The Impact of Green Economy on Corporate ESG Performance

Xintong Zhao

Department of Economics, China Agricultural University, Beijing, Chinam, 100107

Abstract. Nowadays, with the growing global focus on environmental sustainability, it is increasingly important to explore the relationship between the green economy and corporate ESG performance in order to ensure the harmonious coexistence of economic prosperity and environmental protection. This paper utilized the case study method to analyze LONGi Green Energy's ESG practices under the guidance of green economy policies. First, this paper provided a comprehensive summary and introduction of LONGi Green Energy's company profile and practice content. Second, it analyzed in detail the development of various aspects of LONGi Green Energy. It was found that the company significantly enhanced its environmental performance through resource management and improved its social responsibility indicators by optimizing employee welfare and community involvement. Meanwhile, the three-tier ESG governance structure facilitated corporate remediation. Finally, this paper recommended that LONGi continue to increase its investment in sustainable technology R&D, enhance ESG disclosure, and capitalize on policy opportunities to improve market competitiveness. This study contributed to enriching the research theory of green economy and corporate sustainability, and provided a reference for enterprises to formulate and implement ESG strategies to promote the realization of coordinated development.

Keywords: Green Economy, green economy policies, Corporate ESG Performance, corporate sustainability.

1. Introduction

With the rapid growth of the global economy, environmental problems are becoming increasingly serious. Climate change, the decline of biological species, environmental damage, and various social problems have become major global challenges that society and businesses have to pay attention to. In this context, it is particularly important to realize the green and sustainable development of the economy. On the one hand, the good development of economy provided a strong financial guarantee for the sustainable development of environment and society; on the other hand, “environmental protection” and “green” had gradually become an important strategic development direction for enterprises. According to Zhou et al. (2022), the green economy provided a sustainable development path for enterprises, in which digital finance played a key role in supporting the improvement of environmental, social, and governance aspects of enterprises and contributed to energy saving and emission reduction. The integration of the two promoted technological innovation and model innovation, and facilitated the green optimization and upgrading of corporate production chains. It also enabled enterprises to transform into a more environmentally friendly direction through the guidance of capital, forming a good green and sustainable economic development model.

In order to effectively quantify the sustainable development level of enterprises, this paper introduced ESG as an indicator to measure the development capability of the green economy. The ESG concept was first proposed by the United Nations Environment Program (UNEP FI) in 2004 in the research report Who Cares Wins. Due to the uniqueness of the ESG concept of integrating green and sustainable development into corporate governance, it quickly attracted widespread attention and in-depth practice in the field of green finance around the world once it was proposed (Liu &Xie, 2024). ESG plays an important role in the high-quality development of enterprises, which not only improves the image and credibility of corporate social responsibility but also brings more policy support and market advantages to enterprises (Li, 2024).

Environmental, social, and governance (ESG) provides a comprehensive framework for assessing corporate sustainability and has gained global attention (Reber et al., 2022). Since ESG was first proposed in 2004, the ESG concept is evolving and has evolved into a relatively well-developed system. Internationally, the ESG rating products of traditional large index companies are the mainstream of ESG research today, with the ESG products compiled by Bloomberg, Morgan Stanley Capital International (MSCI), Italy's ECPI, and Standard & Poor's being the most representative (Liu & Xie, 2024). However, according to Li (2024), some enterprises still treated ESG with insufficient cognition of related concepts, uneven practice levels, and low transparency of information disclosure.

Since the United Nations Conference on Sustainable Development (Rio+20) was held in Rio de Janeiro, Brazil, in 2012, the world gradually realized that the green economy is an important tool for achieving sustainable development. This is because during this period, many countries and regions began to carry out relevant practical activities, laying the foundation for the development of the green economy (Clemencon, 2012; Korhonen et al., 2018). In addition, in recent years, green economy-related topics had also been actively raised at the annual meetings of the Group of Twenty (G20), which represents the cooperation of the world's largest economies, highlighting the importance of this issue (Loiseau et al., 2016). The green economy is concerned with the long-term sustainability of the living environment for the next generation, which will inevitably have an impact on the financial performance of current enterprises (Cui, 2024).

Theoretical analysis showed that green finance could promote technological innovation in energy-intensive industries, reduce energy consumption, and promote low-carbon sustainable development (Chen & Shen, 2022). According to the analysis of provincial green finance development data, the development of green finance had a positive effect on the ESG level of enterprises in the region, and this effect was strengthened with the increase of green policy support (Zhang & Li, 2023). The development of green finance in Chinese cities also showed that the development of green finance could significantly increase the awareness of environmental protection among firms, prompting them to increase environmental protection investment and total factor productivity, which effectively reduced the carbon intensity of firms and further improved the ESG performance of firms (Zhang & Zhou, 2024). Zhou & Long (2023) results also showed that the implementation of green credit policy contributed to the high ESG performance of enterprises, and measures such as enterprises' green technological innovations also contributed to this performance.

While existing literature had explored the relevance of the green economy to corporate sustainability, most studies had focused mainly on exploring the role of ESG on corporate financial performance, and the lack of empirical analyses of green economy practices in emerging markets had limited the comprehensive understanding of ESG performance enhancement. This paper was dedicated to exploring in depth the impact of the green economy on corporate ESG performance by focusing on a specific company. It clarified how green economy policies could enhance ESG indicators through the three dimensions of environment, society, and governance, and revealed its specific practices in promoting renewable energy development, optimizing resource management, and improving employee welfare.

2. Corporate Profile and ESG Performance of LONGi

2.1. Background and Characteristics

This paper took LONGi Green Energy Technology Co., Ltd in Xi'an City, Shaanxi Province, China as an example to explore the effect of green economy development on corporate ESG performance. Founded in 2000, LONGi Green Energy is a solar energy technology company with great potential for development. Over the past two decades, LONGi Green Energy has been committed to promoting the development of renewable energy, with the mission of “making good use of the sun's rays to create a green energy world,” and adhering to the brand positioning of “steady and reliable, technology leading,” which indicates that the company has always prioritized the quality of products and the reliability of services, and actively promotes the development of the green economy.

Since its establishment, LONGi Green Energy has gone through several stages of development. Initially, the company focused on the semiconductor field and gradually transitioned to the silicon wafer era. In 2014, LONGi Green Energy focused more on the field of solar energy technology and rapidly captured the market. By 2022, the combined industry of photovoltaic and hydrogen energy enabled LONGi's annual production capacity to exceed 30GW, making it a leader in the industry.

LONGi Green Energy focuses on green energy, promotes PV technology change, advocates sustainable development, and is committed to promoting energy transformation. The company's main products cover five core areas: monocrystalline silicon wafers, battery modules, distributed photovoltaic solutions, ground-mounted photovoltaic solutions, and hydrogen energy equipment, forming a “green power”+“green hydrogen” product system to support global zero-carbon development. At the same time, LONGi is constantly innovating in the PV industry, providing solutions including centralized ground-mounted PV plants and distributed rooftop PV (including BIPV). They also plans to combine photovoltaic and pumped storage and is committed to forming a new model of photovoltaic power-driven photovoltaic manufacturing industry in coastal areas with abundant light resources. Since 2000, from the initial semiconductor era to the era of silicon wafers, from the era of solar energy technology to today's era of photovoltaic and hydrogen energy, LONGi Green Energy continues to practice its own philosophy and lead the world trend development.

2.2. Green Economy Practice Status and Evaluation

As a global leading PV company, LONGi Green Energy has outstanding ESG performance. Tables 1, 2, and 3 can conclude that the company is showing an upward trend in most of its ESG indicators. It was certified by the Science-Based Carbon Target (SBTi) in 2020.

LONGi Green Energy has deeply integrated the issue of sustainable development with the company's strategy and operation, and put forward the concept of “LIGHT” sustainable development for the first time. To cope with climate change, LONGi identified and managed climate risks and actively promoted energy saving and emission reduction in its production bases based on the guidelines of the Task Force on Climate-related Financial Disclosure (TCFD) and the International Financial Reporting Sustainability Disclosure Standard No. 2 - Climate-related Disclosure issued by the International Sustainability Standards Board (ISSB); it followed the “14th Five-Year Plan” and the “14th Five-Year Plan,” which were the guidelines of the International Financial Reporting Standards Board, insisted on clean production and economic emissions; meanwhile, LONGi actively managed water resources and protected biodiversity, becoming a leader in the industry in terms of climate action and biodiversity.

Table 1. Environmental performance from 2019 to 2023.

Year	2019	2020	2021	2022	2023
Major environmental violations (s)	0	0	0	0	0
Water reuse rate (%)	43.20	33.89	58.75	63.67	53.82
Proportion of electricity use from renewable sources (%)	49.67	41.83	40.19	47.18	31.1
Operational greenhouse gas emissions (tCO2e)	2212479	2573014	3151974	3088703	5079201

Since 2020, LONGi Green Energy has been committed to responding to the United Nations' Global Compact Corporate Responsibility Initiative. The company protected the well-being of its employees and safeguarded their basic rights and interests, and focused on employee development, formulated talent attraction strategies, paid great attention to employees' occupational health and safety. They always paid attention to community communication in the process of globalization and fulfilled its social responsibility through business innovation, public welfare donations, and employee volunteer services.

Table 2. Social performance from 2019 to 2023.

Year	2019	2020	2021	2022	2023
R&d investment. (100 million yuan)	16.77	25.92	43.94	71.41	77.21
Percentage of R&D revenue (%)	5.10	4.75	5.43	5.54	5.96
Organizational climate satisfaction (score)	/	89.10	90.56	91.12	91.97
Number of employees (persons)	32873	46631	49967	60601	75066
Staff Training (Person-time)	460401	736656	243504	479046	1278230
EHS training time per employee (hours)	/	/	39.66	36.59	37.38

LONGi's governance structure was scientific, efficient, and clearly defined. With the board of directors as the core governance body, the company strictly regulated the behavior of shareholders; it attached great importance to the information security and privacy protection of users based on the “Data Security Law of the People's Republic of China” and the European Union's “General Data Protection Regulation” (GDPR) and other relevant laws and regulations; it established and continued to optimize its risk management mechanism, and will continue to build the “Three Lines of Defense” to ensure stable and compliant operation of the company.

Table 3. Corporate governance performance from 2019 to 2023.

Year	2019	2020	2021	2022	2023
Operating income (100 million yuan)	328.97	545.83	806.08	1289.98	1294.98
Net profit attributable to shareholders of listed companies (100 million yuan)	52.80	85.52	90.6	148.12	107.51
Basic earnings per share (Yuan/share)	1.05	1.16	1.21	1.95	1.42
Total assets (100 million yuan)	593.04	876.35	977.35	1395.56	1639.69
Weighted average return on assets (%)	23.93	27.23	21.45	26.95	16.20
Integrity professional training and publicity series (frequency)	/	80	91	578	1205

3. ESG Performance Evaluation

3.1. Improvement in Environmental (E) Performance

Taking water resource management as an example, it can be seen from Figures 1 and 2 that LONGi's unit consumption of water during the period 2021-2023 decreased significantly compared with the base year, and the efficiency of water resource utilization improved significantly. This was mainly due to the fact that LONGi formulated a comprehensive Water Conservation Management System in accordance with the Water Law of the People's Republic of China and other relevant laws and regulations at home and abroad, part of which is shown in Table 4.

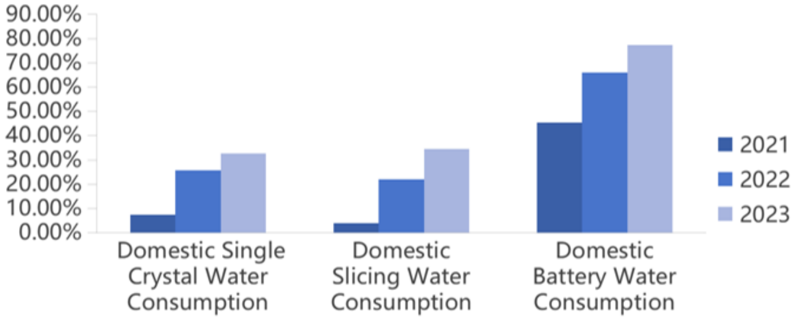

Figure 1. The reduction of water consumption compared with the base year in Longi.

Alt Text for the figure: A bar chart shows the company's three water consumption channels, with their water savings rising year by year from 2021 to 2023.

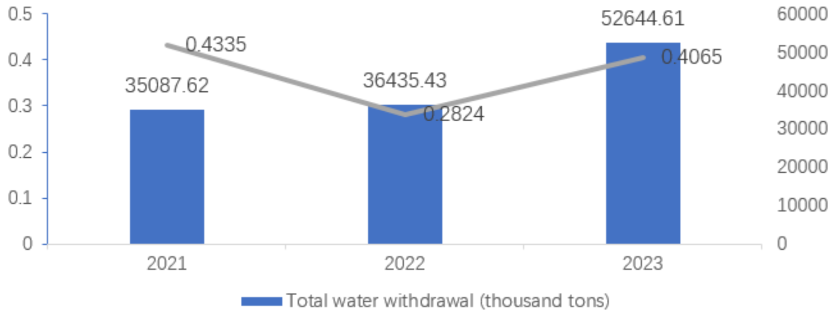

Figure 2. Water resources use statistics in Longi, 2021-2023.

Alt Text for the figure: A bar chart illustrating total water withdrawal in thousand tons from 2021 to 2023, showing an increasing trend, alongside total water intake density.

Table 4. Water-saving measures in Longi.

Water resources management measure	Implication
Centralized water reuse	Treat concentrated water to remove particulate matter
Reclaimed water	The treated wastewater is collected and distributed for multiple uses
Set water saving items	Develop management systems and water conservation policies
Rainwater recycling	Design rainwater collection system
Zero emission programming	Achieve zero discharge of sewage
Other water-saving technological transformation	Circulating water reuse and water equipment

This green system helped the Company to improve its environmental metrics by conducting an in-depth analysis of the water-saving potential of all production processes and taking measures such as exploring alternative water sources and optimizing capacity crop rates. In comparison, JinkoSolar, a well-known PV product manufacturer in its category, had a total water consumption of 62,146 kilotons in 2023 (JinkoSolar's ESG Report 2023), which was significantly higher than LONGi's 52,644 kilotons. This was due to the fact that JinkoSolar's relatively limited disclosure of its water management and water conservation policies failed to reflect its efforts in water conservation measures. This comparison further highlighted LONGi Green Energy's active practice and effectiveness in water resource management.

3.2. Improvement of Social (S) Indicators

LONGi Green Energy took systematic measures to improve its social (S) indicators through various dimensions such as employee welfare, diversity policy, community participation, supply chain management, and information transparency. Taking employee development as an example, Figure 3 below demonstrates the results of LONGi's survey on the satisfaction of the organizational climate of its junior management employees, and the data showed that the company's organizational climate was rising year on year, with a year-on-year increase of 0.93% in 2023 compared to the previous year. This trend reflected the company's good status in terms of employee rights and benefits and team management. This was attributed to internal policies such as the Employee Care Management Regulations and the Compensation Management System followed by LONGi, as well as support for employees' active participation in community environmental activities and public welfare programs.

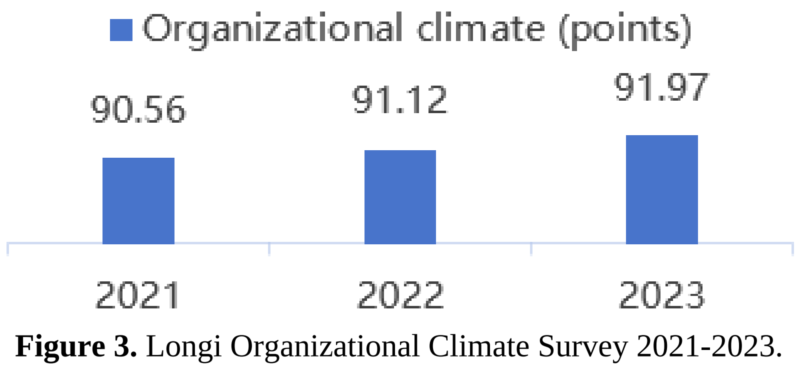

Figure 3. Longi Organizational Climate Survey 2021-2023.

Alt Text for the figure: A bar chart showing the yearly upward trend in employee satisfaction from 2021 to 2023.

By effectively improving employee satisfaction, LONGi reduced employee turnover, decreased recruitment and training costs, and at the same time motivated employees, thereby improving overall organizational efficiency. In addition, the increase in employee satisfaction and loyalty also positively affected the company's culture, helping to gain recognition from investors, which in turn improved the overall ESG score.

3.3. Optimization of Governance (G) Structure

In the context of LONGi Green Energy's governance structure optimization, the company significantly promoted the implementation of its green strategy through the establishment of a sustainable development governance structure. As shown in Figure 4, since 2021, LONGi Green Energy gradually established a three-tier ESG governance structure covering the corporate governance, management, and executive levels, and had basically reached a complete state in 2023. Under the effective operation of this governance structure, LONGi's green R&D investment made a significant leap between 2021 and 2022, growing by 69.5% and 62.5% respectively, far exceeding the annual increase in the previous two years. Meanwhile, operating income in these two years increased by 26.025 billion yuan and 48.39 billion yuan, respectively, compared with the previous year (Figure 5). In addition, the structure facilitated the company's integrity training and awareness series, with the number of trainings in 2022 dramatically increasing more than five-fold from the previous year. These positive changes indicated that this governance structure significantly enhanced the transparency of decision-making and the flexibility of project execution by regularly reviewing and evaluating the progress of green projects, which enabled LONGi Green Energy to achieve significant results in its green investments and further consolidate its sustainable development capabilities in the industry.

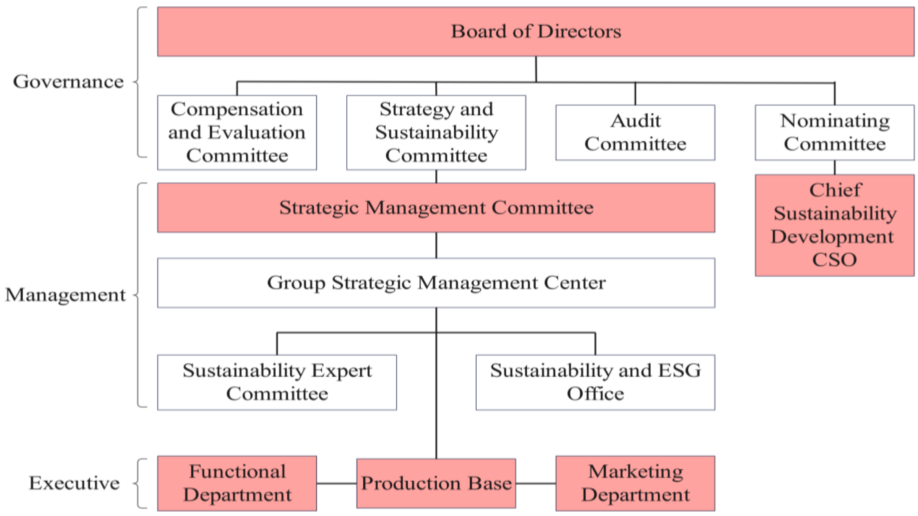

Figure 4. ESG governance structure and responsibilities at various levels.

Alt Text for the figure: A flow chart detailing the internal hierarchy of the company's three-tier ESG governance system.

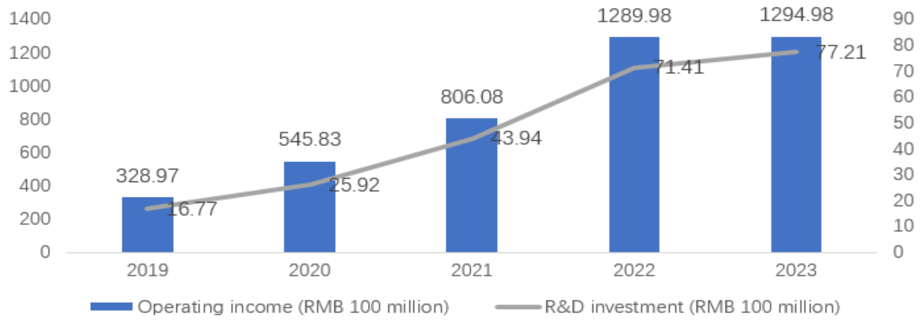

Figure 5. Operating income and R&D investment of Longji Green Energy.

Alt Text for the figure: The bar chart and line chart respectively reflect the annual rising trend of the company's operating income and R&D investment from 2019 to 2023.

3.4. ESG Rating Analysis

For the company's ESG development status, this paper adopted the authoritative ESG rating system to measure its performance in the areas of environmental protection, social responsibility, and corporate governance. Currently, Business Gateway to Green and CSI are among the few organizations that can independently develop and construct a complete ESG rating system and have significant influence in the field of sustainable investment and corporate governance. As shown in Table 5, LONGi Green Energy demonstrated positive ESG development trends in the assessments of both Shangdao Ronggreen and Huazheng, further validating its effectiveness and market recognition in green development.

Table 5. ESG rating of Longi Green Energy from 2018 to 2022.

Rating Agency	2018	2019	2020	2021	2022
Syntao Green Finance	B+	B+	B+	B+	A-
Huazheng Index	BB	BB	BBB	BBB	A

4. ESG Enhancement Strategies

4.1. Enhancing Strengths Through Strategic ESG Initiatives

First, LONGi Green Energy should continue to respond to the country's green economy policies to deepen its ESG practices. In terms of innovation and R&D, the green R&D investment that had been significantly increased laid the foundation for the company to maintain its leading position in the industry. It was recommended that LONGi should further increase its R&D efforts on sustainable technologies and products and explore the application of innovative new energy and low carbon technologies to improve the efficiency of renewable energy use. In addition, LONGi should continue to respond positively to the Science-Based Carbon Targets (SBTi) initiative and set clear energy-saving and emission reduction targets to achieve more efficient environmental management. In terms of social responsibility, employee satisfaction was high. It was recommended that LONGi should continue to optimize its internal employee welfare policy, set up an annual training and development budget, and implement a multi-level career development plan to enhance employee loyalty and trust. At the same time, LONGi should have continued to actively fulfill its social responsibility by launching more social responsibility-oriented projects, such as community environment improvement and sustainable development education activities, in order to enhance the Company's brand image and social influence.

4.2. Addressing Weaknesses: Enhancing ESG Transparency

As the ESG concept had become more popular internationally, more studies had begun to explore the correlation between ESG practices and corporate performance. Studies had shown that good ESG disclosure could significantly enhance the external trust of enterprises, reduce the cost of corporate debt, and expand investment and attract talent (Hamrouni et al., 2020). However, LONGi Green Energy may have had a gap in ESG disclosure compared with industry best practices. This deficiency may have affected its level of trust among stakeholders, which Lee et al. (2023) argued was prone to moral hazard induced by corporate development at the environmental level. Therefore, it was recommended that the company should have strengthened the disclosure and communication of ESG information. Specifically, LONGi should have published regular ESG reports detailing the results of its environmental, social, and governance practices and the challenges it faced, including various ESG indicators and improvement measures. In addition, the company should have actively utilized various channels, such as social media and the official corporate website, to strengthen interaction with stakeholders and enhance external trust and support.

4.3. Capitalizing on Opportunities for Market Expansion

LONGi Green Energy should have fully utilized the current good development opportunities and prospects. Firstly, in terms of policy support, considering the national decision to vigorously promote the green economy, the government's support for renewable energy had continued to increase. Therefore, LONGi should have actively assessed the dynamics of government policies, especially in the field of renewable energy, in order to participate in relevant green projects and advocacy to strive for green subsidies and tax incentives. Secondly, LONGi should have also actively expanded its international market and cooperation. This was because, with the deepening of globalization, the demand for green technology in the international market had become more robust. It was recommended that LONGi should have strengthened its research and analysis of the international market in order to identify potential investment opportunities and establish strategic partnerships with internationally renowned green enterprises to jointly develop green projects and enhance global competitiveness.

4.4. Mitigating Threats Through Strategic Market Awareness

In addition to good development opportunities, LONGi Green Energy should have also emphasized the avoidance of market risks. First of all, facing increasingly fierce competition in the industry, LONGi needed to take active coping strategies to maintain its market competitiveness and leading position. The company should have established a professional market research and competition analysis team to regularly assess the competitive situation in the industry and identify the strategies and market dynamics of its major competitors, such as optimizing product research and development, improving customer service, and upgrading brand image. In addition, LONGi should have implemented policy risk management to cope with the ever-changing domestic and international environmental policies. Specifically, it was recommended that the company should have set up a policy monitoring team to collect and analyze timely information on policy changes related to renewable energy, including subsidies, tax incentives, and environmental protection regulations. Under such circumstances, LONGi would have been able to quickly identify policy risks and formulate corresponding measures to flexibly respond to them, mitigating the negative impacts of policy uncertainties and ensuring the company's sustainable and healthy development and stable market returns.

5. Conclusion

This paper took LONGi Green Energy as the research object and explored the impact of the green economy on corporate ESG performance. This study summarized the development background and current status of ESG practices of LONGi Green Energy and analyzed the optimization of the company's overall ESG performance under the guidance of the green economy policy in the three dimensions of environment, society, and governance. Through specific data analysis, this study found that LONGi's performance in the environmental dimension had been significantly improved, with increased investment in green product R&D, the establishment of a unified environmental management system, and the realization of energy saving and emission reduction. At the same time, LONGi also excelled in social responsibility, paying attention to and making every effort to protect the rights and interests of employees and continuously improving and optimizing the employee welfare system. In addition, the optimization of the governance structure made the company more efficient in the implementation of its green strategy. In the future, LONGi Green Energy should continue to deepen ESG practices, adapt to the national green economy policy, further increase investment in sustainable technology R&D to enhance the company's competitiveness; strengthen the transparent disclosure of ESG information and actively communicate with stakeholders to enhance trust; and grasp the policy opportunities to expand the international market and do a good job in monitoring and responding to market risks to ensure sustainable development.

The innovation of this paper was that it adopted the research method of combining theory and practice and filled the research gap of specific regions and industries by selecting the specific case of LONGi Green Energy and analyzing it in depth. A multi-dimensional analysis framework was adopted and combined with empirical data and relevant policies to effectively demonstrate the coordinated development of the company under the guidance of the green economy. Meanwhile, practical policy recommendations were put forward to broadly enlighten other companies in the green transition.

Several shortcomings remained in this study. First, this paper only focused on one case, Longi Green Energy, which made it difficult to comprehensively reflect how the green economy specifically affected firms' value among all firms. Future research could be extended to more enterprises for a broader comparative analysis. Second, there may have been some selective bias in the acquisition of data in this paper because the acquisition of relevant information mainly relied on the company's sustainability reports and public information websites. Future research could combine more field interviews and quantitative data to make the conclusions more objective and comprehensive.

The research significance of this paper was reflected in both theoretical and practical levels. First, this paper aimed to enrich the theoretical research on the impact of the green economy on corporate ESG practices, as scholars had not yet reached a unified conclusion on this relationship. Secondly, the study helped enterprises correctly understand green development so as to actively practice ESG-related guidelines and improve long-term performance. At the same time, it also provided investors with new perspectives, which helped them make more scientific and reasonable investment decisions and maximize returns.

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