China | Renewable Energy

19 September 2025

Central New Energy (1735.HK) - N-Type Pioneer

CNE – Focusing on high-efficiency PV N-type TOPCon battery

CNE is accelerating its transition to sustainable new energy business and prioritizing renewable energy initiatives, with the plan to gradually scaling back its green construction operations and other non-core businesses. Since 2022, the Group has invested in the high-efficiency PV N-type TOPCon battery and the advanced PV component in Fengtai County. The group plans to install more than 60GW of N-TOPCon cell capacity and 12GW of module capacity in the next five years.

CNE – Distinct advantages over peers

No legacy P-type production burden: Unlike many A-share upstream and midstream peers that still carry substantial legacy P-type capacity—leading to accelerated depreciation, asset impairments, and net realizable value (NRV) write-downs—the Group's capacity mix is "cleaner," with lower fixed-cost and depreciation pressure. Operating leverage is therefore more manageable in a pricing downcycle.

Zero-carbon industrial parks as a second growth engine: While oversupply across the PV value chain is primarily a downstream consumption issue, CNE proposes a user-side solution by deploying integrated "source–grid–load–storage" systems to address the last mile of green-power utilization. To date, CNE's low-carbon smart-park solutions have served more than 120 enterprises, industrial parks and municipalities nationwide.

Pivot from manufacturing to applications and asset management: The Group owns a sizeable pipeline of power-plant resources and project development rights/permits, with zero-carbon industrial parks providing immediate application/offtake. This underpins capabilities in energy savings, emissions reduction, and carbon-asset management, enabling brand and platform-based monetization and clear differentiation from pure manufacturers

PV in global energy generation could reach 25% in 2030 and 48% in 2050

Driven by global carbon-neutrality objectives, PV has become a principal driver of the energy-mix transition, underpinned by low generation costs, substantial room for further cost reduction, and broad applicability. The proportion of PV in global energy generation is expected to grow from 6.8% in 2024 to 25.0% in 2030 and further to 48.0% in 2050. LCOE for PV is estimated at roughly US$0.06/kWh in 2024 and is expected to decline toward about US$0.01/kWh by 2030.

N-type TOPCon cells is expected to reach a market share of 82% by end-2025, growing at a CAGR of 17.9% from 2024-2029

The global PV industry is transitioning from P-type to N-type architectures as the mainstream technology. In 2024, N-type cells reached a market share of approximately 73.8% in terms of production volume. It is expected N-type cells will reach 91.5% by end of 2025, with N-type TOPCon cells having a market share of 82%, dominating the sector in China. With the growing market demand, the production volume of PV cells in China is expected to reach 1,379.7 GW by 2029, with a CAGR of 15.0% from 2024-29, and N-type TOPCon cells is expected to grow at a CAGR of 17.9% during the period.

CNE – Gross profit doubled YoY to HK$86m in 1H25

CNE reported around $4.05bn in 1H25 revenue, up by 59.9% YoY. The increase was primarily due to sales from the New energy and EPC segment saw an increase of 96.9% YoY to HK$3.31bn as a result of growth in sales volume of PV components and high efficiency N-type battery. Gross profit has doubled YoY to HK$86m in 1H25, with GPM up from 1.7ppt in 1H24 to 2.1% in 1H25, amid a relatively higher GPM in the new energy and EPC segment. 1H25 NP declined by 42.6% YoY to HK$23.3m despite gross profit doubled, mainly due to a significant YoY drop in other income.

BUY

Last Price (HK$)*	9.60
Target Price (HK$)	**N/A**
Upside / (Downside)(%)	N/A
Previous rating	*BUY*
Previous TP	*N/A*
Hang Seng Index*	26,545.10
** Prices as of*	*19-Sep-25*

Key Data

Ticker	1735 HK
Market Cap (HK$m)	40,550
3M avg daily T/O (HK$m)	53.7
52-week High (HK$)	12.66
52-week Low (HK$)	7.52
Free Float (%)	31.6%
Shares O/S (m)	4,224.0

Performance	Absolute	Relative
1 month	14.3%	8.2%
3 months	17.1%	2.5%
6 months	9.2%	1.9%

Price Chart

Source: Bloomberg

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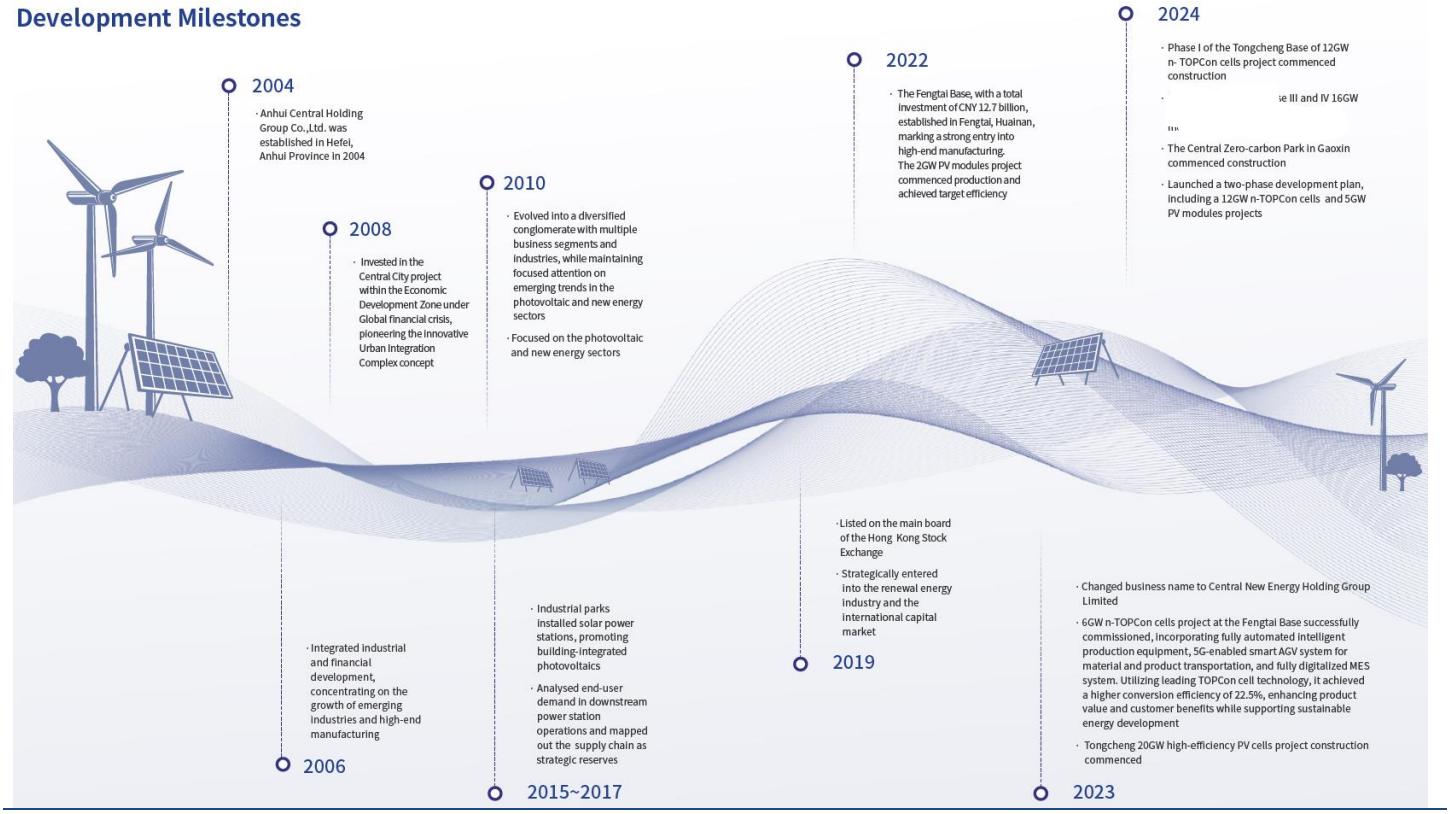
Introduction of Central New Energy Holding Group

Listed on the Main Board of the Hong Kong Stock Exchange in 2019, Central New Energy Holding Group Ltd ("CNE") is accelerating its transition to sustainable new energy business and prioritizing renewable energy initiatives, with the plan to gradually scaling back its green construction operations and other non-core businesses. As of end-FY24, CNE has five operating pillars: New Energy and EPC, Green Building and Construction Related Business, Smart Energy Management Services, Health and Wellness, and F&B Supply Chain.

Since 2022, the Group has invested in the high-efficiency photovoltaic ("PV") N-type battery and the advanced PV component in Fengtai County. The Group's current strategy is to redirect capital, research and development efforts to strengthen renewable energy capabilities and establish new energy solutions as its core growth driver.

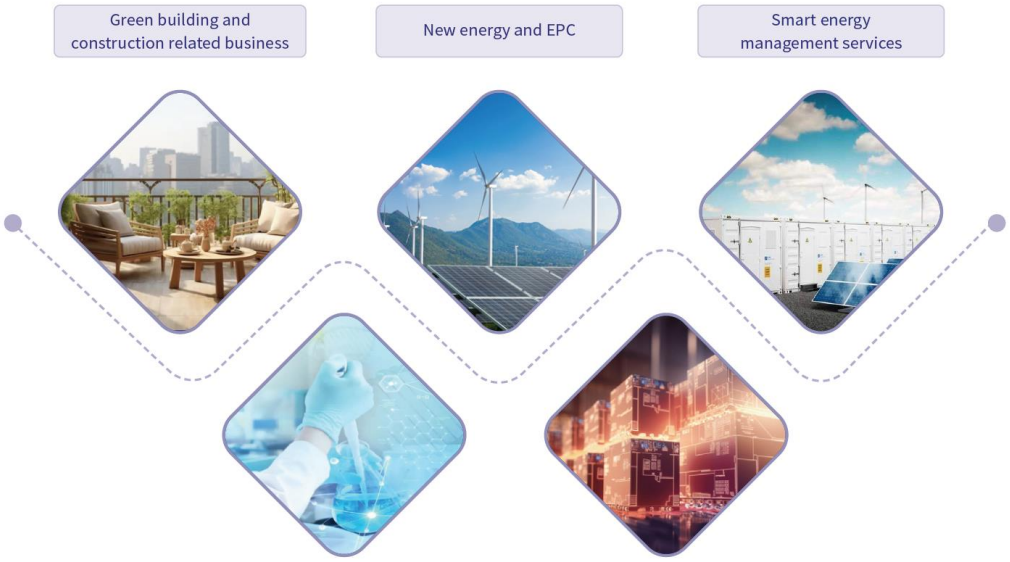
Figure 1 CNE - Development Milestones



Source: Company data, Crosby Securities

Delivering China's dual-carbon goals ultimately hinges on whether new technologies can be commercialized and deployed at scale. CNE is quality-first and innovation-driven: it prioritizes product quality, conversion efficiency and end-customer needs; actively explores multiple technology routes including BC (back-contact) cells, hydrogen/ammonia/alcohol energy vectors and perovskites; and builds a tiered innovation system to sustain competitiveness through rapid iteration cycles. The Group is expanding into downstream applications by combining hardware and software—extending from PV cells and modules to integrated clean, smart-energy solutions—thereby forming a closed-loop technology stack. Management's aim is to reshape industry structure through technological breakthroughs and to help re-architect the energy system around zero-carbon ecosystems.

Figure 2 CNE Business Segments



Source: Company data, Crosby Securities

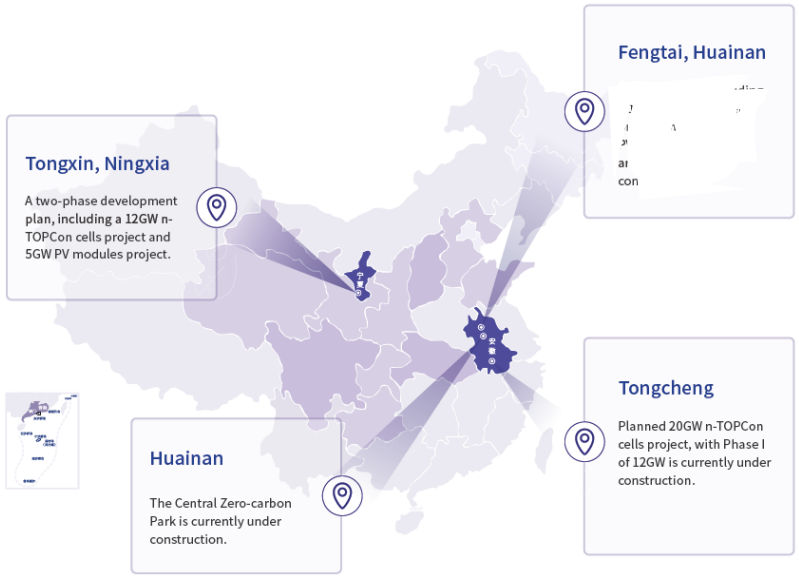
CNE specializes in the research and development, production, and sales of n-TOPCon cells and PV modules. Utilizing large-format ultra-thin N-type silicon wafers and advanced n-TOPCon cells technology, the Group provide professional cell and PV modules manufacturing and services. CNE's products hold multiple certifications, including those from the China Quality Certification Centre (CQC), with their stable and reliable performance validated and recognized by globally renowned third-party organizations such as TÜV Rheinland of Germany.

New Energy and EPC:

CNE's New Energy & EPC business spans the full PV value chain, including innovative R&D, advanced manufacturing, product sales, EPC for solar power plants, and the development and operation of low-carbon smart parks. The Group maintains end-to-end capabilities—from raw-material processing and proprietary design to branded manufacturing of PV cells and modules, followed by downstream sales to customers. CNE also invests in, builds and operates solar power projects, typically deploying its in-house cells/modules during construction. Upon commercial operation, projects are either sold down to asset owners to realize development margins or retained on balance sheet to generate recurring revenue from power sales and operations.

The Group has production bases located in Huainan, Fengtai, Tongcheng, and Tongxin, Ningxia, with plans to install more than 60GW of N-TOPCon cell capacity and 12GW of module capacity. The Huainan Fengtai Photovoltaic Industrial Base has four phases of development: Phase I involves a 3GW photovoltaic module project, Phase II consists of a 9GW N-type TOPCon cells project; the Tongcheng photovoltaic industry base plans to build a 20GW N-type TOPCon battery project, of which the first phase of a 12GW N-type TOPCon battery project is under construction.

Figure 3 Business Portfolio



Source: Company data, Crosby Securities

Figure 4 CNE production bases

Source: Company data, Crosby Securities

CNE has an industry-leading position in n-TOPCon cell technology. In July 2024, certified by the National Photovoltaic Industry Metrology and Testing Center (國家光伏產業計量測試中心), CNE **mass-production TOPCon cell conversion efficiency has reached 26.72%**, ranking second in the global industry. This milestone solidifies the Group's standing in the top tier of the PV cell industry on the mass-production conversion-efficiency leaderboard.

Figure 5 R&D in N-TOPCon - cell conversion efficiency has reached 26.72% in July 2024

Source: Company data, Crosby Securities

Figure 6 Fengtai Development Zone Industrial Park 24MW Distributed Project

Source: Company data, Crosby Securities

Figure 7 Hefei Lianchuang Optics 3.6MW Distributed Project

Source: Company data, Crosby Securities

Figure 8 Central Holding Tong Cheng Base Phase I 5.9MW Distributed Project

Source: Company data, Crosby Securities

Figure 9 Smart Factory - World leading automated intelligent workshop

Source: Company data, Crosby Securities

Green Building and Construction Service:

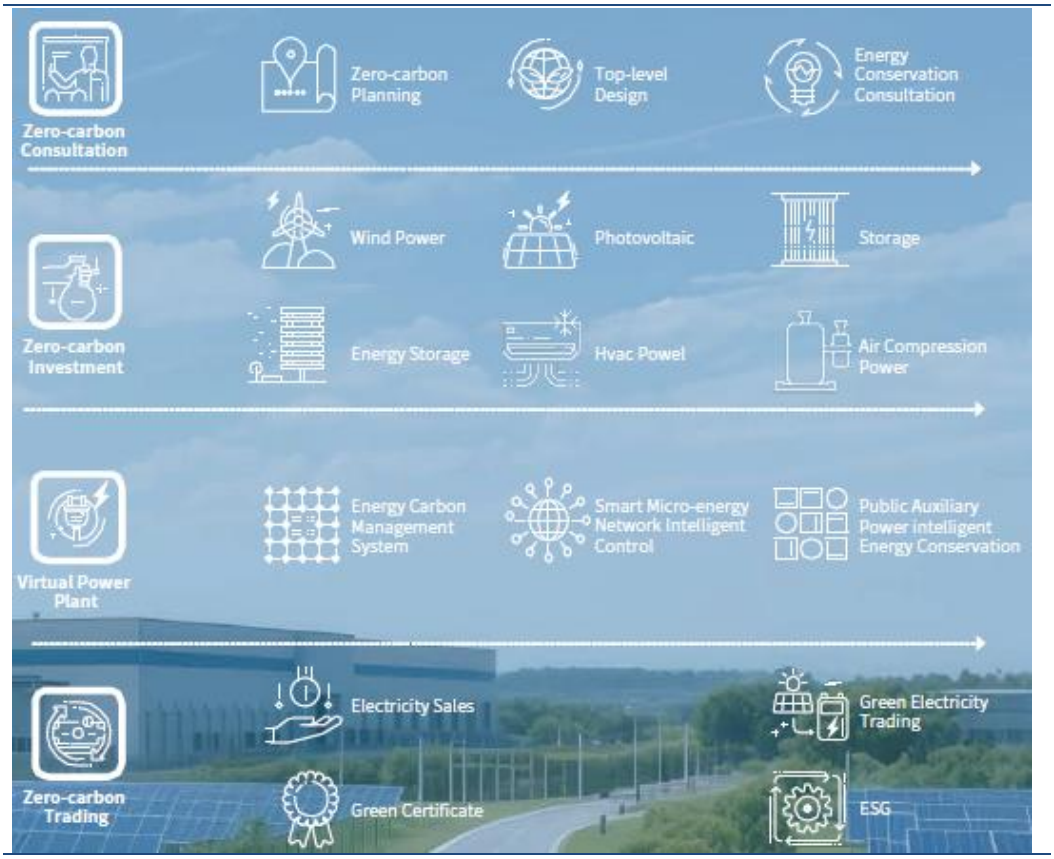
The Group executes eco-friendly, energy-efficient construction projects—including piling, excavation with lateral support, pile-cap works, and general building. It also undertakes property development and sales, maintains an investment property portfolio for leasing income, and supplies green building materials.

Smart Energy Management Service:

By tailoring integrated primary–secondary energy systems to customer requirements and optimizing them with AI-driven analytics, the Group effectively couples multiple energy sources to maximize efficiency and help clients meet energy-saving and decarbonization targets. Its operating model centers on the retrofit, design, and operation of zero-carbon industrial parks.

CHG DiGiTech Co., Ltd., a wholly owned subsidiary of CNE, specializes in zero-carbon smart-factory and industrial-park solutions that integrate the power grid, load management, and energy storage with multi-energy coupling. It is committed to becoming a leading zero-carbon asset operator and solution service provider in China. Its end-to-end low-carbon industrial platforms are already in operation. The CHG Low-Carbon Industrial Demonstration Park in the Huainan High-tech Zone is under construction. CHG DiGiTech has also formed partnerships for low-carbon park development in Nantong and continues to expand its low-carbon industrial footprint.

Figure 10 CNE's Zero Carbon Industrial Park



Source: Company data, Crosby Securities

Since entering the new energy business, CNE has installed PV plants across its own industrial parks and rolled out building-integrated photovoltaics (BIPV), entering the PV application market from the user side. The Group continues to make progress on the application front and is piloting and building zero-carbon industrial parks in multiple regions nationwide. In parallel, CNE is deploying PV-storage-charging solutions, with a particular focus on heavy-duty truck use cases in Western China. By using battery storage as a buffer, the Group enables fast charging for heavy trucks while mitigating grid impact; initial projects have been commissioned. The objective is to replace petroleum with PV-based electricity and reduce import dependence. At the same time, CNE is planning hydrogen–ammonia–alcohol projects (e.g., green hydrogen, ammonia and methanol) to broaden scenarios where PV can replace oil and gas, aiming—through calibrated capacity rollout and use-case expansion—to foster a virtuous cycle in industry pricing and utilization.

Positioning itself as a provider of clean, smart-energy solutions, the Group reports no legacy overcapacity and maintains a firm stance against price competition, consistently prioritizing product quality, conversion efficiency and customer needs. Zhonghuan is developing the "Twin-Star" cell series and the "Huanxi" module series, and collaborates on multiple technology routes with leading domestic and international institutions and enterprises, including Fudan University's International School of Finance, Honeywell UOP, and Iceland's CRI-Maifenlong, to advance innovation that drives cost reduction and efficiency gains. The Group is also active in priority Belt and Road regions, having formed strategic partnerships with SamaTech and Belgium-based ONYX. In addition, its low-carbon smart-park solutions have served more than 120 industrial clients, parks and municipalities nationwide, enabling upgrades to urban energy structures and industrial transformation; by expanding application scenarios, the Group seeks to unlock new sources of demand.

CNE – Distinct advantages over peers

In our view, CNE holds the following advantages versus peers:

No legacy P-type production burden: Unlike many A-share upstream and midstream peers that still carry substantial legacy P-type capacity—leading to accelerated depreciation, asset impairments, and net realizable value (NRV) write-downs—the Group's capacity mix is "cleaner," with lower fixed-cost. This yields a lighter asset base, lower depreciation burden, and stronger gross-margin and cash-flow resilience through the downcycle. With the industry facing overcapacity and falling prices, companies with large P-type footprints are undergoing economic obsolescence, triggering accelerated depreciation, impairments, and NRV write-downs. Following the prior capex upcycle, a high fixed-cost base and lower utilization are amplifying negative operating leverage.

Efficient and reliable products: The C-STAR photovoltaic cell series leverages three proprietary core technologies— "星閃" "星耀" and "星盾" —delivering a meaningful uplift in cell efficiency. The ENSOL high-efficiency module series adopts large-format, ultra-thin N-type wafers and industry-leading TOPCon cell technology. Products have successfully passed enhanced reliability regimes, including 2× IEC-stringent potential-induced degradation (PID), 2× IEC-stringent thermal cycling and 4× IEC-stringent damp-heat tests. Key advantages include high output power, high conversion efficiency, high bifaciality, a low temperature coefficient, low degradation and lower system installation costs. The modules are engineered to withstand sandstorms, low temperatures and other extreme climatic conditions, providing users with a more stable and efficient solution. In addition, CNE has obtained TÜV Rheinland IEC certifications for TOPCon mono-glass and bifacial modules, as well as reliability certificates covering salt-mist, ammonia and sand/dust exposure—demonstrating stable, dependable performance in harsh environments.

Broadening partnerships domestically and overseas: CNE is actively building strategic collaborations and has entered into deep partnerships with major state-owned and leading industry players, including SPIC, China Resources Power, CHN Energy, China Datang (Anhui), Huaihe Energy, CNNC Huineng, Gotion High-tech, Sungrow, LONGi Green Energy, JA Solar, JinkoSolar and Rongjie Group, among others. Internationally, the Company has signed cooperation agreements with multiple partners such as Sama Technology, Honeywell UOP, ONYX Group and Oman EGN LTD, drawing attention to its globalization strategy. In August 2025, the ENSOL series successfully entered overseas markets including Morocco in North Africa, and the international rollout is progressing steadily. The Company has established cooperation relationships with counterparties across more than a dozen countries—covering the EU (e.g., France, Spain), the Middle East (e.g., UAE, Turkey), South Asia (e.g., India), Africa and Southeast Asia—and is actively advancing plans for overseas manufacturing.

Zero-carbon industrial parks as a second growth engine: Management expects the zero-carbon industrial-park business to become the Group's "second growth curve." While oversupply across the PV value chain is primarily a downstream consumption issue, CNE proposes a user-side solution by deploying integrated "source–grid–load–storage" systems to address the last mile of green-power utilization. Through SGLS solutions, "multi-energy coupling" technologies and an AI-enabled energy-management platform, the Group delivers intelligent zero-carbon offerings spanning smart air compressors, HVAC, boilers, motors and IoT-based smart lighting—supporting energy savings, emissions reduction and sustainable development. To date, CNE's low-carbon smart-park solutions have served more than 120 industrial enterprises, industrial parks and municipalities nationwide.

Pivot from manufacturing to applications and asset management: The Group owns a sizeable pipeline of power-plant resources and project development rights/permits, with zero-carbon industrial parks providing immediate application/offtake. This underpins capabilities in energy savings, emissions reduction, and carbon-asset management, enabling brand and platform-based monetization and clear differentiation from pure manufacturers.

- With substantial power-plant resources and development rights in hand, application scenarios such as zero-carbon industrial parks can directly absorb in-house PV output, providing tangible shipment support and reducing sensitivity to external cycles.
- By delivering integrated solutions for energy savings, emissions reduction, and decarbonization at the park level, the Group is extending from "manufacturer" to "renewable-energy asset manager" and "energy-services" provider—building recurring service and O&M income streams.
- Management plans a brand and platform-led global roll-out of zero-carbon parks, progressively reducing reliance on pure manufacturing.
- Potential to tokenize renewable energy assets: Current RWA applications are concentrated in real estate, commodities (e.g., gold), fine art, and traditional financial assets. The Group believes that, over time, renewable energy assets—such as power plants, PPA cash flows, green certificates/carbon assets, and energy-performance service contracts—are viable candidates for tokenization. The Group also possesses power-plant resources and application scenarios such as zero-carbon industrial parks, and provides end-to-end energy-saving and decarbonization solutions, forming an integrated foundation of "asset origination + operational data + demand/offtake." Compared with pure manufacturers, the Group is better positioned to accumulate auditable generation and energy-saving data, enabling a closed-loop data basis for pricing, ongoing disclosure, and risk control of RWA structures, and is therefore well placed to run early pilots. In our view, over the long term—beyond improving financing efficiency for self-owned assets (potentially broadening the investor base, enhancing asset liquidity, and lowering WACC)—the Group can monetize via a platform model to earn diversified fee income, including structuring/issuance fees, custody and operations/asset-management fees, and data and verification service fees. At scale, this should increase the contribution from non-manufacturing businesses, improve earnings quality, and enhance the valuation mix.

Prudent balance sheet: In a capital-intensive photovoltaic industry, the Group demonstrates strong financial discipline and operating efficiency, with below-peer interest-bearing leverage that serves as a key buffer against cyclical volatility. As at end-2024, the Group's interest-bearing debt-to-revenue ratio was the lowest in the sector (c. 14.5% vs. a peer median of ~45%), underscoring a conservative balance sheet and disciplined capex and conferring multiple operating and valuation advantages:

- **Resilient through downcycles:** Amid overcapacity, intense price competition and accelerated technology iteration, a low debt load translates into a lighter interest burden versus peers. This enhances the Group's ability to navigate downturns, reducing the risk of "revenue up, earnings flat" outcomes or losses, and supports business continuity and financial safety.
- **Superior financial flexibility:** Compared with highly leveraged peers facing tight liquidity, CNE retains ample balance-sheet flexibility. This allows continued investment in advanced technologies such as N-type TOPCon cells and the pursuit of emerging opportunities (e.g., zero-carbon industrial parks) without relying on high-cost external financing, laying the groundwork for long-term growth.
- **Expansion optionality:** A healthy balance sheet and ample borrowing capacity position the Group as a potential consolidator. When attractive M&A targets or assets arise, CNE can move swiftly to execute counter-cyclical investments and capture greater market share into the next industry upcycle.

Figure 11 Peers Comparison - Total interests bearing liabilities / FY24 Revenue

(in Rmb 100m)	1735 HK	300274	601012	688223	688472	002459	688599	600438	300118	002865	600732
2024	CNE	阳光电源	隆基绿能	晶科能源	阿特斯	晶澳科技	天合光能	通威股份	东方日升	海南钧达	上海爱旭
Revenue	**55.2**	**778.6**	**825.8**	**924.7**	**461.7**	**701.2**	**802.8**	**919.9**	**202.4**	**99.5**	**111.6**
Short term interest bearing loans	5.1	42.1	3.0	27.6	79.6	85.0	64.2	18.8	69.3	15.1	36.4
Long term interest bearing loans	2.9	48.6	139.5	141.0	63.7	142.4	235.6	512.4	25.4	21.4	70.3
Long term loans due in 1 year		12.5	16.9	23.9	19.6	4.4	66.6	86.2	19.3	9.1	33.2
Long term payables due in 1 yr		6.2		23.0	0.9	9.5	6.8	7.3	8.9	1.6	1.6
Finance lease loans payable etc		28.6		105.8		64.0	7.3	19.6	28.6	38.9	14.7
Total interest bearing liabilities	**8.0**	**138.0**	**159.4**	**321.2**	**163.8**	**305.3**	**380.5**	**644.3**	**151.4**	**86.2**	**156.2**
Total int. bearing liab. / Revenue	**14.5%**	**17.7%**	**19.3%**	**34.7%**	**35.5%**	**43.5%**	**47.4%**	**70.0%**	**74.8%**	**86.6%**	**140.0%**

Source: Bloomberg, Company data, Crosby Securities

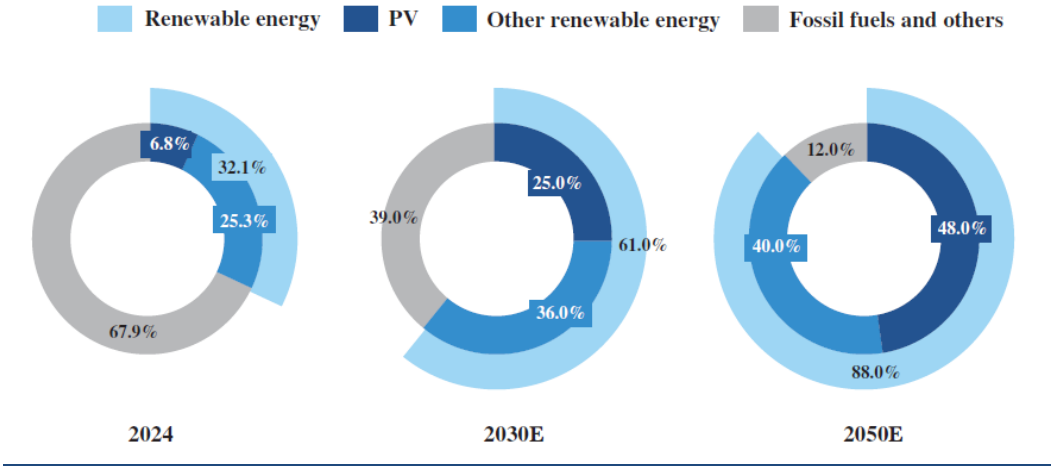
Industry analysis – PV fastest growing energy in the next 25 years

PV in global energy generation is expected to grow from 6.8% in 2024 to 25% in 2030, and further to 48% in 2050

Global carbon emissions remain elevated, and there is broad consensus on achieving carbon neutrality. Meeting this objective requires reducing the share of fossil fuels in energy supply while accelerating electrification. With rapid growth in electric vehicles and the expansion of AI-driven computing/data centers, global electricity demand is expected to rise from about 26,000 TWh in 2024 to over 70,000 TWh by 2050. Against this backdrop, upgrading the energy mix is critical, with renewable energy playing a central role in delivering an efficient, low-carbon transition.

Renewable energy mainly includes solar photovoltaic, wind energy and hydro energy. Renewable energy accounted for 32.1% of global energy generation in 2024, which is expected to increase to 61.0% in 2030 and further to 88.0% in 2050. In particular, the proportion of PV, the most important renewable energy source, in global energy generation will grow from 6.8% in 2024 to 25.0% in 2030 and further to 48.0% in 2050, becoming the main source of global electricity generation.

Figure 12 Proportion of energy types in total global power generation (2024-2050E)



Source: IEA, EMBER, CIC, hkexnews, Crosby Securities

Driven by global carbon-neutrality objectives, PV has become a principal driver of the energy-mix transition, underpinned by low generation costs, substantial room for further cost reduction, and broad applicability. The global levelized cost of energy ("LCOE") for PV is estimated at roughly US$0.06/kWh in 2024 and is expected to decline toward about US$0.01/kWh by 2030. PV also offers wide application scenarios and operates across diverse environmental conditions given abundant solar resources and limited geographic constraints on deployment. In parallel, supportive policies—such as China's "14th Five-Year Plan for a Modern Energy System" and the European Union's "Fit for 55" package—have further catalyzed PV industry development.

Market transitioning from P-type to N-type

The global PV industry is transitioning from P-type to N-type architectures as the mainstream technology

Comparative analysis of mainstream solar cell technology

PV, short for solar photovoltaic power generation system, is a device and system that uses the photovoltaic effect of semiconductor materials to convert solar energy into electrical energy. PV products mainly include solar cells and modules. Solar cells are semiconductor devices with photoelectric conversion characteristics. Solar module refers to the smallest indivisible solar cell combination device with packaging and internal connections that can independently provide direct current output.

Solar cells can be divided into crystalline silicon solar cells and thin-film solar cells by technical routes, among which crystalline silicon solar cells can be further divided into P-type cells and N-type cells. P-type cells are represented by PERC cells and HPBC cells, while N-type cells include TOPCon cells, HJT cells and N-type BC cells. The continuous improvement of its conversion efficiency and cost reduction in the PV industry are the core driving forces for its development. Currently, emergence of breakthrough technologies has become a key demand for industry transition.

Figure 13 Comparative analysis of mainstream solar cell technology routes, 2024

Comparative analysis of mainstream solar cell technology routes, 2024

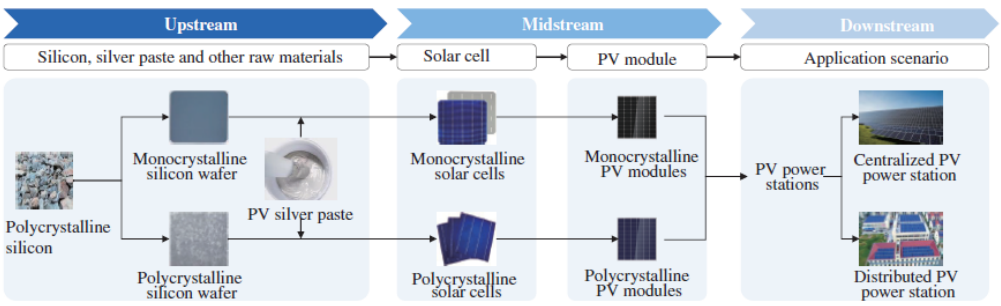
Technical route	PERC	TOPCon	HJT	xBC(1)
Theoretical conversion efficiency	24.6%	28.6%	28.4%	29.3%
Average conversion efficiency	23.5%	25.4%	26.0%	27.0%
Battery silver paste consumption(mg/W)	6.0	10.0	13.0	9.0
Investment in equipment per unit capacity (RMB100 million/GW)	1.1	1.4	2.5	2.0

Note (1): xBC cells include HPBC, TBC, ABC and other technical routes

Source: CPIA, CIC, hkexnews, Crosby Securities

Along the value chain of PV industry, solar cell production and module packaging belongs to the midstream of the chain, with upstream consists of raw materials such as silicon and silver paste, and downstream consists of application scenarios such as PV power stations and distributed PV.

Figure 14 Value Chain of PV industry, based on crystalline silicon solar cells

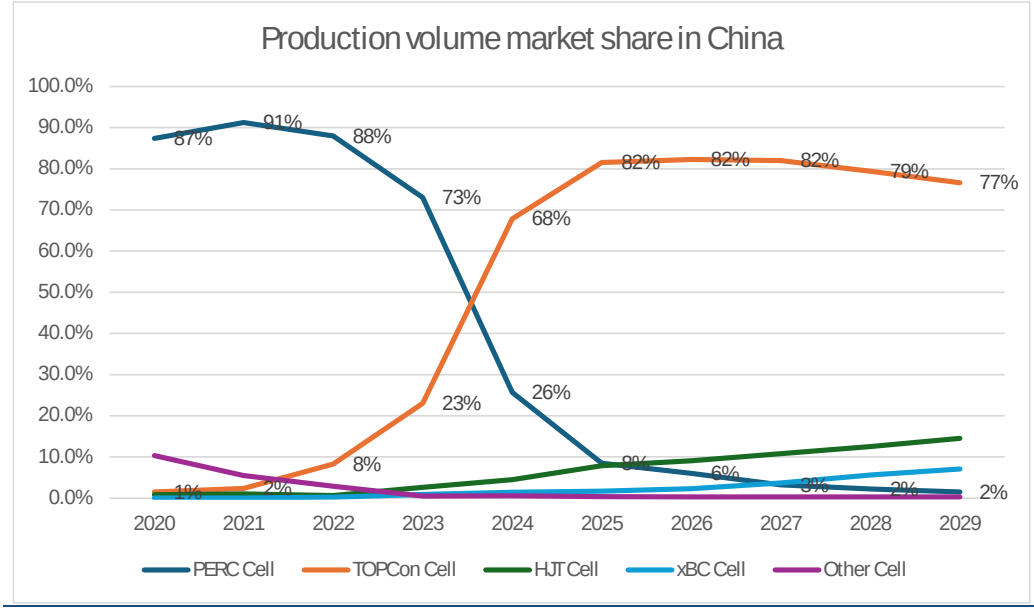


Source: CIC, hkexnews, Crosby Securities

N-TOPCon cells production in China – will reach 82% market share by end-2025

In recent years, P-type PERC cells have been the mainstream technology in the PV industry due to mature technologies and lower manufacturing costs compared with other types of PV cells in large-scale mass production. However, as the PV industry continues to grow and the efficiency of P-type PERC cells approaches its theoretical cap, the challenges in meeting the evolving demands for enhanced efficiency and cost reduction in solar power generation intensifies. Consequently, in seeking new industry breakthroughs, leading market participants have gradually turned their attention to N-type cells, which in turn led to a rapid increase in production and market adoption. In 2024, N-type cells reached a market share of approximately 73.8% in terms of production volume. **It is expected N-type cells will reach 91.5% by end of 2025, with N-type TOPCon cells having a market share of 82%, dominating the sector in China.**

Figure 15 N and P type cells market share from 2020 to 2029, in terms of production volume



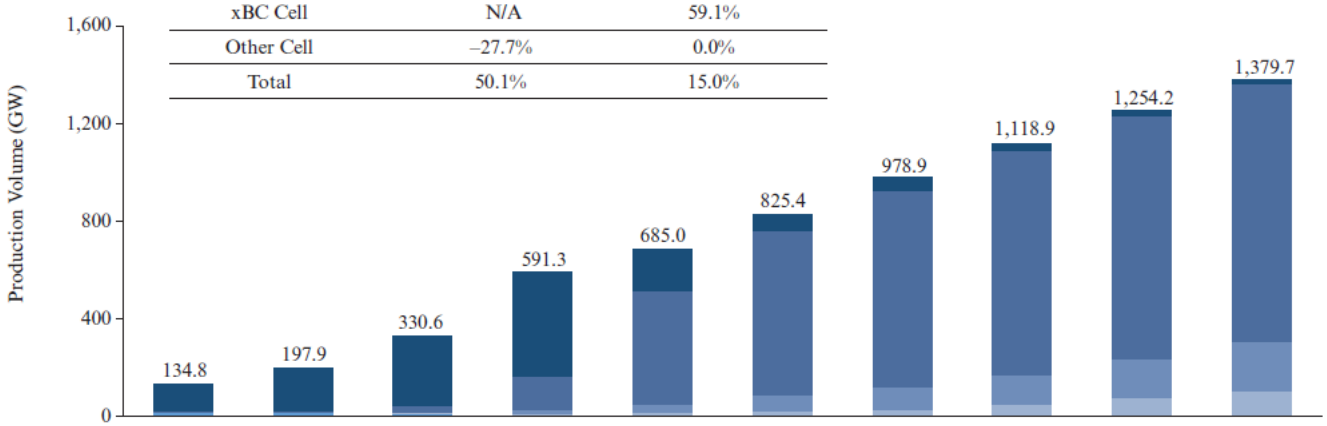
Source: China Photovoltaic Industry Association; Frost & Sullivan Analysis, Crosby Securities

Market size of N-type cells in China:

The production volume of PV cells in China increased from 134.8 GW in 2020 to 685.0 GW in 2024, with a CAGR of 50.1%. During the same period, the production volume of PERC cell, TOPCon cell, HJT cell and other cell in China grew at a CAGR of 10.6%, 290.4%, 130.0%, and -27.7%, respectively. With the growing market demand, the production volume of PV cells in China is expected to reach 1,379.7 GW by 2029, with a CAGR of 15.0% from 2024 to 2029. During the same period, the production volume of PERC cell, TOPCon cell, HJT cell, xBC cell and other cell in China is expected to grow at a CAGR of -34.8%, 17.9%, 45.4%, 59.1% and 0.0% from 2024 to 2029, respectively.

Figure 16 Production volume of PV Cell in China (2020-2029E)

Production Volume	*CAGR (2020–2024)*	*CAGR (2024–2029E)*
PERC Cell	10.6%	–34.8%
TOPCon Cell	290.4%	17.9%
HJT Cell	130.0%	45.4%
xBC Cell	N/A	59.1%
Other Cell	–27.7%	0.0%
Total	50.1%	15.0%



	2020	2021	2022	2023	2024	2025E	2026E	2027E	2028E	2029E
Total	134.8	197.9	330.6	591.3	685.0	825.4	978.9	1,118.9	1,254.2	1,379.7
PERC Cell	117.8	180.5	290.9	431.6	176.0	70.1	58.8	35.8	27.6	20.7
TOPCon Cell	2.0	4.6	27.4	136.0	464.8	673.2	805.5	917.7	995.8	1,057.1
HJT Cell	1.1	2.0	2.0	15.4	30.8	65.2	89.1	120.8	156.8	200.1
xBC Cell	—	—	0.7	5.3	9.6	14.0	22.5	41.4	70.2	98.0
Other Cell	13.9	10.8	9.6	3.0	3.8	2.9	3.0	3.2	3.8	3.8

Source: China Photovoltaic Industry Association; Frost & Sullivan Analysis, Crosby Securities

PRC-based PV companies that focus in N-type cell technologies will continue to ride on industry growth.

The PV industry continues to push the physical limits of photoelectric conversion efficiency through iterative upgrades and innovation. Coupled with large-scale mass production enabled by intelligent manufacturing, this has driven the LCOE of PV below that of natural gas. As a result, PV has become the first renewable energy source to achieve grid parity. Coordinated optimization across the upstream and downstream value chain, along with capacity expansion, has further strengthened PV's economic advantages over traditional energy. Looking ahead, innovations such as xBC architectures, N-type cell technologies (e.g., TOPCon), and smart operations and maintenance (O&M) will usher the industry into a new phase of increasing efficiency and reducing costs. PV is poised to become a major global energy source with leading cost-competitiveness and technological dynamism. PRC-based PV companies continue to increase R&D investment across multiple technology routes, including TOPCon, xBC, and HJT, contributing more "Chinese solutions" to the global energy transformation.

A brief history of P-type and N-type Solar Cells

The first solar cell, created in 1954, was in fact an N-type cell. When PV were been researched back in the 50s, manufacturing costs were extremely high, but this was not a limitation for space applications requiring a viable power source in space, where there were no other ways to generate power for a spacecraft like the Vanguard 1, the first satellite featuring solar panels in space.

As space applications became a priority, P-type solar panels featuring a high resistance to radiation and degradation in space, became an interest. A large number of resources were used in space PV application technology back in the 50s. The solar industry just kept the momentum going, using this well-researched technology by lowering prices to produce better P-type solar panels for terrestrial applications. This is why this technology became the norm for the industry.

Even though P-type solar panels have been the norm for years, this technology has its flaws, especially for terrestrial applications. Boron is used for doping P-type solar panels, but they cause a problem known as a boron-oxygen defect (not a problem in space where there is no oxygen). This defect produces a high amount of Light-Induced Degradation (LID) in P-type solar panels, reducing their performance by up to 10% in some cases.

N-type solar panels doped with phosphorous instead of boron, are completely immune to the boron-oxygen defect that would otherwise reduce its performance. Since there is no LID, there is no fast-paced performance degradation as with P-type solar panels. N-type solar panels also feature a higher conversion efficiency over their lifespan, turning them into a better investment.

PERC vs TOPCon Solar Cells:

Solar cells are essentially a crystalline silicon wafer with other materials added for electricity production. N-type solar cells are made from N-type silicon, while P-type solar cells use P-type silicon. While both generate electricity when exposed to sunlight, N-type and P-type solar cells have some key differences in how they are designed and perform.

Category	PERC Solar Cells	TOPCon Solar Cells
Core Technology	P-type silicon wafer with rear passivation layer (Al_2O_3 + SiN_x) to reduce recombination.	N-type silicon wafer with tunnel oxide (SiO_2, 1-2nm) + heavily doped poly-Si passivated contact for low-resistance electron extraction.
Conversion Efficiency	Mass production: 23-23.5% (monocrystalline); max ~24%. Theoretical limit ~24.5%.	Mass production: 25-25.5%; leading manufacturers achieve 26%+. Potential to reach ~28% with optimization.
Light-Induced Degradation (LID)	Prone to LID (3-5% initial power loss) due to boron-oxygen complexes in p-type silicon.	Minimal LID (<1% long-term loss) as n-type silicon lacks boron-oxygen complexes.
Temperature Coefficient	-0.35% to -0.45% per °C (power output drops more in high temperatures).	-0.25% to -0.3% per °C (more stable power output in hot climates).
Carrier Lifetime & Recombination	Shorter carrier lifetime; rear surface recombination limits performance.	Longer carrier lifetime; tunnel oxide structure minimizes recombination losses.
Manufacturing Complexity	Lower complexity; adapted from traditional BSF lines with few extra steps (passivation, laser vias).	Higher complexity; requires precise control of tunnel oxide deposition and poly-Si doping. Specialized equipment (LPCVD) needed.

Category	PERC Solar Cells	TOPCon Solar Cells
Manufacturing Cost (2024)	Lower cost due to mature scale and cheaper p-type wafers. Non-silicon costs (passivation, metallization) stable.	Cost gap narrowing; higher initial investment but declining with scale. N-type wafers now more cost-competitive.
Cost-Efficiency Ratio	Moderate: Good for cost-sensitive markets but limited by efficiency ceiling.	Strong: Higher upfront cost offset by higher power output/area, ideal for space-constrained projects.
Return on Equity (ROE) Outlook	Pressured by maturing tech, rising competition, and efficiency limits. Margins shrinking.	Positive long-term: Growing demand for high-efficiency cells, declining costs, and scalability drive margin expansion.
Market Share in China (2024)	25.7% of total production volume in China, and expect to decline to 8.5% in 2025	67.9% of total production volume in China, and expect to rise to 81.6% in 2025
Future Viability	Niche role in cost-sensitive markets; gradual phase-out as mainstream tech.	Likely mainstream: Sustained growth via efficiency gains, cost reductions, and policy support for high-performance PV.
Key Risks	Obsolescence risk as efficiency nears limit; competition from N-type tech.	Initial capital intensity; process yield challenges (though improving).

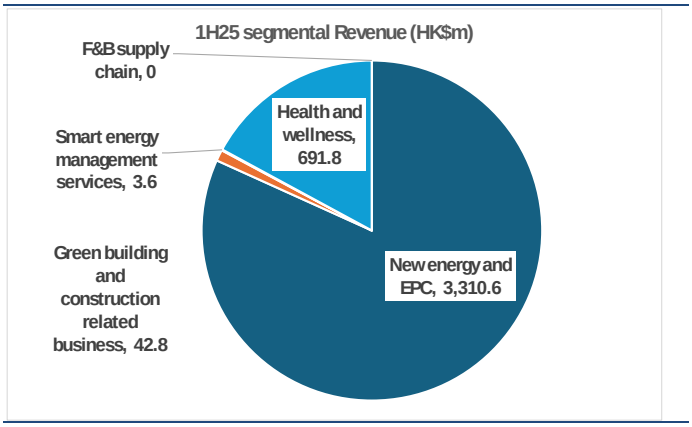
CNE – Gross profit doubled YoY to HK$86m in 1H25, as revenue from New energy and EPC segment increased by 97% YoY

CNE reported around $4.05bn in 1H25 revenue, up by 59.9% YoY. The increase was primarily due to i) sales from the New energy and EPC segment saw an increase of 96.9% YoY to HK$3.31bn as a result of growth in sales volume of PV components and high efficiency N-type battery; and ii) a 73.1% increase in the health and wellness segment amid a strong sales growth in green food products during the period. Sales in New energy and EPC segment remained the largest contributor and accounted for 81.8% of total revenue (1H24: 66.4%), followed by 17.1% in Health and wellness segment (1H24: 15.8%). Due to the change in strategy with the Group put more resources into the new energy and EPC segment, revenue from i) Green building and construction related segment was down by 89.5% YoY to HK$42.8m (accounted for 1.1% of 1H25 total revenue); and ii) F&B supply chain segment has dropped to nil from HK$5.1m in 1H24.

Gross profit has doubled YoY to HK$86m in 1H25, with GPM up from 1.7ppt in 1H24 to 2.1% in 1H25, amid a relatively higher GPM in the new energy and EPC segment. Other income has dropped from HK$144m in 1H24 to HK$92m in 1H25 mainly due to the decrease in gains from disposal of subsidiaries and less government grants. Admin expense was up by 9.3% YoY to HK$96.7m on higher development costs for new production lines in both PV component and N-type battery. Tax expense dropped to HK$1.1m in 1H25 from HK$15.1m in 1H24, due to more tax rebates and incentives in PRC. As a result, 1H25 NP declined by 42.6% YoY to HK$23.3m despite gross profit doubled, mainly due to a significant YoY drop in other income.

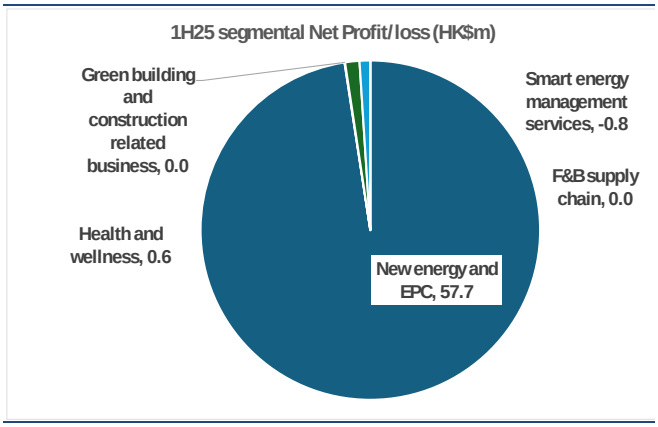
In terms of segmental profits, New energy and EPC segment reported a profit of HK$57.7m in 1H25, down from HK$74.8m in 1H24. The other four segments basically reported insignificant segmental profits during the period. We believe the new energy and EPC segment will continue to be the focus of the management team.

Figure 17 1H25 segmental Revenue (HK$m)



Source: Company data, Crosby Securities

Figure 18 1H25 segmental Net Profit/loss (HK$m)



Source: Company data, Crosby Securities

A-share listed peers reporting 12 months trailing net losses

Over the past 12–18 months, upstream and midstream solar manufacturers (polysilicon, ingot/wafer, and cell producers) have faced an unusually hostile set of fundamentals:

- A capacity glut after the 2021–2023 investment boom triggered an industrywide price collapse across polysilicon, wafers and cells, compressing margins to (and often below) cash cost;
- Demand proved softer than expected as Europe and parts of the U.S. entered a prolonged destocking cycle, financing costs stayed elevated, grid-connection bottlenecks delayed utility projects;
- Rapid technology transitions (PERC→TOPCon and the push toward HJT/BC) rendered large blocks of legacy lines economically obsolete, forcing accelerated depreciation, impairment charges and net realizable value write-downs on inventory, and many producers carry high fixed-cost bases and depreciation from the recent capex wave, so lower run-rates due to lower demand created severe negative operating leverage;
- Trade and compliance frictions between countries increased logistics complexity, duplicated inventories, and added compliance costs;
- Freight volatility (e.g., Red Sea rerouting) and regional energy-price differentials penalized plants outside low-cost power hubs, diluting cost competitiveness.

Taken together, collapsing ASPs, impaired assets, under-utilization and heavier financing burdens explain why many A-share upstream names have reported net losses despite record nominal shipment volumes downstream.

CNE are one of the few listed companies among Mainland and HK listed peers that have recorded positive net profit in the last 12 months (2H24 + 1H25).

Figure 19 12 months trailing net margin comparison

Ticker		12M Trailing Net margin (%)
300274 CH	SUNGROW POWER SUPPLY CO LT-A	15.28
688472 CH	CSI SOLAR CO LTD-A	3.84
1735 HK	**CENTRAL NEW ENERGY HOLDING C**	**1.18**
688223 CH	JINKO SOLAR CO LTD-A	-5.20
601012 CH	LONGI GREEN ENERGY TECHNOL-A	-7.73
002865 CH	HAINAN DRINDA NEW ENERGY T-A	-9.51
600438 CH	TONGWEI CO LTD-A	-9.99
688599 CH	TRINA SOLAR CO LTD-A	-10.07
002459 CH	JA SOLAR TECHNOLOGY CO LTD-A	-11.23
300118 CH	RISEN ENERGY CO LTD-A	-18.30
600732 CH	SHANGHAI AIKO SOLAR ENERGY-A	-26.40

Source: Company data, Crosby Securities

Summary financials

Yr ended 31 Dec	FY 2022	FY 2023	FY 2024
Income Statement (HKD'm)			
Revenue	**1,614**	**4,028**	**6,032**
YoY%	*48.6*	*149.6*	*49.7*
Gross profit	**31**	**173**	**128**
YoY%	*(39.9)*	*455.7*	*(26.1)*
EBITDA	**(16)**	**125**	**240**
YoY%	*N/A*	*N/A*	*91.4*
Net profit	**(28)**	**66**	**106**
YoY%	*N/A*	*N/A*	*60.4*
EPS (Fully diluted)	**(0.007)**	**0.016**	**0.025**
YoY%	*N/A*	*N/A*	*60.5*
DPS	**0.000**	**0.000**	**0.000**
YoY%	*N/A*	*N/A*	*N/A*
Balance Sheets (HKD'm)			
Cash & Cash Equiv	614	137	266
ST Investments	1	0	0
AR	194	943	1,058
Inventories	109	246	157
Other current assets	251	785	1,560
Total Current Assets	**1,170**	**2,111**	**3,041**
PP&E	86	825	1,318
LT Investments	229	222	0
Other Non-curr assets	6	337	118
Total Non-Current Assets	**321**	**1,385**	**1,436**
Payables & Accruals	329	988	894
ST Debts	501	835	1,670
Othe current Liabilities	66	65	51
Total Current Liabilities	**896**	**1,888**	**2,615**
LT Debts	2	288	322
Othe LT Liabilities	405	8	0
Total Long-Term Liabilities	**407**	**297**	**322**
Shareholders' Equity	**188**	**851**	**1,117**
Minority interests	(0)	461	423
Total Equity	188	1,311	1,540
Total Debts	503	1,123	1,992
Net cash / (debts)	111	(986)	(1,726)

Yr ended 31 Dec	FY 2022	FY 2023	FY 2024
Cash Flow Statement (HKD'm)			
Net Income	(28)	66	106
Dep & Amort.	9	19	142
Working capital changs	(54)	(1,084)	(561)
Other adjustments	5	(3)	(84)
Cash From Operations (CFO)	**(68)**	**(1,002)**	**(397)**
YoY%	*142.2*	*1,379*	*(60.3)*
Capex	(78)	(767)	(695)
Other investments	33	19	48
Cash From Investing Activities	**(46)**	**(748)**	**(647)**
Free Cash Flow (CFO - Capex)	**(146)**	**(1,769)**	**(1,092)**
YoY%	*235.8*	*1,110*	*(38.3)*
Net change in debts	383	620	869
Shares issue & buyback (net)	0	0	0
Dividends	0	0	0
Others	#VALUE!	653	304
Cash from Financing Activities	**#VALUE!**	**1,273**	**1,173**
Opening cash	50	#VALUE!	#VALUE!
Net Changes in Cash	#VALUE!	(477)	129
Closing cash	**#VALUE!**	**#VALUE!**	**#VALUE!**
Ratios			
Gross margin	1.9%	4.3%	2.1%
Ebitda margin	-1.0%	3.1%	4.0%
Net margin	-1.7%	1.6%	1.8%
Payout	N/A	0.0%	0.0%
Effective tax	N/A	14.0%	3.9%
Ebit margin (%)	-1.6	2.7	1.8
Interest burden (x)	1.22	0.77	0.52
Tax budren (x)	0.90	0.80	1.89
Asset turnover (x)	1.43	1.62	1.51
Leverage (x)	5.41	4.80	4.05
ROE	**-13.3%**	**12.8%**	**10.8%**
ROIC	**-4.6%**	**5.7%**	**3.1%**
Total debts / Total Capital	72.8%	46.1%	56.4%
Net debts / SH Equity	Net cash	115.9%	154.6%

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Buy (B): The stock's potential total return is expected to be over 10%/15% for Large Caps/Small&Mid Caps, respectively.

Neutral (N): The stock's potential total return is expected to be ranging from -10% to 10%/15% for Large Caps/Small&Mid Caps, respectively.

Sell (S): The stock's potential total return is expected to be less than -10% over the next 12 months.

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Not Rated (NR): Stocks that we have no Fundamental or Tactical Call rating

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