**Shanghai Putailai New Energy Technology Co., Ltd.**

**2024 Semi-annual Report Summary**

* 1. **Company Information**

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| --- | --- |
| Company Name (Chinese) | 上海璞泰来新能源科技股份有限公司 |
| Abbreviation (Chinese) | 璞泰来 |
| Company Name (English) | Shanghai Putailai New Energy Technology Co., Ltd. |
| Abbreviation (English) | Putailai, PTL |
| Legal Representative | Liang Feng |

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| --- | --- | --- |
|  | Secretary of the Board | Representative for Securities Affairs |
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* 1. **Introduction of Main Business**

PTL is committed to becoming a leading provider of comprehensive solutions for key materials and automation equipment in the new energy battery industry. Our primary business segments include anode materials, separator and coating, PVDF and binders, composite current collectors, aluminum-plastic packaging films, nano-alumina and boehmite materials. Meanwhile, we offer automated process equipment and intelligent manufacturing systems.

By leveraging resource sharing and industrial collaboration across our three major business units —— anode material, separator and coatings, and automation equipment. PTL delivers diversified, differentiated, and specialized product combinations and integration services to our customers. As large-scale industry production capacity expands, the demand for upgrades and transformation services for early capacity will increase. PTL is committed in exploring and developing value-added services, providing customers with a comprehensive range of competitive products and solutions that go beyond essential(or core) materials and equipment.

* 1. **Key Accounting Data and Financial Indicators in the past**
  2. **Key accounting data**

Unit: CNY

|  |  |  |  |
| --- | --- | --- | --- |
| Key accounting data | H1 2024 | H1 2023 | YoY(%) |
| Operation revenue | 6,331,503,447.13 | 7,805,597,427.32 | -18.89 |
| Net profits attributable to shareholders of the listed company | 857,818,309.78 | 1,304,391,487.88 | -34.24 |
| Net profits attributable to shareholders of the listed company after deduction of non-recurring gains and losses | 768,067,187.61 | 1,253,889,330.96 | -38.75 |
| Net cash flow from operating activities | -360,684,896.96 | 833,120,328.00 | -143.29 |
|  | 30 June 2024 | 31 December 2023 | YoY(%) |
| Net assets attributable to shareholders of the listed company | 18,344,932,599.21 | 17,774,487,767.57 | 3.21 |
| Total assets | 41,925,402,065.70 | 43,674,947,626.61 | -4.01 |

* 1. **Key Financial Indicators**

Unit: CNY

|  |  |  |  |
| --- | --- | --- | --- |
| Key Financial Indicators | 2023 | 2022 | YoY(%) |
| Basic earnings per share (CNY/share) | 0.40 | 0.65 | -38.46 |
| Diluted earnings per share (CNY/share) | 0.40 | 0.65 | -38.46 |
| Basic earnings per share after deducting non-recurring gains and losses (CNY/share) | 0.36 | 0.62 | -41.94 |
| Weighted average ROE (%) | 4.71 | 9.28 | Decreased by 4.57 percentage points |
| Weighted average ROE after deducting non-recurring gains and losses (%) | 4.23 | 8.92 | Decreased by 4.69 percentage points |

* 1. Technical and R&D Advantages

As a synergic platform conglomerate specializing in battery materials and process solutions, PTL maintains as a comprehensive industry leader in cutting-edge R&D technology. We offer full-service capabilities to provide our customers with comprehensive solutions across various business segment:

**a. New Energy Battery Materials and Services**

(1) Anode Material Business: PTL boasts an extensive, experienced technical team with in-depth knowledge of carbon materials, offering industry-leading R&D advantages. The anode material products hold a leading position in the global mid-to-high-end digital and ev battery market, thanks to product performance metrics such as high capacity, high compaction density, low expansion, long cycling life, and fast charging. PTL continually develops new products and processes in line with market demand, enhancing the competitiveness of our technology and products.

1) The new fast-charging anode product already meets 6C performance requirements. When used with in-house manufactured binders, it can achieve 8C fast charging. The related products have passed technical c from multiple customers and have begun batch shipments. Through innovations in material modification, coating, and particle morphology treatment, we continue to optimize fast-charging anode performance, particularly in dynamics aspects.

2) The new silicon-carbon anode material exhibits high capacity, low expansion, and long cycling. As one of the few enterprises in China with mass production capabilities, PTL supplies these materials to high-end consumer lithium-ion batteries and semi-solid/solid-state batteries. Currently, our CVD deposited silicon-carbon anode products are steadily entering the market, with increasing shipment volumes.

3) PTL conducts forward-looking research and development on lithium metal anode materials, solving challenges such as dendrite, volume expansion, and the interface between the anode/solid-state electrolyte by constructing a new three-dimensional skeleton structure.

4) Sichuan Zichen has optimized and upgraded various processes including crushing, granulating, graphitization, and carbonization. The application of continuous production and automated intelligent powder material transmission technologies, has effectively improved production efficiency, reducing energy consumption, and enhancing raw materials adaptability. These significant upgrades in terms of environmental friendliness, safety, energy conservation, emission reduction, intelligence, and digitalization position our anode production facility as a benchmark for the next generation of anode materials, supporting PTL’s expansion into overseas production bases, including Sweden.

(2) Separator Coating Processing Business: As a leading enterprise in coated separator processing, PTL stands at the forefront of coating technology, quality control, material development, and production efficiency.

1) With a profound understanding of coating processes and equipment, PTL continually improves the performance and automation rate of coating systems. It actively promotes domestic substitution and ongoing improvement of coating materials and binders, providing downstream customers with sustained and integrated product solutions, ensuring a long-term competitive advantage.

2) Significant process has been made with the "dark light" factory, where main processes are automated, which will effectively enhance production efficiency and product consistency.

3) PTL is collaborating with top domestic research institutes, battery manufacturers, and end vehicle factories to develop composite coating separator materials for semi-solid electrolytes. This has resulted in innovative products and proprietary intellectual property, enriching and strengthening PTL’s competitive advantage in the field of separator coating.

(3) Separator Material and Binder Business:

1) Separator Business: PTL, through segmented localization and integration, has made breakthrough domestication of next-generation separator manufacturing equipment where previously heavily relied on imported separator manufacturing equipment. The equipment features a single-line stretching width of 8 meters, with an effective finished product width of over 6 meters, and a design speed of 90m/min. By continuously leveraging the team's synergistic advantages in "material & automation equipment," substantial progress has been made in the domestic substitution of separator equipment. PTL has developed and optimized self-produced prototypes for stretching, extraction, and ovens, achieving full-line operation. Additionally, PTL is also developing separator equipment production lines with a capacity exceeding 200 million m2 per line. The successful R&D of next generation of ultra-thin, high-strength separator provides guarantees for the dynamic performance and safety of next-generation lithium-ion batteries, receiving positive feedback from customers.

2) PVDF and Binder Business: PTL has long been committed to the researching and producing the next generation binders and additives for lithium-ion battery, possessing unique understandings of production processes, product performance, and market demands, forming a long-term competitive advantage for future growth.

①PTL is among the first to complete the domestication of lithium battery-grade PVDF, possessing leading product performance and market share. Its high-performance PVDF and anode and cathode binder products have significant performance advantages.

②The water-based binder developed jointly with the affiliated company, Yindile, boasts significant competitive advantages in terms of binding force, dosage, temperature resistance, and flexibility, effectively enhancing the product competitiveness in the fields of separator coating and anode materials.

3)Actively building new systems for composite current collectors and solid-state battery materials to enhance the comprehensive performance of batteries.

① PTL’s technological breakthroughs in composite current collectors promoted battery weight reduction, improve safety, and enhance manufacturing processes, laying a solid foundation for providing new product combination services to customers. Through inherent synergy with KATOP composite equipment, Zhuoli composite current collectors, and Gaoyuan ultra-thin copper foil, PTL's technical solutions for composite copper foil have been recognized by top domestic customers. The cost, with mass production, is expected to be lower than that of traditional copper foil. Additionally, composite aluminum foil has completed various performance tests and has been recognized by leading industry clients, with preparations currently underway for mass production. Compared to industrial peers, PTL's process solutions feature high yield rates and lower costs.

② PTL is actively engaged in the R&D of solid-state battery materials. In 2022, PTL started the R&D on solid electrolyte materials and has now completed pilot tests of LATP (Lithium Aluminum Titanium Phosphate) and LLZO (Lithium Lanthanum Zirconium Oxide) solid electrolytes, achieving ionic conductivity of 10-3S/cm with controllable particle size. A pilot production line with an annual output of 200 tons of solid electrolytes has been established at the Sichuan base.

③ The low-temperature sintered solid electrolyte, developed in cooperation with research institutions, is progressing smoothly. High-density, high-conductivity LATP electrolyte sheets have been prepared at temperatures lower than traditional sintering temperatures, with relative densities and ionic conductivity reaching 94% and 10-4S/cm, respectively. After annealing treatment of the low-temperature sintered LATP solid electrolyte sheets, the relative density and ionic conductivity achieved 99.6% and 10-3S/cm, respectively. Tests on assembled lithium symmetric cells and lithium iron phosphate semi-cells showed performances superior to those prepared by traditional high-temperature thermal sintering.

**b. New Energy Automation Equipment and Services**

(1) Battery Manufacturing Equipment: PTL is among the pioneers in the domestication of precision automation coating equipment, establishing a significant competitive advantage in lithium battery front-end coating equipment, particularly with its high-speed wide double-sided coaters. In 2023, PTL maintained the leading domestic market share for coaters through continuous R&D and the launch of new equipment segments, the product line now covers key stages of lithium batteries production, from front to back processes, forming comprehensive product service capabilities including coating, slitting, winding, stacking, injection, formation, and capacity matching. It’s expertise extends to core technologies in automation, simulation, and smart oven parameter prediction.

1) PTL's latest coaters have achieved significant breakthroughs in expanded coating functions, high speed, efficiency, and energy saving, maintaining industry-leading technology standards. Among them, the mechanical speed of the high-speed electrode coater has been increased to 150m/min. The new wide-width extrusion gravure integrated machine, with a width of 1.6 meters, can complete "base coating + ceramic edge + electrode" coating in one pass. Additionally, multi-layer reciprocating folding ovens have been deployed in batches, significantly reducing over length. The R&D of laser drying has been successfully validated and launched into the market.

2) PTL's smart high-speed thermal compound stacker has achieved a total system stacking efficiency of 0.1S/PCS, with a stacking yield rate of ≥99.8%, This highly integrated machine performs functions, including unwinding, punching, electrode thermal compounding, separator cutting, stacking, glue application, and material discharge.

3) PTL has launched six series of injection equipment with the horizontal cavity isobaric injection machine as a key innovative product. This enhances equipment stability, reduces failure rates, increases production capacity per unit volume, and further lowers battery manufacturing costs for customers.

(2) Battery Material Equipment: With strong technical strength in equipment R&D and diverse equipment application scenarios, PTL actively promotes R&D and domestic substitution of battery material equipment through inherent synergy and innovations in its business model.

1) The separator equipment. PTL has successfully developed high-speed, wide-width, low-energy-consumption separator stretching and extraction equipment and completed prototype delivery. Other domestic R&D are processing and will be gradually applied at Sichuan Zhuoqin.

2) Powder material equipment. The KATOP and Zichen team collaborate to enhance production processes automation, reduce raw material loss, improve heat recovery capabilities, and achieve cost reduction and efficiency enhancement.

3) Composite current collector equipment. PTL conducts in-house research and development on key equipment supplied by KATOP, ensuring its own supply capability and control over core processes. PTL's composite current collector products have a cost advantage over traditional copper foil in mass production, with significant potential for future market expansion.

(3) Innovative automation equipment: Based on extensive experience and technological advancements in the industrialization of lithium-ion battery equipment, the company expands into fields such as dry electrodes, solid-state batteries, sodium battery equipment, hydrogen energy equipment, silicon-based, and perovskite solar energy equipment, meeting customers' demands for improved precision, speed, digitalization, safety, and products reliability.

1) Dry electrode technology offers numerous advantages, such as saving on solvents, enhanced electrode energy density, reduced internal resistance, and decreased equipment investment. The company has achieved significant progress in three major dry film-forming process routes: multi-roll transfer, segmented roll pressing, and twin steel belt roll pressing, and has delivered and completed the product certification of dry coating equipment.

2) PTL already developed a solid-state lithium metal anode formation solution for lithium tape calendering, which simultaneously achieves lithium tape thinning, trimming, and single or double-sided lithium coating.

3) For hydrogen energy equipment, PTL's independently developed fuel cell CCM coater currently achieves the fastest coating speed of 3-5m/min, significantly reducing commissioning costs for customers.

4) The core technology in photovoltaic equipment focuses on vacuum and plasma-related technologies, mainly producing critical solar battery equipment based on vacuum equipment. PECVD equipment made from stainless steel materials, requires no replacement during its lifecycle, with gas and power consumption only about half that of conventional quartz tube equipment., This significantly improves process efficiency. The heterojunction hot wire CVD equipment can significantly reduce the investment cost of the entire heterojunction equipment line.

* 1. **Discussion and Analysis of Business Situation**

In H1 2024, domestic demand for lithium-ion batteries increased steadily. However, due to short-term supply-demand mismatches various lithium-ion battery businesses faced competition and price pressure. The sales of separator, coating processing, PVDF and other businesses grew well through a differentiated product portfolio. Continuous automation equipment upgrades, value chain extensions, and internal collaboration improved production efficiency and cost advantages, leading to steady growth in the revenue of separator and coating processing businesses. Due to increased competition and weakening demand in the European market, the prices of anode materials continued to decline, resulting in an overall decrease in revenue. The revenue of automation equipment business decreased due to reductions in domestic customer capacity utilization and delays in equipment acceptance. Despite these challenges, growth was maintained in the incremental markets, and PTL strengthened its overseas team, completing industry leading cases and increasing brand recognition for overseas orders. During the reporting period, PTL continuously improved supply chain management, operational efficiency, cost control, and customer payment tracking, resulting in a significant increase in net operating cash and bill flows, ensuring the company’s long-term financial health and stable development.

In H1 2024, PTL achieved a revenue of CNY 6.30 billion and a net profit attributable to shareholders of CNY 0.86 billion.

**a、Anode Materials**

(1) During the reporting period, due to a short-term industry supply-demand mismatch, anode materials prices fluctuated at low levels, with some market prices falling below reasonable production costs. In addition, demand in Europe remained lower than expected. PTL arranged product supply and sales to ensure long-term healthy development, and appropriately reduced shipment of some low-priced products. Therefore, the revenue and sales volume of anode material business decreased year-on-year with 66,992 tons of anode materials shipped during the reporting period.

(2) In H1 2024, PTL achieved cost reductions and efficiency improvements through technological innovation, process optimization, and product serialization. While The production cost of anode materials continuously improved, the continued price decline for some products led to inventory write-off. Therefore, the overall profitability of the anode material business did not improve significantly. However, the anode material business has improved compared to H1 2023, with significant reductions in inventory and production costs compared to the beginning of the year.

(3) In response to current market demand, PTL has gradually certified and introduced differentiated new products to client. The Sichuan Zichen Phase I facility, characterized by its environmental friendly in low-carbon operations, energy conservation, cost reduction and efficiency enhancement, as well as advanced automation and intelligence, has commenced production. With the continuous recovery in the consumer electronics market demand, the company's anode material business is expected to achieve profitability improvement and recovery in the second half of 2024.

**b、Separator Coating Processing**

(1) In H1 2024, the coated separator processing volume (sales) reached 2.91 billion m2，accounting for 41.03% of the domestic wet process separator shipments (7.1 billion m2), leading in market share. Through inherent synergy in separator, coating materials, coating equipment, binders, and coating processing, PTL provides customers with an integrated product portfolio, achieving stable growth in both volume and profit for the coating processing business.

(2) Facing the price reduction in the coating processing business driven by cost-cutting demands and downstream price pressures, PTL has actively implemented cost reduction and efficiency enhancement measures. These include advancing process automation and production efficiency, domestic substitution of coating materials, and cost improvement in binders to counteract the impact of declining prices.

(3) With the strategic layout of "materials & equipment" and the deepening of business synergy, PTL has enhanced its integration framework. Through the supporting synergy of process, equipment and materials, the industrial closed-loop strengthens PTL’s competitive moat. In H2 2024, the separator coating processing business is expected to maintain stable growth.

**c、Coating material and binders**

（1）Separator: From January to June 2024, separator sales exceed 200 million m2. By leveraging the production efficiency of our separator line and the inherent synergy of the separator coating business, customer certification progressed smoothly. The separator products continued to be shipped in volume. PTL will coordinate with the equipment team to further accelerate the process of domestic substitution and increase the self-sufficiency rate of core separator equipment. The per-line capacity of separator equipment will be further increased to over 200 million m2， effectively responding to the competitive landscape of the separator industry in the next phase. In H2 2024, the Sichuan Zhuoqin Phase II production line will be installed and commence production, further supporting the coating processing business and expanding overseas.

（2）Ceramic Coating Materials: During the reporting period, ceramic coating material shipments maintained year-on-year growth and while overall costs were reduced through measures such as BOM optimization, energy recovery, and equipment improvement. Regarding new product pipeline, PTL has developed and mass-produced next-generation ceramic materials for ultra-thin separator coatings, including ultrafine alumina, ultrafine boehmite, and fibrous boehmite. This further expanded the application range of boehmite products, including side-coating boehmite in the cathode field, water-based side-coating slurry catalyst carriers, copper clad laminate fillers, and other applications, providing downstream customers with superior cost reduction solutions.

（3）PVDF and Binders: In H1 2024, PVDF sales reached 8,685 tons, making a significant increase of 115.94% yoy. Due to increased industry supply, the domestic price of lithium battery-grade PVDF decreased significantly compared to the previous year, but the growth in sales volume partially offset the decline in PVDF unit price and profitability. The production and revenue of PVDF continued to grow, with ongoing optimization in customer base and product applications. The rapid increase in the sales volume of coated carbon binder products became a new growth point. Overall, during the reporting period, PTL achieved positive results in capacity expansion and sales growth in the chemicals business. Despite facing short-term price adjustments challenges, PTL continues to advance new product development and process optimization. By leveraging economy of scale, technological cost reductions, and lean production management to enhance product cost competitiveness, PTL consolidates its long-term product competitiveness, contributing to sustained and reasonable profit returns.

（4）Aluminum-Plastic Packaging Film: In H1 2024, the aluminum-plastic packaging film industry competition remained fierce, with overall low capacity utilization in the industry. PTL continuously improved the performance and cost structure of its aluminium-plastic packaging film products through raw material research, product upgrades, organizational optimization, energy saving and cost reduction, and yield enhancement. The product shipment volume reached 7.49 million m2， achieving year-on-year growth.

（5）Current Collectors and Composite Current Collectors: During the reporting period, PTL actively collaborated with downstream customers in product R&D, addressing challenges encountered in mass production. The company's composite copper foil products are expected to achieve small-batch shipments in the consumer sector in H2 2024. Regarding composite aluminum foil, the first-generation product is positioned in fast-charging digital batteries and has currently secured small-scale mass production orders. The second-generation product is designed for high energy. In terms of ultra-thin copper foil, the company's 3μm ultra-thin copper foil has achieved a breakthrough in strength and gained customer recognition, with the prospect of future product introduction. The current collector and composite current collector business is expected to become a new growth area.

**d、LIB Automation Equipment and Services**

During the reporting period, the LIB automation equipment and services business achieved a main business revenue (including internal sales) of RMB 1,720 million. The specific operational details are as follows:

（1）Due to a decrease in capacity utilization rates among domestic cell customers and delays in expansion and equipment acceptance, revenue from the automation equipment business declined during the reporting period. To expedite the acceptance of shipped goods and shorten the fulfillment and delivery cycle, PTL conducted special analysis and tracking on various key projects. PTL worked improve inventory turnover efficiency through active communication with major customers, assigning dedicated personnel for coordination, and implementing refined management practices, thereby strengthening the recovery of accounts receivable and focusing on asset quality management.

（2）Currently, the lithium-ion battery equipment industry is facing changes in significant demand structure. The domestic market is experiencing a phase of reduced capital expenditure due to a slowdown in demand growth, while overseas markets are gradually accelerating their capacity layouts to continuously strengthen its presence in the international market, PTL has focused on expanding the European market, centered around KATOP Europe, while simultaneously establishing professional sales teams for the North American and Southeast Asian markets. So far, this strategy has yielded good results in securing overseas orders.

（3）During the reporting period, the wide-width coating equipment manufactured for top European customers was successfully delivered, signifying that the company has once again won recognition and trust from overseas clients with its high-quality products and services. PTL has provided related products and services to overseas customers in Sweden, Germany, France, India, and other countries, accumulating extensive experience in overseas deliveries. Going forward, PTL will continue to expand sales channel, laying a solid foundation for further development in overseas markets.

（4）Leveraging the advantages of the equipment team to enhance the competitive moat of the materials business, the equipment team has actively engaged in the R&D and application of anode powder materials, silicon carbon anode CVD rotary kilns, separator production equipment, composite current collector production equipment, etc. All mentioned equipment has completed prototype delivery. Moving forward, PTL will further increase the localization and self-sufficiency rates of its materials business equipment, protect its manufacturing technology improvements, and create a positive synergy between the materials and equipment business.

* 1. **Shareholdings of the Top Ten Shareholders**

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| --- | --- | --- | --- | --- | --- | --- |
| Shareholdings of the top ten shareholders | | | | | | |
| Shareholder name  (full name) | Increase or decrease during the reporting period | Number of shares held at the end of the period | Proportion(%) | Number of shares held with restrictions on sales | Shares in pledge, marked or frozen | |
| Share Status | Quantity |
| Liang Feng | 0 | 531,510,881 | 24.86 | 0 | In pledge | 250,627,320 |
| Ningbo Shengyue Venture Capital Partnership (Limited Partnership) | 0 | 230,261,325 | 10.77 | 0 | In pledge | 34,208,000 |
| Ningbo Kuoneng Venture Capital Partnership (Limited Partnership) | 0 | 199,799,546 | 9.35 | 0 | none |  |
| Chen Wei | 0 | 175,942,165 | 8.23 | 0 | none |  |
| HKSCC | -91,617,246 | 70,137,003 | 3.28 | 0 | none |  |
| China Construction Bank Corporation - Huaxia Energy Innovation Equity Securities Investment Fund | 14,835,597 | 44,792,664 | 2.10 |  |  |  |
| Chengdu Advanced Capital Management Co., Ltd. - Chengdu Major Industrialization Project Phase I Equity Investment Fund Co., Ltd. | 0 | 43,177,892 | 2.02 | 0 | none |  |
| Xiaodong Qi | 0 | 37,990,000 | 1.78 | 0 | none |  |
| China Postal Savings Bank Co., Ltd. - Dongfang Growth Small and Medium Cap Hybrid Open-End Securities Investment Fund | 1,430,153 | 33,392,215 | 1.56 | 0 | none |  |
| Bank of China Limited - CITIC UBS New Energy Hybrid Securities Investment Fund | 2,950,965 | 15,146,817 | 0.71 | 0 | none |  |

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