How Does Dual Carbon Policy Affect Selections of GLS Tools and Projects-Case Analysis of Fujian Zhongyu New Materials Technology Co., Ltd and Hunan Kaimeite Gases Co., Ltd

Mingyang Chen
Department of Economics, University of Nottingham Ningbo China, Ningbo, Zhejiang, China
**Corresponding Author*

Abstract: In recent years, many studies have indicated that green-lean and sustainability (GLS) methods can influence small and medium-size enterprises (SMEs) under the low-carbon policies. However, research on the relationship of dual carbon policy between the selections of GLS tools and projects in China is limited. This paper explores the effects of dual carbon policy to SMEs in identifying tools and projects of GLS by studying the comparative cases of Fujian Zhongyu New Materials Technology Co., Ltd and Hunan Kaimeite Gases Co., Ltd. are used to investigate the distinctions of GLS tools in two firms. News and other official documents related to the two enterprises will be provided to evaluate the identification under the dual carbon policy. Finally, this paper will compare the distinction between two enterprises when applying different tools and projects respectively, and indicate the limitations of this study.

Keywords: Dual Carbon Policy; Green-Lean-Sustainability (GLS); SMEs; Tool and Project Selection

1. Introduction

Currently industrialization has contributed to higher global greenhouse gas emission, amplifying climate impact as a substantial challenge[1]. The structural adjustment toward carbon peaking and carbon neutral is prompting social economy and well-being prosperously[2]. Advancing the green transformation can be supported by pursuing new-carbon initiatives and the "common prosperity" objective[2]. According to [The 2023 China SME Green and Low-Carbon Development Report], approximately 46% of SMEs' carbon emission in Chinese industrial sectors was estimated[3]. Moreover, further investigation in accelerating the green transition of small and medium-size enterprises is crucial for the related field[4]. However, present sample which from a wide range of regions to research concept of Green-Lean is limited[5]. Furthermore, with the limited sample size, more studies can be broadened in some less mature green-lean organizational settings[6]. It is necessary to analyse the developed progress of SMEs under the impacts of dual carbon policy. This paper examines two cases of Fujian Zhongyu New Materials Technology Co., Ltd and Hunan Kaimeite Gases Co., Ltd to explore their identification of tools and project based on publicly available policy documents, company reports, and news materials under the policy context in China.

2. Literature Review

The development of green-lean and sustainability is essential for firms to seek strategies under growing environmental pressure. The combination of green and lean strategy may affect supply-chain procedures across multiple functions[6]. With the aim of various sustainability, a GL2S method incorporating Lean Six Sigma and Green is acknowledged[7]. The survival pressure of SMEs indicates that the principles of green, lean and sustainability need to be adopted in an accessible and refined manner, integrating with features of SMEs[8]. Sustainability coordination is increasingly required to emphasize operational implement, supported by regulatory mechanism[5]. It is essential for the social dimension to be more systematically integrated into sustainable development [5]. Five-phase framework (RCPES) is substantiated by empirical findings to merge Green-Lean and Sustainability and highlight the their effects in enduring environment, economic and social sustainability among SMEs[5]. However, existing studies need more evidences for further exploration. The number of interview participants was relatively

limited[5]. Moreover, the data of this research were collected in German, further studies are needed in other locations to assess the generalizability of framework[5]. Siegel et al.[5] offered a staged approach to support SMEs in different industries under persistent constrains of budgets and resources. The RCPES framework was validated by seven industry professionals, whose feedback was supportive, confirming its five phases and 20-step procedures[5].

The proposal of the "dual carbon" goals, together with the green low-carbon development framework, demonstrate the commitment of China to green development and climate-change mitigation which contribute to global sustainable governance[9]. Under the background of the dual carbon policy, it is necessary to restructure and optimize the concepts, contents, and pathways of engineering talent cultivation in China[1]. In the context of China, it is essential for SMEs to ameliorate implementation mechanism to be compatible with extensive sustainability objectives. Zhang and Tan[3] indicate that optimizing Green Finance Pilot Zone policies and providing support to focused SMEs has a positive effect on enhancing emission-reduction outcomes and facilitating the transition of SMEs from emission-intensive production to low-carbon development. Additionally, financial institutions are advised to standardize certification for green project, harmonizing with Green Financial Pilot Zone policies to advance green and low-carbon transition[3]. Meanwhile, green-investing firms can construct supply-chain mechanism by forming alliance governance to accelerate cost-sharing process across the supply chain[9]. However, the green transition of SMEs also needs internal projects. With stricter restriction and higher transition costs, enterprises in pollution-intensive industries may be more dependent on the collaboration between financial technologies and green finance[4]. Furthermore, the unified portfolio of tools within lean, green and sustainability is still inadequate, which tools are underdeveloped and have limited acceptance across the sectors[8].

3. Analytical Framework and Case Evidence

3.1 The Classification of GLS Tools and Projects

The concept of adopting green and lean tools is crucial for the social development. From the exhibition of investment pattern in European and America, the sustainable assessment criterion classify ESG elements as an essential part[10]. By motivating firms to improve green investment and shorten deployment of green technologies, ESG guidance increases the effectiveness of green innovation and foster the adaption of low-carbon transition[10]. The varieties of green-lean and sustainability projects should be categorized. Informed by the project loan amounts, the Green Credit Statistical Table published by the China Banking Regulatory Commission in 2013 covered energy saving, clean energy, pollution treatment into green sectors[11]. Additionally, Green Bond Supported Project Catalogue (2015 Edition) formulated by the People's Bank of China (PBoC) encompassed emission reduction and recycle of resources and other important dimensions to strengthen green bond[11]. In terms of GLS tools, enterprises should emphasize it and divides its effects. Xie and Han[12] indicates that optimizing different bundles of green activities, enhancing partnership with other green firms and promoting digital capabilities are three practical recommendation of tools for enterprises. Overall, a concentration on social demand and advocacy for environment performance and methods diffusion for green transition play central roles for employing GLS tools and projects in firms.

3.2 Case Studies of Two SMEs

This paper will adopt two representative Chinese small and medium-sizes enterprises cases in background and organized construction aspects, and contrast their differences in GLS tools and projects to reflect the effects of dual carbon policy on selection of managers on GLS tools and projects. The 14th Five-Year Plan for Promoting the Development of Small and Medium-Sized Enterprises (SMEs) emphasizes that 43.31 million enterprises were recorded among more than 140 million market entities at the end of 2020, which SMEs accounts for 95.68% of the above-designated-size enterprise population[13]. In addition, Working Guidance For Carbon Dioxide Peaking And Carbon Neutrality In Full Faithful Implementation Of The New Development Philosophy suggests that an approach aimed at green and low-carbon improvement is validated by Chinese government[14]. Hence, the analysis of GLS tools and projects in several SMEs under the

policy pressure is fundamental.

3.2.1 Fujian Zhongyu New Materials Technology Co., Ltd.

As reported by Lin[15], located in Xianyou county in Fujian province, Zhongyu New Materials Technology Co., Ltd targeted at artificial leather industry. According to the administrative manager Zhang Wuxiang of the firm, the businesses of the firm included long-term development of manufacturing polyurethane synthetic leather materials for sports footwear[15]. The certification to the company mainly contains ISO 9001 and ISO 14001[15]. Moreover, some official designations such as the national "Little Giant" specialized and sophistical SME and provincial-level Green Factory , was awarded to Zhongyu New Materials Technology[15]. These facts imply that the firm which receives national environmental attention prioritizes the corporation of green technologies and quality evolution. In recent years, the company supplied products for some famous enterprises, such as Nike, Adidas and Anta[15]. From the R&D center manager Huang Jiao, the investment of upgrading process optimization in advancing polyurethane synthetic leather materials is enduring and increasing[15]. Furthermore, resources recycling, cleaner production, solvent-free, environmentally friendly formulation and other fields are explored by Zhongyu New Materials to improve economic benefits over the last several years[15]. These characteristics suggest that the competitive advantages of Zhongyu depend on the technologies innovations which highly correlated with environmental materials under the dual carbon policy.

The selection of GLS tools for Zhongyu New Material may be a method or a system which can benefit the corporation of low-carbon development and business within the enterprises. As is mentioned in Central Committee of the CPC and the State Council, the expansion of cleaner production and advancements of emission control are called for by the government. A news released by Lin[15] indicates that ISO 9001 and ISO 14001 are two of several accreditation gained by Zhongyu New Material. The standards for ISO 9001 and ISO 14001 are respectively about quality and environment management[17,18]. The requirements of Green Factory include the absence of incidents about environments and qualities within 3 years[19]. This indicates that the baseline of green factory is the assurance of environment protection and quality control. For ISO 14001, "green" signs will be given to the companies within the qualification, capitalizing the surging amount of consumers who prefer to green commodities[20]. In addition, the qualification may attribute that firms possess stronger management and advanced high-quality system[21]. These studies suggests that ISO 14001 as well as ISO 9001 benefit to develop the supply of green and high quality level products in the markets. Thus, it is likely that the achievement of building ISO 14001 and ISO 9001 regime responds the lean requirement and dual carbon policy. This may highlights that the conjunction with quality and environment protection is emphasized as a goal into the developing system in Zhongyu New Material with the propulsion of policy. Additionally, this information may be interpreted that the two systems establish a robustness in using renewable energy, which contributes to the sustainability.

Another tool of this enterprises is digital capability system. Under Chinese carbon agenda, several requirements may be presented for green developments. According to Lin[15], by adopting ERP system, Zhongyu New Materials can select partner with multiple assessment. Enterprise resource planning (ERP) is a system which designs to centralize data and business workflow across the whole departments of the enterprises[22]. The optimization of energy management and the enhancement of system for tracking key energy consumption is mandated with the effects of dual carbon policy. The traceability which can chase the product flows may be established in the ERP mechanism to enable the certification about low-carbon to be easier. Therefore, the establishment of ERP which utilize data collection from different departments may follow the official prescription, which captures the lean ability of the enterprise. Additionally, ERP system reinforces the criteria of partners to ensure the products to conform official green and sustainable specification.It also reflects Zhongyu New Material regulates the benchmarks of dual carbon policy.

Under the dual carbon policy, Zhongyu New Materials incorporates energy-efficient and environmentally sustainable projects to develop productive effectiveness and reduce pollution. In 2024, Zhongyu New Materials initiated a rooftop

distributed photovoltaic (PV) system to reduce carbon and increase green sustainability, which project was executed jointly by Huawei and Taiyang New Energy[23]. Spanning approximately 23,000 m², the project adopts operating schemes, in which surplus electricity is injected into the grid[23]. It can be inferred that the actions of selecting PV system conform to the direction of green economy and target to leverage sustainable energy, which may address double-carbon policy and enforce the social requirement. Notably, Evidence from Fujian Provincial Department of Industry and Information Technology[24] shows that the transformation of PV system which will save 1086 tonnes of standard coal equivalent a year after finishing the project was supported by the funding of local government. One possible explanation is that the PV project can improve the integration of green-lean and sustainability, which may align with dual carbon policy objectives, so the official funding can be provided to reinforce the renovation. Actually, the implement of PV system is a project. As reported by Lin[15], the provincial-level green factory by official has given to the firm. Correspondingly, the principle of green factory tiered cultivation seeks to promote the regional and industrial restructuring for green-lean and low-carbon[25]. Thus, it is likely that the PV system may prompt the production process to maintain regulatory compliance. Besides, the PV system implemented in producing leather might increase efficiency, which can adjust to the exported demand of large enterprises.

The second GLS project of Zhongyu New Material is also correlated with dual carbon policy. 22 projects were incorporated into Fujian's 2025 provincial program aiming at energy saving, which production equipment renovation of Zhongyu New Material was comprised of the list[26]. Drawing on the file of Fujian Provincial Department of Industry and Information Technology[26], a 20 t/h natural-gas-fired boiler was commissioned to substitute a coal-fired boiler in order to cleaner process, with annual energy conservation of 561 tons of standard coal equivalent. It follows that the replacement of coal with natural gas reduces the air pollution to protect environment, as well as utilizes the sustainability of machines. The Implementation Plan for Fujian Province's Key Industrial Energy-Saving retrofits and Upgrading of General Equipment demonstrates that one of the aims of upgrading equipment is to enhance process of dual carbon achievement[27]. Therefore, the dual carbon agenda advances the environmental improvement as a compulsory requirement, which enables the enterprises to use facilities with green standard. Under the intervention of dual carbon policy, the optimization of equipment in Zhongyu New Materials is a project which shifted to the green-lean and sustainable development pathway.

A comparison between PV project and production equipment renovation suggests that Zhongyu New Materials selects GLS projects in distinct aspects. The sustainability is shown by deploying solar energy in the PV project. In contrast to the PV project, the replacement of cleaner energy machines aiming at reducing the consumption of coal energy majorly focuses on preservation of green environment.

Under the driving force of tools and projects, Zhongyu New Material gains some significant achievement. Firstly, according to Zhang Xiangwu, administrative manager at Zhongyu New Materials, the yields of total output reached 540 million by manufacturing exceeding 13 million meters synthetic leathers in 2022[15]. Furthermore, the Zhongyu New Material was featured in the 2025 Green Factory list[28]. It can be seen that Zhongyu New Materials achieves ambitious results in terms of economic outputs and national certification. The transition of green-lean producing procedure is acknowledged by government. Overall, these GLS tools application contribute to economic benefits and reputation for the enterprise.

3.2.2 Hunan Kaimeite Gases Co., Ltd

Hunan Kaimeite Gases Co., Ltd was established in Yueyang in 1991, which current orientation are collaborated developments between electronic specialty and basic traditional business[29]. By satisfying certificated procedures, the food-liquid CO_2 products of the company have been accredited by Coca-Cola and PepsiCo[29]. These facts may suggest that the products of the company have superior quality and gain the recognition of large brands in the competitive market. The Shenzhen Stock Exchange approved the listing of the enterprise with the name Kaimeite Gas, with the total issued share capital attains roughly 714.16 million shares[29]. Notably, some designations such as Provincial High-tech Enterprise and provincial-level Green Factory are qualified to

the Hunan Kaimeite Gases[29]. This suggested that as a publicly listed firm, the company implement some green-lean and sustainable activities to seek the official certifications.

The Kaimeite Gases Co., Ltd applied several tools to translate dual carbon policy into practice. The first tool is a kind of low-carbon method. The integration of circular economy method, resource recovery are the technical route of the firm, which enable numerous patents such as specialty gases and gas separation to be obtained[30]. To supply useful inputs for sustainable production, off-gases and flare gas are recovered and converted by Kaimeite Gases[30]. The company maps the business processes onto the mechanism in the adoption of tools. The recovered utilization of off-gas promotes the production of commodities such as hydrogen and fuel gas building on liquid CO_2 and dry ice operations[30]. In this context, the tool not only reduces the damage caused by off-gas but also streamlines the harness of resource inputs, which demonstrates the green-lean and sustainability of the enterprise. Correspondingly, some government requirements were established to drive the low-carbon actions of the enterprises. To improve the efficiency of mode of energy use, building on the architecture of low-carbon source and security is essential for the society[14]. From this, it can be inferred that the application of tools in Kaimeite Gases may be propelled by the energy of the policy regulating the low-carbon principles. Overall, as the policy takes effect of protecting environments, the small and medium-size enterprises may choose some tools related to waste repurposing.

The second tool refers to multiple management within the enterprise. The identifications of hazard sources, environmental impacts, and OHS risks are consistent into Integrated Management System (IMS) and Occupational Health and Safety documentations[30]. To reduce the damage of chemical products, an annual safety inspection program was supported by checklists to implement dynamic evaluations[30]. Secondly, dedicated staffs have responsibility for stewardship the safe facilities to keep their proper functioning[30]. Within the system framework, the aims of IMS depend on cohesive integration between different departments to decrease structural friction[31]. The practices about managing products can mitigate the frequency of happening incidents, which may minimize the pollution of chemical substances and enhance the energy utilization. Additionally, fewer conflicts within the enterprise can develop the efficiency of screening clean energy. The tool may reveal the characteristics about green-lean and sustainability. Therefore, the threats posed by chemical products to environments may decrease in order to secure the green and sustainable developments which follow the official laws.

In addition to GLS tools, some projects are also implemented within the Kaimeite Gases under the effects of low-carbon policy. The kaimeite gases was choose by government to be included in the first batch of “Little Giant” enterprises under China’s “SRDI” program[32]. Upstream waste gas is retrofitted by utilizing patented resource recovery methods to manufacture high-quality products and recovered products[30]. This information may suggest that under the press of the policy, the enterprise can pay more attention to develop green projects. Stricter low-carbon policy construct higher standards for the enterprise, which may enable it to select environmental projects to gain higher benefits and mitigate producing costs. Additionally, the reputation of “Little Giant” may attract more partners and resources about green developments in the market, which can trigger the firm to shift to recycling and reuse of energy. The tax intensives may construct the primary driver for green production and development of the Kaimeite gases. The company reports that 70% VAT rebate treatment stipulated under the regulations is granted for high-purity CO_2 and industrial hydrogen derived from off-gases[30,33]. Overall, dual carbon policy can provide economic and resource advantages to stimulate the enterprise to move toward green productions.

Another GLS project is related to process utilization. Energy-saving optimization retrofit project for the CO_2 unit was selected to receive the honor as Hunan “Manufacturing Powerhouse” transformation and upgrading project category[34]. The work primarily concerned with constructing a third line of production on the basis of existing system, which allowed three lines to switch to produce aiming at lower energy consumption and carbon pollution[35]. The utilization of process might increase the efficiency of production with lower energy and decrease the carbon emission during the process, which presents the features about green-lean and

sustainability in the project. Estimated annual benefits encompassed energy saving of 603,900, reduction of oxygen costs which is approximately 200,000 CNY, and 602.08t/a decrease in CO_2 emissions[36]. Although was accepted for review in 2018, whereas the formal approval of project was in 2021[35,36]. This information may suggest that under the stress of dual carbon policy, the approval of GLS projects may be accelerate by local government. The firm may be more willing to implement the energy-saving optimization retrofit project to decrease costs and increase the benefits.

The outcomes of Kaimeite Gases is significant after using GLS tools and projects. The list of the 2022 reassessment of the Provincial Green Manufacturing System Demonstration Units included Hunan Kaimeite Gases as No.100[37]. In economic term, the forecast is positive after applying the tools and projects. According to annual earnings forecast, the transition from a net loss to a state of profitability may be indicated[16]. In the short run, the investment in the GLS tools and projects may reduce benefits. However, long-term development may be affected by advanced GLS tools and projects positively, which can enhance profit performance.

4. Discussion and Limitations

In conclusion, this section mainly focuses on the comparison between Fujian Zhongyu New Materials and Hunan Kaimeite Gases. In terms of GLS tools, based on the case evidences, the applications of Zhongyu New Materials tends to use digital systems and international criteria to attain green-lean and sustainable governance. The Hunan Kaimeite Gases adopts tools about recycling energy and multiple systems to manage and control risks. Compared with the managerial characteristics of Zhongyu New Materials, Hunan Kaimeite gases mainly focuses on cooperating different systems and improving energy efficiency. Regarding the GLS projects, Zhongyu New Material shows a preference for renewable energy projects, whereas Kaimeite Gases is concerned with the low-carbon energy projects. As a result, the GLS tools and projects in Zhongyu New Materials are mainly more aligned with lean development through green and sustainable activities; the GLS tools and projects facilitated in Hunan Kaimeite Gases focus on constructing environmental and sustainable production process coordinated with lean management utilization. In addition, the distinctions of businesses across different firms may affect types of tools and projects within the framework of low-carbon policy. Overall, with diverse characteristics and levels of exposure to dual carbon policy, firms may select varied tools and projects to adjust to the market environment.

However, this study still has some limitations. First of all, this analysis primarily relies on media reports and annual reports of companies, which may lack the explicit data on operational performance during the GLS tools and projects application process. Secondly, only two provincial companies in China were examined to demonstrate the effects of dual carbon policy on the selections of companies, which lacks in generality. Moreover, the two cases are respectively in Fujian and Hunan, which conclusions might not directly extend to less-developed regions. Finally, the other factors in enterprises which may have the same impacts like GLS tools and projects still need to discuss and control under the policy pressure. Future studies can adopt cases from wider range of regions and compare the different performance indicators of a firm over multiple years across the GLS tools to analyse the influences of policy on GLS tools.

References

[1] Wang, W., Lin, A., Zhang, Y., & Yang, Z. (2023). Exploration and practice of course construction based on“dual carbon”policy: Take Environmental Economics course for example. *Modern Chemical Research*, (15), 146–149.

[2] Research Group of National Institute of Development Strategy at Wuhan University. (2022). Path choice for China to implement green low-carbon transformation and achieve carbon neutrality. *China Soft Science*, (10), 1–12.

[3] Zhang, Z., & Tan, Q. (2026). Does Green Finance Promote Green and Low-carbon Development of Inclusive Business Entities?—Empirical Evidence from Listed SMEs in China. The Theory and Practice of Finance and Economics. Advance online publication.

[4] Zhang, C., Liu, Y., Liu, C., & Zhu, W. (2025). The impact of FinTech–green finance synergy on SMEs’green transformation. *Finance and Accounting Monthly*, (15), 32–40.

[5] Siegel, R., Antony, J., Govindan, K., Garza-Reyes, J. A., Lameijer, B., & Samadhiya, A. (2024). A framework for the systematic implementation of Green-Lean and sustainability in SMEs. *Production Planning & Control, 35*(1), 71–89.

[6] Duarte, S., and V. Cruz-Machado. (2019). Green and lean supply-chain transformation: a roadmap. *Production Planning & Control 30*(14):1170–1183.

[7] Cherrafi, A., S. Elfezazi, K. Govindan, J. Arturo Garza-Reyes, K. Benhida,and A. Mokhlis. (2017). A framework for the integration of Green and Lean Six Sigma for superior sustainability performance. *International Journal of Production Research 55*(15): 4481–4515.

[8] Siegel, R., Antony, J., Garza-Reyes, J. A., Cherrafi, A., & Lameijer, B. (2019). *Integrated Green Lean approach and sustainability for SMEs: From literature review to a conceptual framework. Journal of Cleaner Production, 240*, 118205.

[9] Liu, H., & Sun, Y., (2024) *The supply Chain Cost Sharing of Enterprise Green Investment*]. *Economic Management (Jingji Guanli) , (9),* 168-187.

[10] Wang, F. (2024). Enterprise ESG Performance and Low-Carbon Green Transformation: Effect Evaluation Based on the Support of Financial Policy Instrument. *Contemporary Finance & Economics*, (1), 152-164.

[11] Gu, L., Pei, Q., & Bai, Q. (2018). A Comparative Study of Green Industry & Project Criteria. *Environmental Protection, 46*(10), 25–31.

[12] Xie, X., & Han, Y. (2022). How can Local Manufacturing Enterprises Achieve a Luxuriant Transformation Green Innovation? A Multiple-case Study Based on Attention-based View]. *Guanli Shijie (Management World)*, (3), 76–102.

[13] Ministry of Industry and Information Technology of the People's Republic of China; National Development and Reform Commission; Ministry of Science and Technology of the People's Republic of China; Ministry of Finance of the People's Republic of China; Ministry of Human Resources and Social Security of the People's Republic of China; Ministry of Agriculture and Rural Affairs of the People's Republic of China; Ministry of Commerce of the People's Republic of China; Ministry of Culture and Tourism of the People's Republic of China; People's Bank of China; General Administration of Customs; State Taxation Administration; State Administration for Market Regulation; National Bureau of Statistics; China Banking and Insurance Regulatory Commission; China Securities Regulatory Commission; China National Intellectual Property Administration; China Council for the Promotion of International Trade; All-China Federation of Industry and Commerce; China Development Bank. (2021, December 17). *Notice on issuing the"14th Five-Year Plan"for promoting the development of small and medium-sized enterprises*. https://www.miit.gov.cn/zwgk/zcwj/wjfb/tz/art/2021/art_bed2939fdf834bb7872f3aaaf29673ed.html

[14] National Development and Reform Commission. (2021, October 24). *Working guidance for carbon dioxide peaking and carbon neutrality in full and faithful implementation of the new development philosophy.* Department of Resource Conservation and Environmental Protection. https://en.ndrc.gov.cn/policies/202110/t20211024_1300725.html

[15] Lin, P. (2023, August 22). *Zhongyu New Materials: Building on "specialized, refined, distinctive, and innovative"strengths to become an industry vanguard.* Dongnan Net. https://fjnews.fjsen.com/2023-08/22/content_31392079.htm

[16] Hunan Kaimeite Gases Co., Ltd. (2026, January 21). *2025 annual performance forecast* [PDF]. CNINFO. https://static.cninfo.com.cn/finalpage/2026-01-21/1224941311.PDF

[17] International Organization for Standardization. (2015a, September). *ISO9001:2015 quality management systems—Requirements.* https://www.iso.org/standard/62085.html

[18] International Organization for Standardization. (2015b). *ISO14001:2015 Environmental management systems—Requirements with guidance for use* (ISO Standard No. 14001:2015). https://www.iso.org/standard/60857.html

[19] State Administration for Market Regulation & Standardization Administration of China.

(2018). *General principles for assessment of green factory (GB/T 36132-2018).*https://yhp-website.oss-cn-beijing.aliyuncs.com/upload/files/GBT%203613 2-2018%20%E7%BB%BF%E8%89%B2%E5%B7%A5%E5%8E%82%E8%AF%84%E4%BB%B7%E9%80%9A%E5%88%99.pdf

[20] Wu, L., Yu, Q., & Ping, J. (2023). The Roles and Limitations of Voluntary Environmental Regulation in the Green Transformation of Chinese Manufacturing Firms. *Finance & Trade Economics, 44*(4), 140–156.

[21] Zhao, Y., & Qi, N. (2023). Centrality, technical influence and Firms' Sustainable Innovation—The Moderating Role of Environmental Responsibility and Corporate Resilience. *Management Review, 35*(10), 105–117.

[22] Kumar, K., & van Hillegersberg, J. (2000). *ERP experience and evolution. Communications of the ACM, 43*(4), 22–26.

[23] Huawei Digital Power. (n.d.). *PV + Zhongyu New Materials: Huawei supports the green upgrading of a "Little Giant" specialized enterprise.* Fusion Solar. Retrieved February 24, 2026, from https://solar.huawei.com/cn/cases/commercial-industrial/storie63/

[24] Fujian Provincial Department of Industry and Information Technology. (2024, July 24). *List of 17 provincial key industrial energy-saving retrofit projects; Excel spreadsheet.*http://gxt.fujian.gov.cn/zwgk/zfxxgk/fdzdgknr/gzdt/202407/P020240731639387224318.xlsx

[25] Ministry of Industry and Information Technology of the People's Republic of China. (2024, January 30). *Interim measures for gradient cultivation and management of green factories.* Xinhua Net. https://www.news.cn/enterprise/20240130/e61fe24c9b394dd6a616edf24d9e5e5f/c.html

[26]Fujian Provincial Department of Industry and Information Technology. (2025, December 8). *Fujian Liheng Nylon Industrial Co., Ltd. polymer extraction process MVR retrofit and 22 provincial key industrial energy-saving retrofit projects* [Data set; Microsoft Excel spreadsheet]. http://gxt.fujian.gov.cn/zwgk/zfxxgk/fdzdgknr/gzdt/202512/P020251217378539394964.xls

[27] Fujian Provincial Department of Industry and Information Technology. (2025, December 17). *Notice on announcing 22 provincial key industrial energy-saving retrofit projects, including the MVR retrofit of the polymer extraction process at Fujian Liheng Nylon Industrial Co.,Ltd.* https://gxt.fujian.gov.cn/zwgk/zfxxgk/fdzdgknr/gzdt/202512/t20251217_7047273.htm

[28] Ministry of Industry and Information Technology of the People's Republic of China. (2026, February 5). *Public notice of the list of green factories and green industrial parks (2025).* https://www.miit.gov.cn/zwgk/wjgs/art/2026/art_3a21aeedde284fe99b12e42703deb0bd.html

[29] Hunan Kaimeite Gases Co., Ltd. (2024, March). *2023 Corporate Social Responsibility Report [Report]*. https://www.hnqlw-csr.com/uploads/20240412/d7933577995e844d65928e038d278525.pdf

[30]Hunan Kaimeite Gases Co., Ltd. (2025). *2025 semiannual report.* Sina Finance. https://money.finance.sina.com.cn/corp/view/vCB_AllBulletinDetail.php?id=11266315&stockid=002549

[31] Karapetrovic, S., & Jonker, J. (2003). Integration of standardized management systems: Searching for a recipe and ingredients. *Total Quality Management & Business Excellence, 14*(4), 451–459.

[32] Ministry of Industry and Information Technology. (2019, June 5). *First batch list of specialized and sophisticated "little giant" enterprises* [WPS attachment]. Hubei Provincial Department of Economy and Information Technology. https://jxt.hubei.gov.cn/bmdt/ztzl/zjtx/zcwj/202210/t20221001_4331153.shtml

[33] Ministry of Finance & State Taxation Administration. (2021). *VAT preferential catalogue for comprehensive resource utilization Products and services (2022edition)* [Attachment]. https://shanghai.chinatax.gov.cn/zcfw/zcfgk/zzs/202201/P020220107380765870650.pdf

[34] Hunan Kaimeite Gas Co., Ltd. (2022, March). *2021 social responsibility report.* https://static.cninfo.com.cn/finalpage/2022-03-18/1212609292.PDF

[35] Yueyang Municipal Bureau of Ecology and Environment. (2021, August 4). *Public notice of approval for the energy-saving*

optimization retrofit project of the carbon dioxide unit. https://hbj.yueyang.gov.cn/6824/23623/24072/content_1841395.html

[36] Yueyang Environmental Protection Bureau. (2018, December 24). *Proposed approval announcement for Hunan Kaimeite Gas Co., Ltd.'s carbon dioxide unit energy-saving optimization and renovation project.* https://hbj.yueyang.gov.cn/12235/12237/12245/content_1461023.html

[37] Hunan Provincial Department of Industry and Information Technology. (2023, January 13). *Notice on the publication of the review results of demonstration units in the green manufacturing system for 2022.* https://gxt.hunan.gov.cn/xxgk_71033/tzgg/202301/t20230113_29183265.html

