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Study on the Performance Evaluation of Sungrow from the Perspective of Green Governance

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Abstract

The "dual carbon" strategy has pushed Chinese new energy firms to rethink how they manage environmental responsibilities, and the link between such management and financial results has drawn growing scholarly attention. This paper takes Sungrow Power Supply as a case, looking at the five years from 2021 through 2025, and pairs financial statement analysis with environmental performance indicators to judge whether and how the company's green governance has paid off. What emerges is a picture of steady improvement on both fronts. Energy use per unit of output has fallen, as has pollutant intensity, and by 2025 renewable sources supplied 79% of the electricity Sungrow consumed-enough to lift its MSCI ESG rating to AAA. On the financial side, the energy storage business has expanded rapidly, lifting revenue and profit in tandem, and leverage has come down. The evidence suggests that environmental gains and financial gains at Sungrow have reinforced rather than crowded out one another, which carries practical lessons for other manufacturers navigating their own low-carbon transitions.

Keywords

Green Governance; Financial Performance; Environmental Performance; Performance Evaluation.

1. Introduction

China's "dual carbon" goals have been written into policy and are now being implemented across industries, which means the country's energy mix is shifting faster than ever toward green and low-carbon sources. Among the industries affected, new energy stands out as a major engine of high-quality growth. Photovoltaic power, with its clean and renewable nature, has risen to become one of the leading forces in this energy transition. Policy support and falling technology costs have kept global PV installations climbing, and China has built a complete, globally competitive supply chain. But growth has brought tougher competition: prices have been under pressure and profit margins have swung. How companies can turn green governance into real high-quality development has therefore become a question that needs answering. Green governance sits at the core of modern management thinking-it is rooted in sustainable development and means weaving environmental protection into both long-range strategy and day-to-day operations, so that economic, social, and environmental goals move together rather than against one another[1]. Given this, it is now widely accepted in academic circles and industry alike that environmental performance should be folded into how companies are evaluated, and that assessment frameworks need to balance economic returns against ecological impact[2]. A growing body of empirical work also suggests that stronger ESG performance tends to go hand in hand with better financial outcomes[3].

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Green governance performance evaluation has drawn considerable attention in corporate governance research. Li Weian and his colleagues were among the first to lay out the concept systematically and to design an evaluation framework tailored to Chinese listed companies, which gave later researchers a workable analytical tool. Since then, scholars at home and abroad have tested the link between environmental performance and financial results. Most of them find that companies with stronger environmental records do better-spend less on compliance, use resources more efficiently, and enjoy better brand recognition Not everyone is equally optimistic, though. A number of papers point out that green investment can weigh on margins in the short run, and the benefits may not show up on the income statement until several quarters later. For a new energy company, this trade-off looks somewhat different: being green is not merely a cost of regulation but also a way to differentiate products and build a moat that peers cannot easily breach. Despite this, the literature has comparatively little to say about how green governance plays out inside a single firm. Existing empirical work relies heavily on broad cross-industry samples; close-up accounts of representative companies are thin on the ground. Following one firm over several years, as this study does, lets you see how governance decisions translate into environmental and financial outcomes over time-something that a large-N regression can only approximate.

Sungrow Power Supply is the case selected for this study, with 2021–2025 as the observation window. The analysis brings financial ratios and environmental metrics together, allowing the reader to see not just what the company says about green governance but what the numbers show[4]. Section 2 traces why Sungrow moved into green governance and how it organized that effort; Section 3 works through the financial and environmental record side by side; Section 4 closes with takeaways and suggestions. The contribution here is primarily empirical: a single-firm longitudinal account that complements the large-sample studies already in the literature, while also giving managers at other Chinese new energy companies something concrete to compare against.

2. Sungrow's Green Governance Journey

2.1. Introduction to Sungrow

Sungrow Power Supply (300274.SZ) was founded in Hefei, Anhui, in 1997 and listed on the Shenzhen Stock Exchange in 2011. The company focuses on the research, development, and manufacturing of new energy power electronics, and photovoltaic inverters are at the center of what it does. Its product line has expanded well beyond inverters to include energy storage systems, wind power converters, electric-vehicle drive systems, and new energy investment and development, with a presence in more than 100 countries. Over two decades the company has moved through several stages: first domestic substitution in PV inverters, then building up and scaling the energy storage business, and most recently pushing deeper into global markets. Today it operates across photovoltaics, energy storage, and wind power in a coordinated way, and it has been the world's largest supplier of PV inverters by shipment volume for several years running. By the end of 2025, the cumulative installed capacity of its power electronic conversion equipment worldwide had passed 1,000 GW. In 2025 alone, it shipped 143 GW of PV inverters globally and ranked first in BloombergNEF's financing value index, with 100% bankability. It also delivered 43 GWh of energy storage systems, about 84% of which went to overseas markets, and shipped 63 GW of wind power converters. Running these businesses together has reduced the company's dependence on any single market. In 2025 revenue reached 89.184 billion yuan, up 14.55% year on year, and net profit attributable to shareholders came to 13.461 billion yuan, up 21.97%. The energy storage system business brought in 37.287 billion yuan-up 49.39% and accounting for 41.81% of total revenue-overtaking PV inverters as the company's largest segment and its main growth driver. At year-

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end 2025, total assets stood at 118.679 billion yuan and net assets attributable to shareholders at 46.611 billion yuan. As its scale and financial strength have grown, Sungrow has become a leading global manufacturer and a benchmark in the new energy equipment space.

2.2. Analysis of the Motivations and Pathways for Sungrow's Green Governance

Why did Sungrow pursue green governance so deliberately? On the external side, the "dual carbon" goals and the energy-saving, emission-reduction, and energy-transition targets laid out in the 14th Five-Year Plan have pushed new energy companies to transform faster. Environmental rules, competitive pressure, stakeholder scrutiny, and the pull of green markets and green finance all create constraints as well as incentives. New trade rules are also a factor: carbon border adjustment mechanisms around the world have raised the compliance bar for exporters, and going green has become a practical necessity for staying competitive overseas. Internally, the company's mission-"making clean power accessible to everyone"-its sustained R&D spending, its culture of "everyone participates in ESG," and its attention to risk management and long-term growth give green governance its internal momentum. Following the green governance evaluation framework of Li Weian et al. (2019), Sungrow has advanced along four dimensions[1]: building the institutional architecture, improving governance effectiveness, taking on social responsibility, and upgrading green production and operations[5]. On the institutional side, green requirements are written into strategy, and a four-tier governance structure runs from the Board and the Strategy and Sustainability Committee down to the Sustainability Management Office, the ESG Development Center, and the Sustainability Execution Task Force. Independent directors make up 37.5% of the board, and ESG targets are tied to executive pay-10% of each executive's annual variable compensation is linked to sustainability goals, so that green accountability is directly connected to business results. On governance effectiveness, the company has rolled out an updated sustainability strategy through 2030, with quantifiable targets on climate, ecology, and business ethics that cascade down to individual units. Its decarbonization roadmap calls for operational carbon neutrality by 2028, supply chain carbon neutrality by 2038, and net-zero supply chain emissions by 2048. It has set up an energy management system and put green production practices in place. By building its own PV stations and buying green electricity and green certificates, it raised the renewable share of its power use to 79% in 2025, and it hit the target of cutting unit product energy consumption by 10% from 2020 levels ahead of schedule. On social responsibility, the company treats "everyone participates in ESG" as more than a slogan. By 2025, employee training coverage was 100% and employee engagement had risen to 4.45 points, while spending on occupational health and safety kept growing. It also set up a public welfare foundation for green initiatives, with charitable spending approaching 20 million yuan in 2025. On disclosure, it has published social responsibility reports since 2015 and upgraded them to sustainability reports in 2021; by 2025 it had issued 28 ESG-related policy documents, widening both the scope and depth of what it discloses. Where the company has perhaps been most deliberate is in pushing green thinking down to the operational level. R&D dollars, for instance, are being directed toward efficient, low-carbon product platforms-total R&D outlay hit 4.175 billion yuan in 2025. The supply chain is not exempt: every new supplier has to pass an ESG screen, existing ones are audited, and the company ran more than 2,543 hours of ESG training sessions, with 99.2% of suppliers eventually signing the code of conduct. On the shop floor, smart manufacturing and circular packaging are replacing conventional practices, and logistics routes are being reworked to trim transport-related emissions. The external market noticed: MSCI lifted the company's ESG rating from AA to AAA in 2025. The upshot of all this is that green governance is not parked in a CSR department—it cuts across strategy, operations, and the supply chain, which gives the company the organizational muscle to keep performance moving.

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3. Performance Evaluation of Sungrow from the Perspective of Green Governance

Whether green governance actually works can be judged by watching what happens to performance over time. A long-standing gap in corporate evaluation is that financial results used to tell the whole story. Under the "dual carbon" agenda, that is no longer adequate—environmental outcomes matter too. This study therefore sets up two parallel lenses, one financial and one environmental, built specifically for a new energy equipment manufacturer. The financial lens covers four things: how profitable the company is, how efficiently it runs its assets, how it manages debt, and how fast it grows. The environmental lens covers five: money spent on environmental management, what comes out of the smokestack, what resources are consumed, how much is recycled, and how the environmental management system itself is organized. The choice of indicators reflects three constraints: they need to cover the relevant ground, they should be comparable from one year to the next, and the data have to be publicly available. Financial numbers are taken from annual reports; environmental numbers from sustainability reports. Applied to Sungrow over 2021–2025, the framework makes it possible to see how the company has done on energy mix, emissions control, and resource recovery.

No single method would do the job here, so the paper pairs descriptive trend analysis with institutional explanation. The numbers themselves-ratios, growth rates, year-over-year changes-show whether performance is moving in the right direction and how far. But numbers alone do not tell you why they moved. Each significant shift in the financial indicators is therefore read alongside the green governance actions the company took in the same period, so the analysis goes beyond surface-level correlation. One caveat: revenue and profit are shaped by macro conditions, industry cycles, and competitive dynamics as much as by governance choices. This study does not attempt to isolate a clean causal effect; it instead describes the broader relationship and leaves causal identification to future work.

3.1. Financial Performance Analysis

3.1.1. Profitability

Profitability is the most direct read on whether a company can generate earnings and whether it has the means to keep operating-and to keep investing in green projects. Return on equity tells you how much shareholders earn on their capital; net profit margin and gross profit margin capture profitability at different points in the business. From a green governance angle, spending on green R&D and energy-saving upgrades can push costs up in the short run, but over time those investments tend to pay off through lower costs, better efficiency, and a green premium. This section looks at three profitability indicators-return on equity, net profit margin, and gross profit margin-for Sungrow over 2021–2025 (Table 1).

Table 1. Profitability Indicators of Sungrow Power Supply from 2021 to 2025 Unit: %

Indicator	2021	2022	2023	2024	2025
Return on Equity	13.05	20.95	40.96	33.99	31.26
Net Profit Margin	7.06	9.18	13.30	14.47	15.17
Gross profit margin	22.25	24.55	30.36	29.94	31.83

Profitability in 2021 was at its weakest point in the whole sample: ROE of 13.05%, a function of expensive silicon and crowded competition. The recovery that followed was swift. Gross margin rebounded to 24.55% in 2022, as energy storage took off and overseas sales gathered momentum. The following year was exceptional-ROE jumped to 40.96%, far outpacing the sector at a time when most producers were watching margins compress. That kind of gap does

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not happen by accident; it reflects better capital deployment, process refinement, and a product mix tilted toward higher-margin greener offerings. 2024 saw some give-back (ROE at 33.99%) as prices fell and new capacity came online, but the level was still historically strong. By 2025, gross margin had recovered 1.89 percentage points to 31.83%, supported by brand strength, product refresh, and scale. The storage business itself generated a 36.49% gross margin, with inverters at 34.66%; as these high-margin lines become a bigger share of sales, the profit mix keeps improving. Net margin climbed from 7.06% (2021) to 15.17% (2025), evidence that cost control is keeping pace with top-line growth. Non-GAAP net profit represented 95.3% of attributable net profit in 2025, so earnings are coming from the core business rather than one-offs. ROE has exceeded 30% each year since 2023. The causal chain here runs in both directions: greener products command better prices, greener operations cut waste, and greener supplier relations lower procurement costs-so profitability and sustainability reinforce rather than compete.

3.1.2. Operational Capability

How well a company uses its assets says a lot about operational quality. Total asset turnover measures broad asset efficiency; receivables turnover measures how quickly invoices convert to cash. When a company embarks on green governance, supply chain coordination, smarter production, and digital workflows all feed back into these turnover numbers. Two ratios are examined here-total asset turnover and receivables turnover-for Sungrow over 2021–2025 (Table 2).

Table 2. Sungrow's Operational Capacity Indicators from 2021 to 2025, Unit: Times

Indicator	2021	2022	2023	2024	2025
Total Asset Turnover Ratio	0.68	0.77	1.00	0.79	0.76
Accounts Receivable Turnover Ratio	3.15	3.57	4.14	3.19	3.49

From 2021 to 2025, Sungrow's total asset turnover stayed relatively high, peaking at 1.00 times in 2023-well above the industry average. That peak reflects better coordination between production and sales as PV and energy storage shipments grew rapidly. After 2023 the ratio eased somewhat, partly because industry sentiment cooled and partly because the asset base expanded with the business; by 2025 it was 0.76 times, still above the industry average, and asset growth kept pace with revenue growth. The accounts receivable turnover rose from 3.15 times in 2021 to 4.14 in 2023, then settled at 3.49 in 2025. It has run below the industry average overall, but the gap is narrowing-which suggests that the company's green supply chain finance measures and its tighter customer credit assessment and risk controls are starting to show. From 2024 on, as competition intensified and prices fell, the company stuck to a sales-driven production model and kept adjusting its scheduling, which helped asset efficiency hold up reasonably well. Taken together, the gains in operational capability have been driven by green supply chain development and digital transformation in manufacturing, placing Sungrow among the more asset-efficient players in the sector.

3.1.3. Solvency

Can the company pay its bills as they come due, and is the balance sheet structurally sound? The debt-to-asset ratio speaks to the long-run answer; the current ratio speaks to the short run. Green transformation is capital-hungry-R&D, capacity, supply chain upgrades all cost money up front-and it is reasonable to expect leverage to rise during that phase. The debt-to-asset ratio and current ratio are used below to track whether that happened at Sungrow between 2021 and 2025 (Table 3).

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Table 3. SunPower's Debt Repayment Capacity Indicators from 2021 to 2025

Indicator	2021	2022	2023	2024	2025
Debt-to-Asset Ratio/%	61.01	67.97	64.46	65.07	58.06
Current ratio	1.54	1.47	1.51	1.58	1.67

Of the five years studied, 2022 saw the highest leverage: debt-to-asset at 67.97%. That was the year Sungrow was spending heavily to expand green product lines, energy storage above all. From 2023 onward the ratio drifted downward, reaching 58.06% by 2025-down 7.01 percentage points year on year and the lowest reading in the sample. The reason on the liability side was stronger cash generation: operating cash flow hit 16.918 billion yuan in 2025, up 40.18%, which gave the company internal funds to draw on rather than relying on borrowing. The current ratio moved between 1.47 and 1.67 across the period; its trough in 2022 coincided with the heaviest capital spending, and it recovered to 1.67 by 2025 as operating cash flow strengthened and short-term debt was better managed. Most liabilities are operating liabilities rather than financial debt, so leverage sits within a comfortable band. In other words, Sungrow has been able to fund its green push without overextending itself, and the balance sheet is healthy enough to keep funding future investment.

3.1.4. Growth Potential

Growth tells you whether a company has room to keep expanding. Revenue growth tracks market expansion; non-GAAP net profit growth tracks whether that expansion is actually profitable. Green governance, in theory, should open up new product and market opportunities rather than constrain them. Two measures-revenue growth and non-GAAP net profit growth-are used to track Sungrow's expansion from 2021 to 2025 (Table 4).

Table 4. Growth Capability Indicators of Sungrow Power Supply from 2021 to 2025 Unit: %

Indicator	2021	2022	2023	2024	2025
Revenue growth rate	25.15	66.79	79.47	7.76	14.55
Non-GAAP net profit growth rate	-27.72	153.70	172.18	16.03	19.98

Over 2021–2025, Sungrow's revenue and non-GAAP net profit growth both trended upward, though with noticeable swings. In 2021, non-GAAP net profit growth turned negative-the industry was softening and raw material costs were rising. From 2022 to 2023, both numbers ran high on the back of rapid expansion in PV and energy storage. In 2024, growth slowed sharply as competition tightened. The picture turned around in 2025: revenue grew 14.55% and non-GAAP net profit 19.98%, both back in double digits. Storage was the engine-storage system revenue climbed 49.39%, with roughly 84% of shipments going to overseas customers. Global inverter shipments reached 143 GW and wind converter shipments 63 GW, cementing the company's worldwide position. The overseas push is doing more than adding revenue: it gives Sungrow a buffer against slowdowns in any one market, and international customers tend to pay better, which is why foreign sales have become such a large profit pool. On the input side, the company invested 4.175 billion yuan in R&D in 2025 (+31.97%), and that spending is translating into products that command premium positions-an important long-run growth support.

3.2. Environmental Performance Analysis

Environmental performance refers to the measurable results a company achieves when it manages environmental factors and meets its environmental responsibilities-in other words, whether it is actually delivering on environmental requirements. Drawing on the

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characteristics of the new energy equipment manufacturing industry, this paper evaluates Sungrow's environmental performance along five dimensions: environmental governance investment, pollution emissions, resource consumption, recycling, and environmental management. The data come from the company's annual sustainability reports, which give a reasonably complete picture of its environmental management.

3.2.1. Environmental Governance Investment

Environmental governance investment is the financial base for a company's green management, and Sungrow has kept increasing it. In 2025, R&D spending reached 4.175 billion yuan, up 31.97% year on year, with R&D intensity at about 4.68%. The money went to cutting-edge green areas-PV inverters, energy storage systems, hydrogen energy-keeping the company at the front of the industry in green innovation investment. That has shown up in better product conversion efficiency and reliability, and new ventures like hydrogen energy have opened additional growth paths for green technology. Occupational health and safety spending came to 138.608 million yuan in 2025, up from 125.408 million in 2024, mainly for workplace improvements, disease prevention, and safety facility upgrades. Employee training spending rose from 21.55 million yuan in 2024 to 23.74 million in 2025, reaching full employee coverage, and employee engagement climbed to 4.45 points. Because of these sustained investments, the company hit its target of cutting unit product energy consumption by 10% from 2020 levels ahead of schedule. Its green innovation capacity keeps strengthening, which gives environmental improvement both the financial and human capital it needs.

3.2.2. Environmental Pollution

Controlling pollutant emissions is a core part of environmental performance evaluation, and Sungrow has made real progress here. In 2025, VOC emission intensity per unit product fell to 30.27 kg/GWh-down from 42.08 kg/GWh in 2024 and a 62% drop from 79.77 kg/GWh in 2020, well ahead of the original 30% reduction target. Total VOC emissions dropped from 12.16 tons in 2024 to 9.80 tons in 2025, a 19.4% year-on-year decrease. Particulate matter emission intensity per unit product reached 20.18 kg/GWh, an 81% decline from 2020, also beating the targets. The company manages this through a list-based system for raw and auxiliary materials containing VOCs, combining source substitution (more low-VOC, eco-friendly coatings), process control (online environmental monitoring), and end-of-pipe treatment (upgraded exhaust and dust facilities). Wastewater is treated by tier and category so that discharges meet both national and local standards. As its pollution control system has matured, environmental compliance risk has steadily come down.

3.2.3. Resource Consumption

How tightly a company manages its resource inputs is itself a green performance indicator. On this measure, Sungrow has done better than most peers. Unit energy consumption fell from 0.0907 kg of standard coal per kW in 2021 to 0.0843 kg/kW in 2024, and ticked up slightly to 0.0851 kg/kW in 2025. The 10% reduction target set against 2020 was achieved a year early-by 2025 the cumulative cut was 10.2%. Back in 2020, Sungrow joined RE100, pledging to run all global operations on renewable power by 2028. It is well on its way: renewable electricity accounted for 35% of consumption in 2021, rose to 55% in 2023 and 70% in 2024, and reached 79% in 2025. The mix is being reshaped through three channels-company-owned PV plants, purchased green power, and green certificates-alongside ongoing energy-saving retrofits on the production line. A real-time energy management system monitors and dispatches power use at key stages; in 2025 alone it helped the company save nearly 4,000 MWh. Running on more renewable power does double duty: it cuts operational carbon emissions and, over time, reduces the power bill.

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3.2.4. Recycling

Waste recovery matters for two reasons: it lowers disposal costs and it lightens the environmental footprint. Sungrow has improved rapidly here. Non-hazardous waste utilization went from 52.3% (2021) to 60.1% (2023), then to 90% (2024) and 90.9% (2025)-well ahead of the internal target of 70%. Hazardous waste has been disposed of at 100% compliant rates throughout, with end-to-end tracking. Unit water use dropped to 0.53 kg/kW, 29% below 2020 levels, mainly through process tweaks and tighter water management. In 2025, the company also cut annual waste generation by more than 4,000 tons (via reusable packaging and similar measures), reduced hazardous waste by 60 tons through dedicated campaigns, and saved over 2,515 tons of water annually. The recycling infrastructure keeps improving, which is gradually embedding circular practices into how the factory runs.

3.2.5. Environmental Management

The institutional side of environmental management-how the company organizes, standardizes, and audits its environmental work-is what makes the operational improvements above stick. Sungrow frames this under its "Green Mission, Better Future" philosophy. Its ISO 14001 system now covers all operations, and a carbon accounting framework tracks Scope 1, 2, and 3 emissions. Carbon measurement extends beyond domestic factories to overseas plants and key suppliers; footprint assessments have been done for critical inputs. In 2025 the company upgraded its ESG data platform, which increased the share of data collected automatically and gave management better numbers to work with. Outside recognition has followed: MSCI and Wind both rate the company AAA on ESG. It was named to S&P Global's Sustainability Yearbook 2026 (top 5% in electrical equipment), the Fortune China ESG Impact List, and Corporate Knights' Global 100 Most Sustainable Corporations (ranked 12th worldwide, first in electrical equipment). EcoVadis Gold certification and National Green Factory / National Green Supply Chain designations round out the list. These rankings are not just PR-they reflect an environmental management system built on both technical investment and organizational discipline, and they reinforce the company's market reputation.

4. Conclusion

Sungrow's experience over 2021–2025 shows that green governance can produce measurable environmental gains: cleaner energy mix, lower unit energy and emissions intensity, and higher waste recovery. The MSCI AAA rating by 2025 is an external reflection of that progress. Financially, the company has held up despite a tough competitive environment. Storage-led growth has opened new revenue streams, while green technologies have brought manufacturing costs down and generated stronger operating cash flow, which in turn reduced leverage. The pattern across the period is consistent with a "front-loaded cost, back-loaded return" dynamic: the money spent on green R&D and efficiency upgrades in the early years is now coming back through lower operating costs, better pricing power, and easier financing. As trade rules like the EU CBAM tighten, these green capabilities are likely to become a competitive advantage rather than just a compliance burden. Green governance, on this evidence, is one of the main drivers behind Sungrow's high-quality growth.

Several implications follow. For Sungrow itself, continued R&D in efficient, low-carbon products is essential if the company wants to stay ahead on technology. The supply chain should be brought along too-extending ESG assessments to more suppliers will push decarbonization through the whole value chain. Disclosure should track international ESG reporting norms more closely, which strengthens trust with investors and customers. The company should also make fuller use of green financing instruments-green loans, green bonds-to fund the transition at lower cost. And product carbon footprint accounting and eco-design should be planned for now, so that EU-style disclosure requirements become a market advantage rather than a

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compliance headache. A note on limits: the study relies on publicly disclosed data, so not every internal green governance practice is visible; and the assessment covers financial and environmental performance more than social performance. Future work could broaden the sample, extend the time frame, and apply formal causal methods. Sungrow's case suggests that green governance and financial strength can go together, and it offers a reference point for other new energy manufacturers working through similar transitions.

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