 model. According to the 2019 press release the companies were to lead a joint R&D effort to bring these batteries to the market. With over 500,000 annual units shipped and a strong financial partner in Volkswagen, this agreement sounded very promising but with just 5 months remaining on the original agreement the company has not provided any further updates and it's unclear if they will produce a 46800 battery from this agreement.

As we noted previously, In November 2020, the company announced a supply framework agreement with Zhejiang Kandi Vehicles Co ("Kandi" NASDAQ: KNDI) and stated that Kandi was planning to buy $120 million worth of battery pack systems and battery manufacturing services in 2021. Since CBAK only reported $1.6 million of EV/LEV battery sales in 2021 it is clear that this agreement was not fully realized.

MANAGEMENT

Yunfei Li has served as the chairman of the board, president, and chief executive officer since 2016. According to the company, Mr. Li has more than 20 years of management experience in real estate, battery, and new energy industries. From 2014 to 2016, Mr. Li served as the Vice President of the Company's subsidiary, CBAK Power managing the construction of manufacturing facilities and business development. Previously, Mr. Li held management positions with new energy development and real estate development companies in China. Prior to that, he held a variety of positions with Shenzhen BAK Battery Co., Ltd., a former subsidiary of the Company from 2003 to 2010. Mr. Li holds a bachelor's degree in Civil Engineering.

Xiangyu Pei has served as Interim Chief Financial Officer since 2019. Prior to that, Ms. Pei had served as the financial controller of the Company's subsidiary, CBAK Power since 2017. She has experience in the audit, accounting, and investor relations roles of a company. Ms. Pei received a Ph.D. in World Economics from Jilin University in China.

Wenwu Wang has served as the company's Vice President and General Manager since 2018. Previously, he held the position of CFO of CBAK from 2014 - 2019.

Xiujun Tian acts as the Deputy General Manager and General Engineer of the company. Mr. Tian has 15 years of experience in lithium-ion battery R&D and technical management.

RECENT NEWS

In April 2023, the company announced a new order from Shenzhen PowerOak for roughly $2.7 million of cells to be used by Shenzhen PowerOak in their portable power systems. Shenzhen PowerOak markets its consumer power supply systems under the BlueTTI brand which has a strong reputation on many US websites including Amazon and Walmart.com. The BllueTTI systems are principally used as off-grid power supplies or whole-house battery backup systems. Given that CBAK Energy had total uninterruptible power supply sales of $20.9 million in Q2 2023, this order is fairly small in terms of its immediate financial impact but it does demonstrate that industry leaders – BlueTTI is considered one of the top 3 manufacturers in the portable power station market – value the relationship with CBAK.

In early June, CBAK announced that Shenzhen Hello Tech Energy had agreed to invest roughly $3.5 million into CBAK Energy for R&D related to sodium-ion batteries. It was unclear if this investment was into the parent company's common stock or if it was an investment in a subsidiary (we believe it was into a subsidiary) but we expect that will be clarified in future filings. While the actual size of this investment is fairly small, Hello Tech through their Jackery brand, is a dominant player in small, portable power supply units with many leading publications naming their products as the best in the market. The commitment from Hello Tech is a very positive endorsement of CBAK's R&D initiatives in sodium-ion technology.

In mid-June 2023, CBAK Energy announced a very large order from Viessmann Group for roughly $125 million of cells for 2024. Viessmann is a privately held, German-based energy system company with over 14,000 employees and over $4 billion in annual revenues. The Viessmann Climate Solutions business is being acquired by Carrier in a $13 billion acquisition that is expected to close by the end of 2023 and the potential to expand the relationship with Carrier is interesting. Viessman's strength in home solar and battery storage solutions was cited as a reason for the acquisition by Carrier.

CBAK had previously announced roughly $60 million in orders in 2022 from a European customer that was unnamed at the time but now has been disclosed as Viessman. In total, the company has received roughly $185 million in orders from Viessman in the last two years. Given that the company's total battery sales were roughly $85 million in 2022, it is evident how important this relationship is to CBAK. We believe that the acquisition of Viessman by Carrier offers significant opportunities to expand their sales into new markets. Management has indicated that they expect this relationship to continue beyond 2024 and they expect the size of the contract to continue to grow.

In late June 2023, CBAK Energy announced an agreement with HiNa Battery to supply a dedicated portion of CBAK's sodium-ion battery production to HiNa. While financial terms were not disclosed, the important takeaway from this announcement was that CBAK was now capable of mass production of cylindrical sodium-ion batteries. We think this has the potential to be an exciting new market for CBAK but we will wait until deliveries are confirmed before adjusting our model to reflect this new business.

In mid-July 2023 the company announced a three-year supply agreement with Guangzhou Echom Science & Technology ("Echom") for roughly $25 million of the company's cells (principally 32140 and 26700 cells). We are encouraged by further orders for the company's cells which will reduce the company's customer concentration.

In July 2023, the company filed an 8-k indicating that the Board of Directors elected to replace its auditors – Centurion ZD CPA – with a new firm, ARK Pro CPA & Co. ARK does not appear to have a significant online presence but they have been winning new auditing business in China and Hong Kong.

Finally, in July 2023, the company announced a new lease agreement with Shangqui City and the owners of a battery production facility that will give the company access to a production line to help meet the demand for its 26700 battery cells. This state-owned facility will require some retooling but it appears to be a cost-effective way to expand capacity in the near term and it is a good sign that demand for the company's 26700 cells remains robust.

RECENT PRICING TRENDS FOR HITRANS

Pricing data in the market for precursors and cathode materials is difficult to come by because it is not reported in a centralized market like oil or copper. Instead, negotiated prices are reported across the markets and then prices are aggregated and reported.

Given this imperfect data, we still can look at trends in pricing which show most precursor and cathode prices hitting record highs in May 2022 before sinking to record lows in May 2023. This tracks with the reported results for Hitrans as revenues soared in 2022 – we estimate that on a proforma basis, revenues were probably up 40% year-over-year due in large part to the increase in market prices for their products.

In 2023, Hitrans revenues have declined sharply (down 66% in the first half) as a result of the steep decline in market prices and lower volumes as many of the company's customers are waiting for prices to bottom before securing new supply.

We believe that the volatility of prices in this market makes it very difficult for investors to accurately evaluate Hitrans and CBAK. As the company's battery business is expanding (despite the sequential decline in Q2 revenues) the decline in the raw material business is masking some of the real gains made in the higher-value, higher-margin battery business. We think management recognizes this challenge and is open to all alternatives including selling off a minority interest in Hitrans to improve investor understanding of the company.

FINANCIAL REVIEW

Second Quarter 2023 Financial Results

On August 9th, 2023, the company reported record financial results for the second quarter of 2023 and held a conference call for investors.

Total revenues for the quarter were down 25% year over year and flat versus Q1 2023 at $42.4 million. However, since the company is emphasizing its battery business, we think it is important to focus on trends in that business.

Battery revenues were down 13.5% versus Q2 2022 and down 25% sequentially to $22.2 million as a result of lower LEV/EV battery sales and a decline in the core uninterruptible power supply business. The company said fluctuations in the pricing of raw materials led customers to defer orders and that they anticipate growth returning in the second half of the year.

Despite the decline in revenue, the company's battery gross margins benefitted from improved efficiency at its two manufacturing facilities due to higher utilization and battery gross margins improved sharply to 15.4% in the second quarter.

The company's general and administrative expenses increased sharply in the second quarter to $3.6 million which we believe is related to the capacity additions being made at its two facilities which increased overhead. We will have to monitor this expense line closely going forward as the company continues to expand its production.

RISKS

- The PRC government exerts substantial influence over a wide variety of issues related to the company's business. Since the company is based in the US with China-based operating subsidiaries, there are several issues related to the government's oversight that could result in a material adverse change in the company's operations and subsequently, the value of CBAK's common stock. In addition, it should be noted that rules and regulations in China can change quickly with little advance notice.

- The company's independent auditors have expressed substantial doubt about its ability to continue as a going concern. The company is working with its banks and lenders to ensure that they will have access to credit but improving the company's profitability will be an important step toward resolving this issue.

- The competitive landscape for lithium batteries is intense and many of the company's competitors are in much stronger financial positions. In the long run, the company will also face increased competition from new facilities that are expected to be built in North America and the EU.

- The company's customer concentration remains very high and the loss of any significant customer could impact the company's financial stability. In 2022, roughly 70% of revenues were derived from the company's five largest customers. In the battery business, customer concentration could be even higher. The acquisition of Viessmann by Carrier presents an opportunity and a risk given the proportion of battery sales Viessmann represents.

- The company indicated that it identified a material weakness in its internal control over financial reporting. Management believes that the company did not have appropriate policies and procedures in place to evaluate proper accounting and disclosures of key documents and agreements, and there was insufficient accounting personnel with an appropriate level of technical accounting knowledge. The company has implemented additional training to address this issue but it remains a risk. As noted in recent news, the company elected to change its auditor in July 2023 and we will see if this leads to improved internal financial controls.

INSIDER OWNERSHIP

	Number (2)	Percent (3)
Officers and Directors		
Yunfei Li	11,025,871	12.38%
J. Simon Xue	30,000	*
Martha C. Agee	50,000	*
Jianjun He	50,000	*
Xiangyu Pei	267,983	*
All executive officers and directors	**11,423,854**	**12.82 %**
Principal Stockholders		
Daiwei Li	6,733,359	7.57%

Source: Company filings

VALUATION

CBAK has successfully launched lithium-ion battery manufacturing operations and now has a stable battery business. In Q2 2023, uninterruptible battery sales of $21 million nearly equaled the total battery sales of the company for the full year of 2020 ($23 million). As new capacity comes online, adding roughly 75% of additional capacity in 2023 (going from 1.7 GWh to 3 GWh) and 67% of additional capacity in 2024 (going from 3 GWh to 5 GWh) we believe the company is about to enter a period of significant growth. If the company can reach its aggressive expansion goals and achieve 36 GWh of capacity by 2027 the implications for our model are significant. The challenge with valuing CBAK is that the company is significantly smaller than most public battery manufacturers today, its cells are not principally sold to the EV market and the majority of the comparable public companies are profitable. We believed that the revenue mix at CBAK also impacts the valuation as raw material sales are not highly valued by investors and the volatile nature of pricing in that market has made it difficult to build reliable projections.

The smaller battery manufacturers tend to trade at roughly 1x forward sales. While the largest companies in the sector trade on earnings we are not forecasting profitability until the end of 2025, so our valuation in 2024 will be based on our revenue forecast and an evaluation of the Hitrans business.

We are forecasting a return of growth in the battery business for the balance of 2023 and 2024 with total battery sales over $141 million in 2024. Since the Viessmann order for 2024 was equal to $125 million we believe our estimates are very achievable. Discounting the revenues by 10% given CBAK's size and lack of profitability we arrive at a valuation of $1.45/share for the battery business. We believe the Hitrans business has likely appreciated since the acquisition in 2021 but investors are unlikely to assign much value to that business as a part of a battery manufacturer. Based on comparable valuations of public companies similar to Hitrans, we believe the total value of Hitrans is north of $50 million today meaning CBAK's stake of 67% is likely worth roughly $0.35 per share. The value of Hitrans to a strategic investor could be much higher than this estimate, but again we are attempting to be conservative with our forecast. Combining these two figures we arrive at our initial target valuation of $1.80/share or roughly 65% above current trading levels.

If the company successfully expands its capacity, we believe our forecasts may prove conservative. Additionally, as we enter 2024, investor focus may shift to our 2025 battery revenue forecast of nearly $300 million. In 2024 we will refine this model to reflect the company's progress toward completing capacity additions.

One additional wild card is the company's sodium-ion battery business which we believe is attracting some attention from outside investors. If the company sold a stake in that business for a substantial sum (recent VC investments in sodium-ion battery startups have had eye-popping valuations) it could materially impact our valuation.

SUMMARY

1) Despite the company's long operating history, CBAK should be viewed as an emerging lithium-ion battery manufacturer. The company plans to expand its capacity from 1.7 GWh in 2022 to 5 GWh by 2024 and ultimately have an installed capacity of 36 GWh by the end of 2027. Managing this expansion effectively and financing the growth will be a challenge for the company but demand remains robust in the lithium-ion battery market. We anticipate most of the new capacity will be absorbed quickly by the market.

2) The company has established itself as a leading manufacturer of cylindrical cells just as the cylindrical format is becoming more popular in the market and energy storage applications are growing significantly. The company is one of the first manufacturers to announce a large-scale commercial sodium-ion production facility which presents a substantial new revenue opportunity for the company.

3) As a result, of the company's past missteps, we feel like the valuation is much more reasonable today just as the battery business is about to experience meaningful growth.

4) The Hitrans business is operating in a very attractive market despite recent operating weakness and the company has several options that it could pursue. We believe the company could continue to expand capacity at its facilities or some or all of the business could be sold to unlock additional shareholder value.

5) Finally, several items are difficult to quantify but may increase investor confidence over time. Addressing past financial reporting deficiencies through new hires or training, demonstrating that new equipment is being installed as expected, new investments from outside parties into Hitrans or the sodium-ion business, and finally, delivering sustained, consistent growth in battery sales will attract give investors confidence in the CBAK story.

PROJECTED INCOME STATEMENT

CBAK Energy Technology

8/9/23

(USD in 000's; December Year-End)	2021	Mar 1Q22A	June 2Q22A	Sept 3Q22A	Dec 4Q22A	2022A	Mar 1Q23A	June 2Q23A	Sept 3Q23E	Dec 4Q23E	2023E	Mar 1Q24E	June 2Q24E	Sept 3Q24E	Dec 4Q24E	2024E	Mar 1Q25E	June 2Q25E	Sept 3Q25E	Dec 4Q25E	2025E
Battery Revenues																					
Uninterruptible supplies	33,308.0	14,931.0	25,045.0	24,680.0	18,948.0	83,604.0	25,815.1	20,948.0	24,090.2	26,499.2	97,352.5	29,149.1	31,481.1	33,999.6	37,399.5	132,029.3	45,066.4	56,333.0	73,232.9	97,033.6	271,666.0
Light Electric Vehicles	733.0	88.8	671.0	1,146.0	4,508.0	6,413.8	1,968.1	1,147.9	1,182.3	1,241.5	5,539.7	1,055.2	1,582.9	2,216.0	2,880.8	7,734.9	3,745.0	5,617.5	6,741.1	8,089.3	24,192.9
Electric Vehicles	244.0	0.3	-	20.0	4,675.0	4,695.3	1,820.2	135.7	156.1	202.9	2,314.9	162.3	284.0	454.4	704.4	1,605.1	810.0	931.5	1,024.7	1,127.2	3,893.4
Total Battery Revenues	34,285.0	15,020.1	25,716.0	25,846.0	28,131.0	94,713.1	29,603.4	22,231.6	25,428.6	27,943.5	105,207.1	30,366.7	33,347.9	36,670.0	40,984.7	141,369.3	49,621.5	62,882.1	80,998.7	106,250.0	299,752.3
Battery Revenues % change (yoy)							97.1%	-13.5%	-2%	-1%	11.1%	3%	50%	44%	47%	34.4%	63%	89%	121%	159%	112.0%
Raw Material Revenues																					
Precursor	9,139.0	36,813.0	4,110.0	20,681.0	17,076.0	78,680.0	10,621.0	-	-	-		-	-	-	-	-	-	-	-	-	-
Cathode	8,726.0	28,363.0	26,524.0	11,195.0	9,249.0	75,331.0	2,173.0	-	-	-		-	-	-	-	-	-	-	-	-	-
Total Raw Material Revenues	17,865.0	65,176.0	30,634.0	31,876.0	26,325.0	154,011.0	12,794.0	20,189.3	23,217.7	25,539.4	81,740.4	13,689.6	21,198.7	24,378.5	26,816.4	86,083.3	14,100.3	22,258.7	25,597.5	28,157.2	90,113.6
Other sales	520.0				2.0																
Sales	**52,669.7**	80,196.1	56,349.7	57,722.0	54,458.0	**248,725.8**	42,397.4	42,420.9	48,646.3	53,483.0	**186,947.5**	44,056.3	54,546.7	61,048.5	67,801.1	**227,452.5**	63,721.7	85,140.8	106,596.1	134,407.3	**389,865.9**
% change (yoy)						**372%**			-16%	-2%	**-25%**	4%	29%	25%	27%	**22%**	45%	56%	75%	98%	**71%**
Cost of Revenues	47,559	74,880	50,814	54,261	50,675	230,630	39,491	38,536	44,122	48,423	170,572	38,877	48,719	54,616	60,621	202,833	55,447	74,555	93,031	116,736	339,769
Gross Profit	5,110	5,316	5,535	3,461	3,783	18,096	2,906	3,885	4,524	5,060	16,376	5,179	5,828	6,433	7,180	24,619	8,275	10,586	13,566	17,671	50,097
% change (yoy)																50%					103%
Gross Profit Margin	**9.7%**	**6.6%**	**9.8%**	**6.0%**	**6.9%**	**7.3%**	**6.9%**	**9.2%**	**9.3%**	**9.5%**	**8.8%**	**11.8%**	**10.7%**	**10.5%**	**10.6%**	**10.8%**	**13.0%**	**12.4%**	**12.7%**	**13.1%**	**12.8%**
Operating Expenses:																					
Research and Development	5,274.3	3,313.1	2,299.5	2,385.6	2,637.3	10,635.5	2,455.3	2,980.7	3,070.1	3,162.2	11,668.4	3,004.1	2,853.9	2,996.6	3,056.5	11,911.2	2,995.4	2,845.6	2,987.9	3,047.7	11,876.6
Sales and marketing	2,301.7	829.7	697.7	834.5	(354.0)	2,007.8	721.0	963.6	982.9	1,012.3	3,679.8	1,154.1	1,327.2	1,526.3	1,755.2	5,762.7	2,000.9	2,301.1	2,646.2	3,043.2	9,991.4
General and Administrative	10,027	2,237	2,454	1,866	3,181	9,738	2,479	3,583	3,619	3,655	13,336	3,691	3,728	3,840	3,936	15,196	3,976	4,015	4,136	4,239	16,366
	17,603	6,380	5,451	5,086	5,464	22,381	5,655	7,527	7,672	7,829	28,684	7,850	7,909	8,363	8,748	32,870	8,972	9,162	9,770	10,330	38,234
% of Sales	33.4%	8.0%	9.7%	8.8%	10.0%	9.0%	13.3%	17.7%	15.8%	14.6%	15.3%	17.8%	14.5%	13.7%	12.9%	14.5%	14.1%	10.8%	9.2%	7.7%	9.8%
Operating Income (Loss)	**(12,493)**	**(1,064)**	**85**	**(1,625)**	**(1,681)**	**(4,285)**	**(2,749)**	**(3,643)**	**(3,147)**	**(2,769)**	**(12,308)**	**(2,671)**	**(2,082)**	**(1,930)**	**(1,568)**	**(8,251)**	**(697)**	**1,424**	**3,796**	**7,341**	**11,863**
Impairment Charge on PPE & goodwill	-	-	-	-	**6,388**	**6,388**															
(Provision for) recovery of doubtful accounts	780	(271)	60	143	(762.5)	(831)	(131)	(130)			(261)										
Other Income, net	3,644	285	(459)	(991)	(6,087)	(7,252)	183	238	0	0	421	0	0	0	0	-	0	0	0	0	-
Finance Expenses/(Income)	(785)	(5)	620	(687)	(419)	(491)	(5)	(252)	0	0	(257)	0	0	0	0	(509)	0	0	0	0	(509)
Changes in fair value of warrants liability	61,802	1,632	2,131	936	1,011	5,710	85	36	0	0	121	0	0	0	0	157	0	0	0	0	157
Impairment of non-marketable equity securities	(693)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Income before Taxes	**53,826**	**587**	**1,196**	**(850)**	(13,488)	**(12,556)**	**(2,607)**	**(3,247)**	**(3,147)**	**(2,769)**	**(12,284)**	**(2,671)**	**(2,082)**	**(1,930)**	**(1,568)**	**(8,603)**	**(697)**	**1,424**	**3,796**	**7,341**	**11,511**
Loss (income) attributable to non-controlling interests	(73)	(236)	(211)	848	1,478	1,879	824	304	787	692	2,607	668	520	483	392	2,063	174	(356)	(949)	(1,835)	(2,966)
Income tax (expense)/credit	7,733	94	(180)	2	1,312	1,228	403	307										(214)	(569)	(1,101)	(1,884)
Net Income (Loss) attributable to CBAK	**61,486**	**444**	**805**	**0**	**(14,966)**	**(9,448)**	**(1,380)**	**(2,636)**	**(2,360)**	**(2,077)**	**(9,677)**	**(2,003)**	**(1,561)**	**(1,448)**	**(1,176)**	**(6,540)**	**(523)**	**854**	**2,277**	**4,405**	**6,661**
EPS reported	**0.70**	**0.01**	**0.01**	**0.00**	**(0.17)**	**(0.11)**	**(0.02)**	**(0.03)**	**(0.03)**	**(0.02)**	**(0.11)**	**(0.02)**	**(0.02)**	**(0.02)**	**(0.01)**	**(0.07)**	**(0.01)**	**0.01**	**0.03**	**0.05**	**0.07**
% change (yoy)		N/A	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**N/A**
Diluted Shares (weighted average)	**87881.9**	88735.0	89007.9	88996.7	88968.4	**88927.0**	89013.4	89030.0	89208.1	89386.5	**89159.5**	89565.2	89337.8	89744.4	89516.5	**89541.0**	89695.5	89720.1	89874.9	89899.5	**89797.5**
Margins:																					
Gross Margin	**9.7%**	6.6%	9.8%	6.0%	6.9%	**7.3%**	6.9%	9.2%	9.3%	9.5%	**8.8%**	11.8%	10.7%	10.5%	10.6%	**10.8%**	13.0%	12.4%	12.7%	13.1%	**12.8%**
Research and Development as a % of Sales	10.0%	4.1%	4.1%	4.1%	4.8%	4.3%	5.8%	7.0%	6.3%	5.9%	6.2%	6.8%	5.2%	4.9%	4.5%	5.2%	4.7%	3.3%	2.8%	2.3%	3.0%
General & Administrative as a % of Sales	19.0%	2.8%	4.4%	3.2%	5.8%	3.9%	5.8%	8.4%	7.4%	6.8%	7.1%	8.4%	6.8%	6.3%	5.8%	6.7%	6.2%	4.7%	3.9%	3.2%	4.2%

Source: Zacks SCR, Brian Lantier, Company Filings

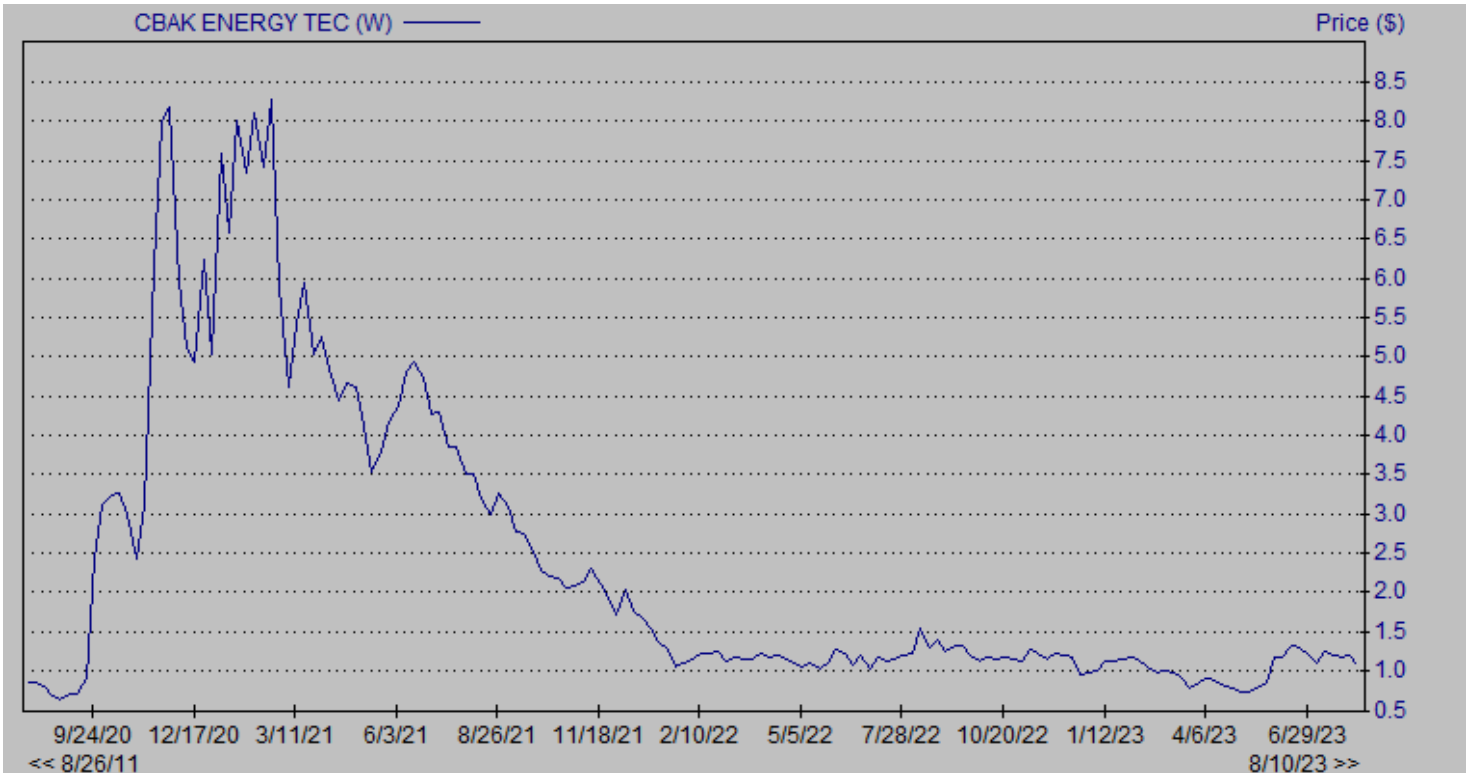
BALANCE SHEET

CBAK Energy Technology, Inc.
Balance Sheet in US Dollars
6/30/23

(US Dollars USD in 000s)	
Assets	
Current Assets	
Cash and Cash Equivalents	3,449
Pledged Deposits	40,189
Trade and bills receivable, net	29,323
Inventories	41,819
Prepayment & other receivables	5,267
Receivables from a former subsidiary, net	324
Income Tax recoverable	55
Total current assets	120,426
Property, plant & tquipment (net)	88,084
Construction in progress	25,946
Long-term investments, net	900
Prepaid land use rights	11,617
Intangible Assets (net)	1,017
Operating lease right-of-use assets, net	1,082
Deferred tax assets, net	3,102
Total Assets	**252,174**
Liabilities	
Current Liabilities	
Trade and bills payable	75,570
Short-term bank borrowings	26,814
Other short-term loans	352
Accrued expenses and other payables	27,869
Payables to a former subsidiary, net	387
Deferred government grants, current	367
Product warranty provisions	23
Warrants liability	15
Operating lease liability, current	366
Finance lease liability, current	115
Total current liabilities	131,880
Deferred government grants, non-current	5,129
Product warranty provisions	452
Operating lease liability, non-current	540
Accrued expenses & other payables, non-current	0
Total Liabilities	**138,001**
Shareholder's Equity	
Common stock	89
Donated shares	14,102
Additional Paid-in Capital	247,070
Statutory reserves	1,231
Accumulated Deficit	(135,962)
Accumulated Other Comprehensive Loss	(13,799)
Shareholder's Equity	**112,731**
Less: Treasury Shares	(4,067)
Total shareholders' equity	**108,664**
Non-controlling interests	5,509
Total equity	**114,174**
Total Liabilities & Equity	**252,174**

Source: Company press release 8/9/2023

HISTORICAL STOCK PRICE



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